FAIR OAKS BOULEVARD
COMPLETE STREET MASTER PLAN
HOWE AVENUE TO MUNROE STREET

SACRAMENTO COUNTY

Adopted December 13, 2017

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NO PARKING

EXECUTIVE SUMMARY

Sacramento County received a Bicycle and Pedestrian Grant from the Sacramento Area Council of Governments (SACOG) in 2014 to study and implement pedestrian crossing improvements along Fair Oaks Boulevard. This master plan will allow the County to explore and plan for the long term vision of the corridor and design a compatible near term pedestrian crossing project.

Fair Oaks Boulevard has six lanes and carries over 30,000 vehicles per day within the project limits. Fair Oaks Boulevard is four lanes at the American River and east of Munroe Street. Fair Oaks Boulevard also has two frontage roads, each with two lanes in each direction and limited parking, between University Ave and Fulton Ave. At its widest Fair Oaks Boulevard has 11 lanes for automobiles, and unlike many complete streets projects, creates a rare opportunity to enhance the roadway for all users without significant widening or right of way acquisition.

The project segment is a vibrant mixed use corridor and activity center. There are many destination points along this corridor including the Pavilions, Loehmann's Plaza, Lyon Village, and University Village shopping centers, in addition to many popular restaurants and retail shops. There are also several apartment complexes and office buildings including the Kaiser Permanente medical offices. Travel behavior data showed that approximately 60% of trips using Fair Oaks Boulevard start or end locally (i.e. within ½ mile of the corridor). Many of these automobile trips could be replaced with walking and bicycling if local residents, employees and shoppers had better connectivity and felt safe doing so.

To better understands the needs of the various users along the project corridor selected complete streets elements were combined to create corridor concepts around a basic theme or goal. These concepts were compared, contrasted and vetted with project stakeholders and the community at public workshops, County Planning Advisory Council (CPAC) meetings, and small working group meetings.

After receiving input from the stakeholders and the public, conducting additional traffic analysis, and creating a planning level cost estimate, a preferred phased alternative was developed. The immediate improvements would be to add two new pedestrian only signals near the Pavilions shopping center and Loehmann's Plaza. The improvements would include bulb-outs at the frontage roads, high visibility crosswalk treatments of the frontage roads, pedestrian refuge islands at the medians, and pedestrian actuated signals that would stop traffic on Fair Oaks Boulevard.

The second phase and longer term improvements include new traffic signals to be added at the University Avenue / Fair Oaks Boulevard and Fulton Avenue / Fair Oaks Boulevard Intersections in addition the previously installed pedestrian signals. Significant changes would be made at the Munroe Street / Sierra Boulevard intersection to accommodate new northbound traffic coming from Fulton Avenue. The outside travel lane on Fair Oaks Boulevard will be converted to separated bikeways (Class IV) along with green paint conflict marking to accommodate bicycle riders.

Average travel time will increase with the short-term and long-range improvements. With the short-term improvements, average travel time will increase by about 30 seconds (eastbound and westbound) due to the addition of the two pedestrian signals. With the long-range improvements, average travel time will increase by about 2.4 minutes eastbound and by about 1.7 minutes westbound, due to the addition of the two pedestrian signals and two full-access traffic signals, but overall automobile capacity is constrained on Fair Oaks Boulevard by the four lanes segments west of Howe Avenue and east of Munroe Street.

The two pedestrian signals currently have about $700,000 allocated for implementation of the near term project elements. Preliminary cost estimates for all phases of improvements identified in the Fair Oaks Boulevard Complete Street Master Plan are approximately $6.5M -$8M between Howe Avenue and Munroe Street.


RadioShack

1.0 INTRODUCTION

The Fair Oaks Boulevard Complete Street Master Plan will develop a long-term vision for the corridor based on an understanding of the transportation, land use, environmental, economic, and social needs.

Sacramento County received a Bicycle and Pedestrian Grant from the Sacramento Area Council of Governments (SACOG) in 2014 to study and implement pedestrian crossing improvements along Fair Oaks Boulevard. This master plan will allow the County to explore and plan for the long term vision of the corridor and design a compatible near term project to directly address the pedestrian crossing needs.

This master plan report documents Fair Oaks Boulevard's existing conditions of the corridor's infrastructure, performance of multiple transportation modes, development and analysis of alternative improvement scenarios, and selection of a preferred alternative.

1.1 CORRIDOR PLAN AREA

Fair Oaks Boulevard is a major thoroughfare that traverses Sacramento County, from the American River in the City of Sacramento to Old Auburn Road in the City of Citrus Heights. The Fair Oaks Boulevard Master Plan includes the primary study corridor bounded by Howe Avenue to Munroe Street, with Sierra Boulevard to the north and American River Drive to the south. The City-County boundary divides the corridor near the intersection of Fair Oaks Boulevard and University Avenue. The corridor plan also includes Fulton Avenue from Fair Oaks Boulevard to Munroe Street. Figure 1 shows the study area and highlights the City-County Boundary. As shown, the Fair Oaks Boulevard/Howe Avenue intersection and the south leg of the Fair Oaks Boulevard/University Avenue intersection are in the City of Sacramento.

The project segment is a vibrant mixed use corridor and activity center. There are many destination points along this corridor including the Pavilions, Loehmann's Plaza, Lyon Village, and University Village shopping centers, in addition to many popular restaurants and retail shops. There are also several apartment complexes and office buildings including the Kaiser Permanente medical offices. All developments within the corridor are less than ½ mile from existing transit stops on Howe Avenue and Munroe Street.

FIGURE 1: STUDY AREA

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1.2 GOALS

1. Improve mobility for pedestrians, bicyclists, motorists, and transit users
2. Improve safety of all travel modes
3. Create a sense of place and center of activity
4. Strengthen neighborhood cohesiveness
5. Stimulate economic development
6. Promote and incorporate active design
7. Create a sustainable corridor
8. Reduce vehicle miles traveled (VMT)

1.3 APPLICABLE PLANS AND DOCUMENTS

1.3.1 SACOG REGIONAL BICYCLE, PEDESTRIAN AND TRAILS MASTER PLAN

The SACOG Regional Bicycle, Pedestrian and Trails Master Plan shows class II bike lanes along the Fair Oaks Boulevard corridor. The proposed bike lanes would connect to the existing Class II bike lanes on Fair Oaks Boulevard from Munroe Street to Morse Avenue. Class II bike lanes are also proposed on Fair Oaks Boulevard from Morse Avenue to Watt Avenue.

Appendix B of SACOG's Regional Bicycle, Pedestrian and Trails Master Plan includes a regional project list that identifies Class II bike lanes on Fair Oaks Boulevard from Howe Avenue to Munroe Street.

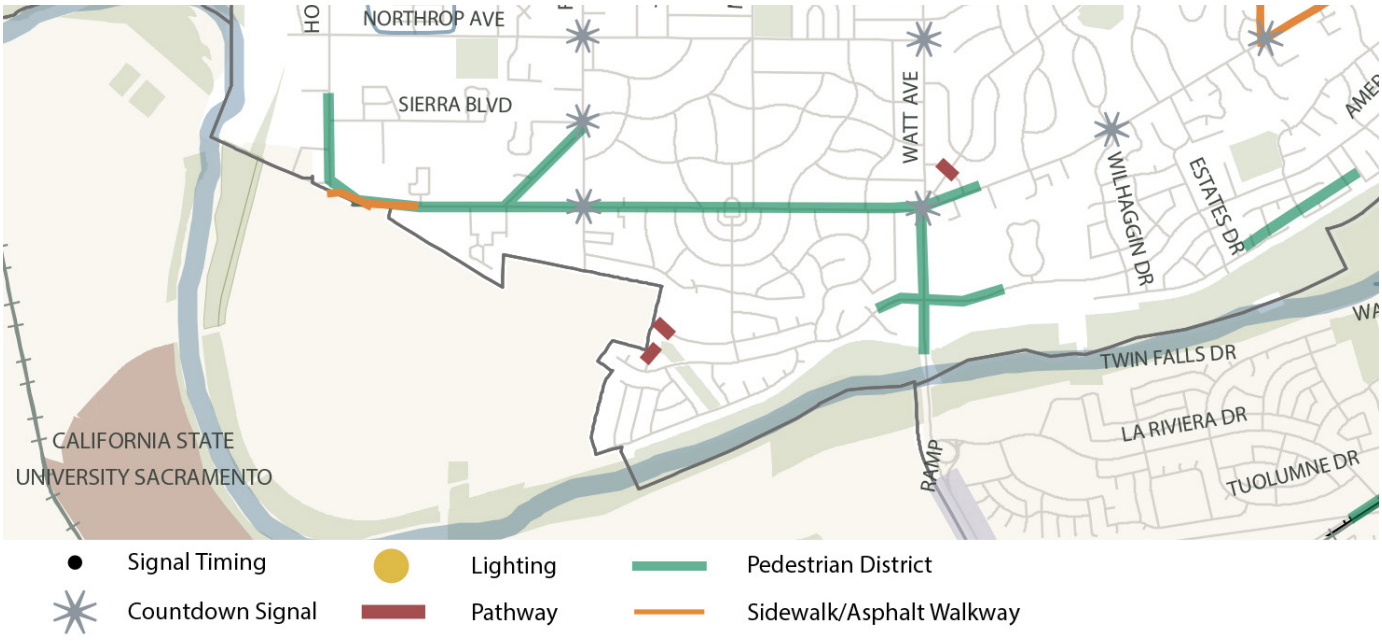
1.3.2 SACRAMENTO COUNTY BICYCLE MASTER PLAN

The 2011 Sacramento County Bicycle Master Plan shows proposed Class II bike lanes along the Fair Oaks Boulevard corridor.

1.3.3 SACRAMENTO COUNTY PEDESTRIAN MASTER PLAN

For Fair Oaks Boulevard, the Sacramento County Pedestrian Master Plan recommends a Pedestrian District to emphasize pedestrian needs along sections of road where pedestrian demand is or could be high, based on adjacent land uses and transit activity. This project has been identified as a high priority project in the Pedestrian Master Plan

FIGURE 2: SACRAMENTO COUNTY PEDESTRIAN MASTER PLAN



Map prepared by Moore Iacofano Goltsman, Inc. April 2007

(Figure 2). Additionally, parts of the corridor are recommended for funding for the construction of sidewalks as a Capital Improvement Program (CIP) project. [P. 98 Ped MP]. Munroe Street and Fair Oaks Boulevard received funding for and installed East/West pedestrian countdown signals.

1.3.4 SACRAMENTO COUNTY GENERAL PLAN

The following goals from the Sacramento County General Plan Transportation Element are applicable to the Fair Oaks Boulevard Master Plan:

1. Provide mobility for current and future residents of Sacramento County through complete streets and through a balanced and interconnected transportation system which includes all modes of travel - automobile, transit, pedestrian and bicycling.
2. Provide a balanced and integrated roadway system that maximizes the mobility of people and goods in a safe and efficient manner.
3. Promote a balanced and integrated transit system to maximize mobility in a safe and efficient manner.
4. Provide safe, continuous, efficient, integrated, and accessible bicycle and pedestrian systems that encourage the use of the bicycle and walking as a viable transportation mode and as a form of recreation and exercise.
5. Manage travel demand on the roadway system and maximize the operating efficiency of transportation facilities in order to reduce impacts on air quality and to minimize the need for new or expanded facilities.
6. "Smart Growth Streets" that enable safe and efficient mobility and access for all users holistically considering the adjacent corridor, surrounding community and natural environment while allowing for more flexibility in the design of street and corridor improvements.

Fair Oaks Boulevard has been identified as a candidate corridor for "Smart Growth Street" and this master plan strives to advance the following objectives:

» Incorporate "green infrastructure" to the greatest extent feasible

» Create and/or improve community identity by coordinating improvements to the streetscape and the surrounding corridor to achieve a consistent look and feel or carry through a specific "theme."

» Create an "outdoor room" along the street to establish a sense of place and improve the comfort and overall experience of all users, particularly pedestrians and bicyclists.

» Create communities and corridors using a holistic perspective when considering land uses and the design context of street and corridor improvements.

» Encourage the use of shared driveways to reduce the total number of driveways along a Smart Growth Street to improve overall mobility and safety for all modes of travel.

» Encourage the use of shared parking facilities and reduced parking requirements.

» Design corridors that equitably accommodate all users and complement the unique characteristics of the surrounding community and mix of uses.

1.3.5 SACRAMENTO COUNTY COUNTYWIDE DESIGN GUIDELINES

The Countywide Design Guidelines provide consistent design principles to implement the County General Plan. They encourage high quality development in the private and public realm that strengthens the economic vitality of all areas of the County. The guidelines facilitate well-designed

and sustainable projects that raise the overall development occurring within the County. The Guidelines emphasize projects that contribute to the health of County residents and the beauty of the established communities. The guidelines state that Active Design shall be incorporated into all projects in order to reinforce the community's and County's goal to create a built environment that is healthy, sustainable, livable and promotes active transportation choices such as walking, bicycling, and accessing transit; particularly in commercial and business districts like the Fair Oaks Boulevard Corridor.

2.0 EXISTING CONDITIONS

The Fair Oaks Boulevard corridor and surrounding community hosts a vibrant and diverse mix of land uses. These uses include a concentration of employers that support 5,900 retail and non-retail jobs and a blend of housing products that include over 2,800 single family and multi-family households.

Within Sacramento County, the American River has a limited number of crossings, providing critical arterial-level access for communities north and south of the river. The study corridor is located near three of the river crossings, at J Street, Howe Avenue, and Watt Avenue. Consequently, the study corridor is an important regional facility linking Arden-Arcade, Carmichael, California State University Sacramento (CSUS), East Sacramento, Midtown, and Downtown Sacramento.

With so few river crossings, demand on these river crossings is substantial, especially during the evening commute period. Drivers traveling these corridors may experience delays and vehicle queues on the approaches to the Howe Avenue / Fair Oaks Boulevard and the Watt Avenue / Fair Oaks Boulevard intersections. As a result, peak hour travel on Fair Oaks Boulevard is metered, meaning that there is more demand for travel than can be delivered to the corridor. This condition will not change in the future as peak hour travel conditions on the study corridor are expected to remain similar to today, since the area is mostly fully built out and the travel demand is constrained by the river crossings and by the capacity of the Howe Avenue and Watt Avenue intersections with Fair Oaks Boulevard.

Additionally, many drivers use the Howe Avenue river crossing to access destinations in Arden-Arcade, utilizing American River Drive and Munroe Street to bypass congestion at the Howe Avenue/ Fair Oaks Boulevard intersection.

Fair Oaks Boulevard has six lanes and carries over 30,000 vehicles per day within the project limits. Fair Oaks Boulevard is four lanes at the American River and east of Munroe Street. Fair Oaks Boulevard also has two frontage roads, each with two lanes in each direction and limited parking, between University Ave and Fulton Ave. At its widest Fair Oaks Boulevard has 11 lanes for automobiles, and unlike many complete street projects, creates a rare opportunity to enhance the roadway for all users without significant widening or right of way acquisition.

FIGURE 3: STUDY CORRIDOR

Currently, Fair Oaks Boulevard lacks enhanced infrastructure for pedestrians and bicyclists. Minimum width sidewalks are provided along Fair Oaks Boulevard and its frontage roads, however, no crossings are provided between Howe Avenue and Munroe Street, creating a barrier for residents, employees and retail customers. There are numerous challenges along the sidewalk related to accessibility of disabled users created by utility poles, numerous driveways and a lack of ADA compliant pedestrian ramps. Fair Oaks Boulevard also lacks bikeways. People who ride bikes have the choice of either riding with high speed traffic in the travel lanes along Fair Oaks Boulevard, navigating the many driveways on the frontage roads, or more commonly, riding on the narrow sidewalks.

2.1 CORRIDOR HISTORY

The project area was originally part of Rancho Del Paso, and subsequently sold and subdivided in 1922 into Swanston Acres, by C. Swanston and Son's. Historically an agricultural supporting area that slowly developed into the mixed use residential suburb of Sacramento. The construction of the H Street Bridge over the American River in 1932 helped connect the area to Downtown Sacramento.

The most notable changes to the corridor occurred in the mid 1980's when Robert Powell was developing the Pavilions Shopping Center. Not only did Mr. Powell create a compelling lifestyle shopping center, he collaborated with other owners along the boulevard to enhance the streetscape by adding the tree canopy that exists today.

2.2 AUTOMOBILE TRAFFIC

Fair Oaks Boulevard varies between five and eleven lanes along the ¾-mile corridor. In general, the roadway has six travel lanes, one turn lane, and four parallel frontage road lanes. Figure 4 shows the existing Fair Oaks Boulevard cross-section along the frontage road section of the corridor.

Access to the frontage roads is provided by eight intersections on Fair Oaks Boulevard that have side-street stop control with the following permitted turn movements:

- All intersections allow right-in/right-out turn movements
- Six intersections allow left-turn in movements
- Three intersections allow left-turn out movements

The allowed turning movements along the frontage road section of Fair Oak Boulevard create many conflict points between vehicles traveling the corridor and accessing the frontage road. The posted speed is 40 miles per hour. Residents and business owners have expressed concerns that drivers do not obey the posted speed, driving faster than the speed limit. Of the permitted turn movmenets, the outbound left-turn movements are the most difficult given the traffic volume and speed of travel on Fair Oaks Boulevard.

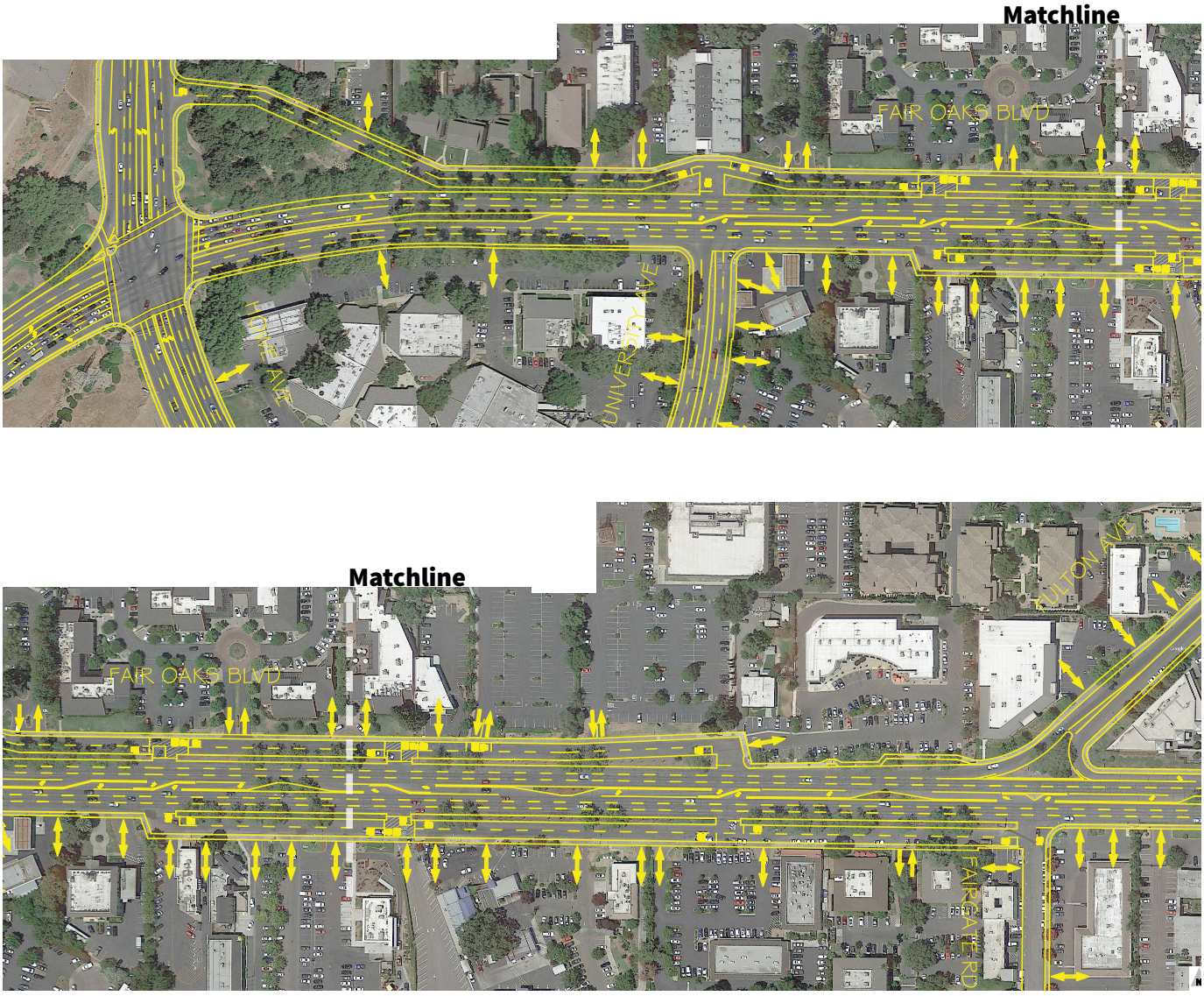
Additional information on existing traffic operations are included in Section 3.0.

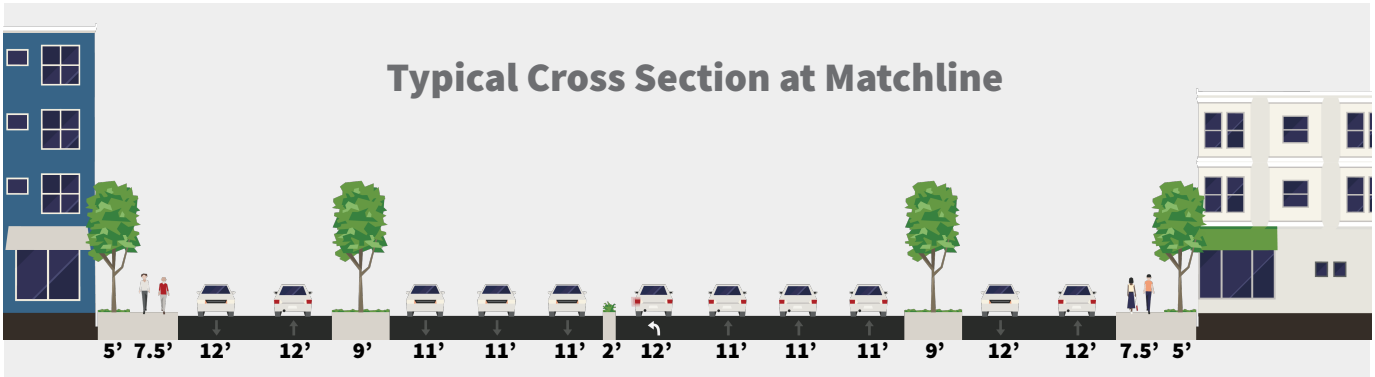
Fair Oaks Boulevard East of Howe Avenue

Frontage Road Entrance

Planted Median Between Frontage Road and Fair Oaks Boulevard

FIGURE 4: EXISTING CROSS-SECTION (ALONG FRONTAGE ROADS)





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The roadway segments in the project area vary and will need to be evaluated based on their traffic patterns, land use, and geometry. Below is a brief description of each segment in project area:

» **Howe Avenue to East of University Avenue** - This section of Fair Oaks Boulevard has one frontage road north of Fair Oaks Boulevard with bi-directional vehicular travel. There are six travel lanes and one eastbound left-turn lane.

» **East of University Avenue to Fulton Avenue** – This section of Fair Oaks Boulevard has six travel lanes, one turn lane, and frontage roads with two lanes of traffic to the north and south. Multiple driveway access locations create conflicts for all modes, including vehicles, pedestrians, and bicyclists. Parking spaces in the frontage road between the eastern frontage road access location and Fairgate Boulevard are frequently occupied on the south.

» **Fulton Avenue to Munroe Street** – This section of Fair Oaks Boulevard has two to three westbound travel lanes, one turn lane, and three eastbound travel lanes. There are commercial destinations on both sides of Fair Oaks Boulevard, including several apartment complexes to the south. As such, there are visible trails worn into the median that mark informal pedestrian crossing locations.

» **Fulton Avenue and Fair Oaks Boulevard** - The Fulton Avenue/Fair Oaks Boulevard intersection presents unique challenges for pedestrians and bicyclists. The intersection has a long right-turn corner radius that transitions into the third westbound through lane. The combination of the long corner radius and free (i.e., protected) right-turn movement contribute to high speed turn movements for motorists travelling southwest on Fulton Avenue to westbound Fair Oaks Boulevard.

» **Fairgate Road and Fair Oaks Boulevard** – South of the Fulton Avenue intersection, Fairgate Road intersects both the southern frontage road and Fair Oaks Boulevard. There are several reported collisions involving northbound and westbound left-turn movements to and from Fairgate Road. The frontage road also makes crossing Fairgate Road difficult for pedestrians.

» **Fulton Avenue from Fair Oaks Boulevard to Munroe Street** – Fulton Avenue is two lanes with a posted speed limit of 35 miles per hour. Parking is allowed on the east side of Fulton Avenue adjacent to Loehmann's Plaza. Several participants on the community walk audit commented about vehicle travel speed on Fulton Avenue.

2.3 PEDESTRIAN FACILITIES

Fair Oaks Boulevard has four to six foot sidewalks along the primary corridor. Typically, the sidewalk is attached to a rolled curb adjacent to the frontage roads and has a vertical curb when attached to Fair Oaks Boulevard directly. There is a single example of a separated sidewalk with a landscape buffer on the north side of Fair Oaks Boulevard just to the west of the Fulton Avenue intersection. There are no pedestrian crossings of Fair Oaks Boulevard between the signalized intersections of Fair Oaks Blvd/Howe Ave and Fair Oaks Blvd/Munroe

Pedestrians Crossing Near Loehmann's Plaza

Street. During the community walk audit many participants noted sidewalk areas in need of repair, numerous utility poles located in the sidewalk, and numerous driveway conflicts.

2.4 BICYCLE FACILITIES

There are no bicycle facilities along the primary study corridor on Fair Oaks Boulevard between Howe Avenue and Munroe Street.

Outside of the study area, there are Class II bicycle lanes on Fair Oaks Boulevard East of Munroe Street to Oak Avenue. West of the study area, the American River Bicycle Trail intersects at Fair Oaks Boulevard near the J Street Bridge. Fair Oaks Boulevard serves as a gateway to Downtown by vehicle, but does not provide convenient access to regional amenities like the American River Bike Trail.

2.5 ACCESS TO TRANSIT

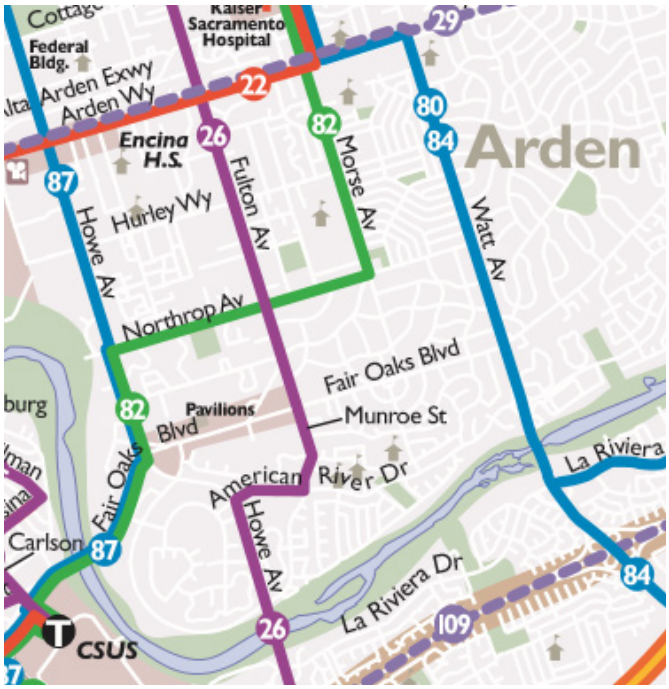
There are no transit routes that directly service the corridor along Fair Oaks Boulevard. However, there are routes that travel adjacent to the corridor boundaries, along Howe Avenue and Fulton Avenue/Munroe Street.

Routes 82 and 87 travel along Howe Avenue with stops northbound and southbound within 500 feet of the Howe Avenue/Fair Oaks Boulevard intersection. Both routes also have stops at Howe Avenue and Sierra Boulevard.

Route 26 travels along Munroe Street with stops at the following locations:

- Munroe Street and Fair Oaks Boulevard (NB)
- Munroe Street and Sierra Boulevard (SB)
- Fulton Avenue and Sierra Boulevard (NB)
- Munroe Street and Latham Drive (NB and SB)
- Munroe Street and American River Drive (NB and SB)
- American River Drive and Scripps Drive (WB)
- American River Drive and Howe Avenue (EB)

Bicyclist on Fair Oaks Boulevard



Sacramento Regional Transit Route Map

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3.0 CIRCULATION STUDY

3.1 VEHICLES

This section analyzes the performance of the Fair Oaks Boulevard study area for vehicles. The findings from this analysis provide a framework for shaping recommendations for the corridor. This section identifies existing traffic volumes and operational issues at key intersections, frontage road access locations, and driveways.

Existing traffic data was collected from various sources, including Sacramento County Department of Transportation, available data from development studies conducted in the study area, and new midweek and weekend intersection and roadway segment traffic counts. Available traffic counts were used to refine more detailed traffic data collection. After determining the peak travel periods, vehicle, pedestrian, and bicycle counts were collected by a local traffic firm for the remaining intersections and driveways in the study area.

3.2 LEVEL OF SERVICE

The operational performance of the vehicular roadway network is commonly described with the term Level of Service (LOS). Level of Service is a qualitative description of operating conditions, ranging from LOS A (optimum traffic conditions with little or no delay) to LOS F (long queues and delays). The delay ranges for unsignalized intersections are lower than for signalized intersections as drivers expect less delay at unsignalized intersections.

FIGURE 5: FAIR OAKS BOULEVARD (EAST OF UNIVERSITY) TWO-WAY TOTAL VOLUMES

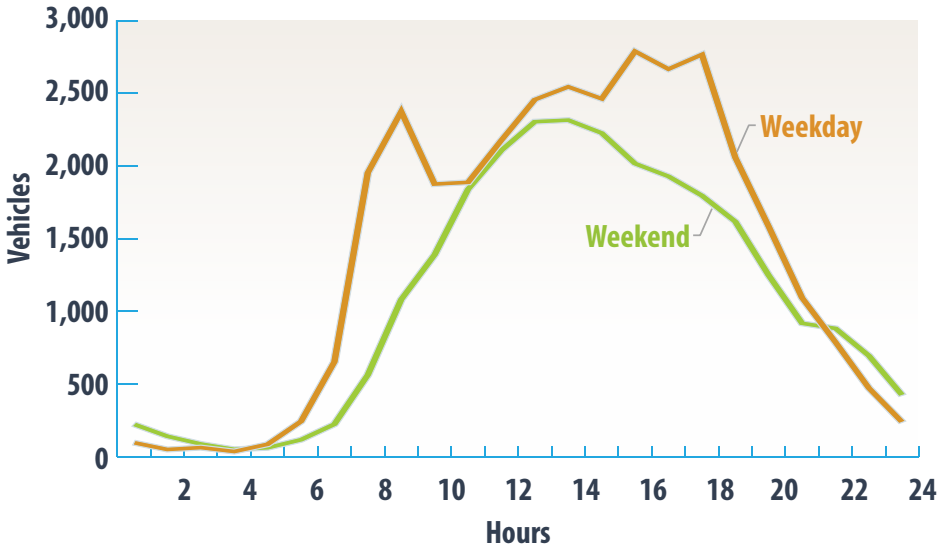
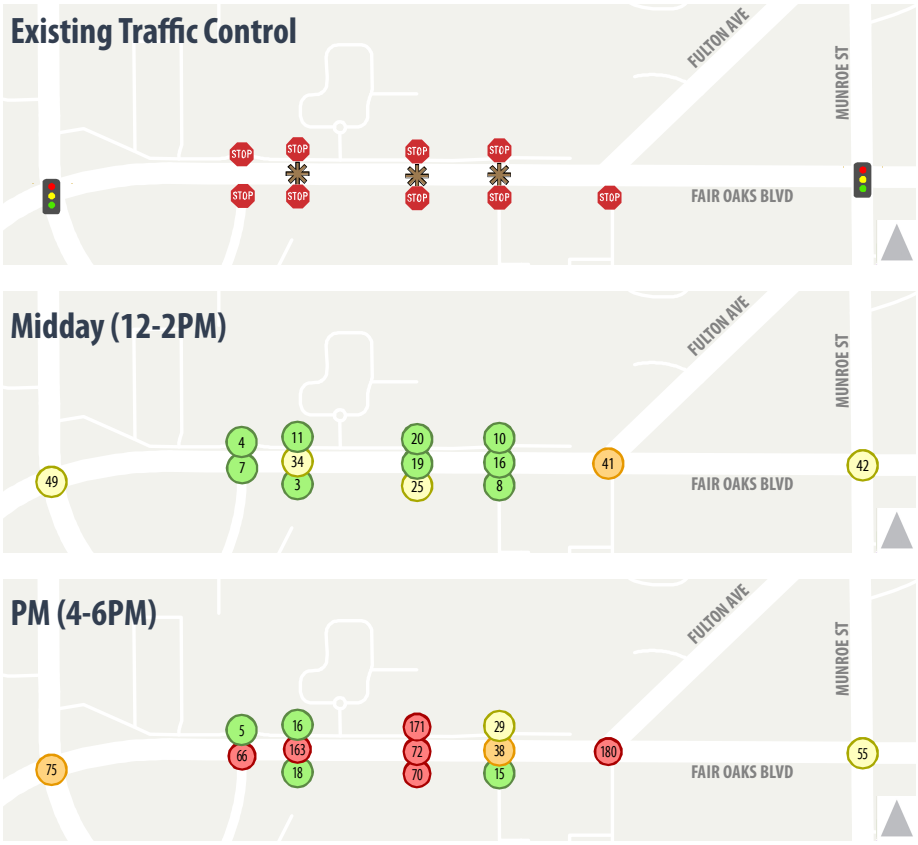


Figure 6 summarizes existing traffic operations on the Fair Oaks Boulevard corridor and includes the following information for Fair Oaks Boulevard:

- 24-hour two-way traffic volumes for weekday and weekend conditions. (east of University Avenue)
- Level of service descriptions for signal and stop-controlled intersections
- Existing traffic control
- Midday (12:00 to 2:00 PM) peak hour delay and level of service
- PM (4:00 to 6:00 PM) peak hour delay and level of service

As shown, Fair Oaks Boulevard serves more traffic during the week than on weekends. As expected, the weekday traffic shows distinct peaks that correspond with the morning and evening peak commute hours. In addition, the corridor also shows a distinct mid-day peak between 12:00 and 2:00 PM with the many businesses that produce lunchtime traffic. The highest travel period occurs during the weekday PM peak hour, due to the combination of commute traffic and commercial-related activity. Drivers experience the highest delay at all intersections during the PM peak hour.

FIGURE 6: EXISTING TRAFFIC CONDITIONS



Level of Service		Description	Delay (XX) [seconds / vehicle] Signal Control	Stop Control
	A	Free flow. Individual users are virtually unaffected by others in the traffic stream.	≤ 10	≤ 10
	B	Stable flow. The presence of other users in the traffic stream begins to be noticeable.	> 10 to 20	> 10 to 15
	C	Stable flow. The operation of individual users is affected by interactions with others in the traffic stream.	> 20 to 35	> 15 to 25
	D	Stable flow. Much higher traffic density. The effect of interactions with other users is more pronounced.	> 35 to 35	> 25 to 35
	E	Operating conditions at or near the capacity level.	> 55 to 80	> 35 to 50
	F	Forced or breakdown flow.	> 80	> 50

Traffic Signal

Stop Sign

Uncontrolled Intersection

3.3 PEDESTRIANS

This section analyzes the performance and comfort of the Fair Oaks Boulevard study area for pedestrians. The findings from this analysis provide a framework for shaping recommendations for the corridor. Key items include the locations of existing pedestrian infrastructure and pedestrian level of traffic stress in the study area.

3.3.1 EXISTING INFRASTRUCTURE

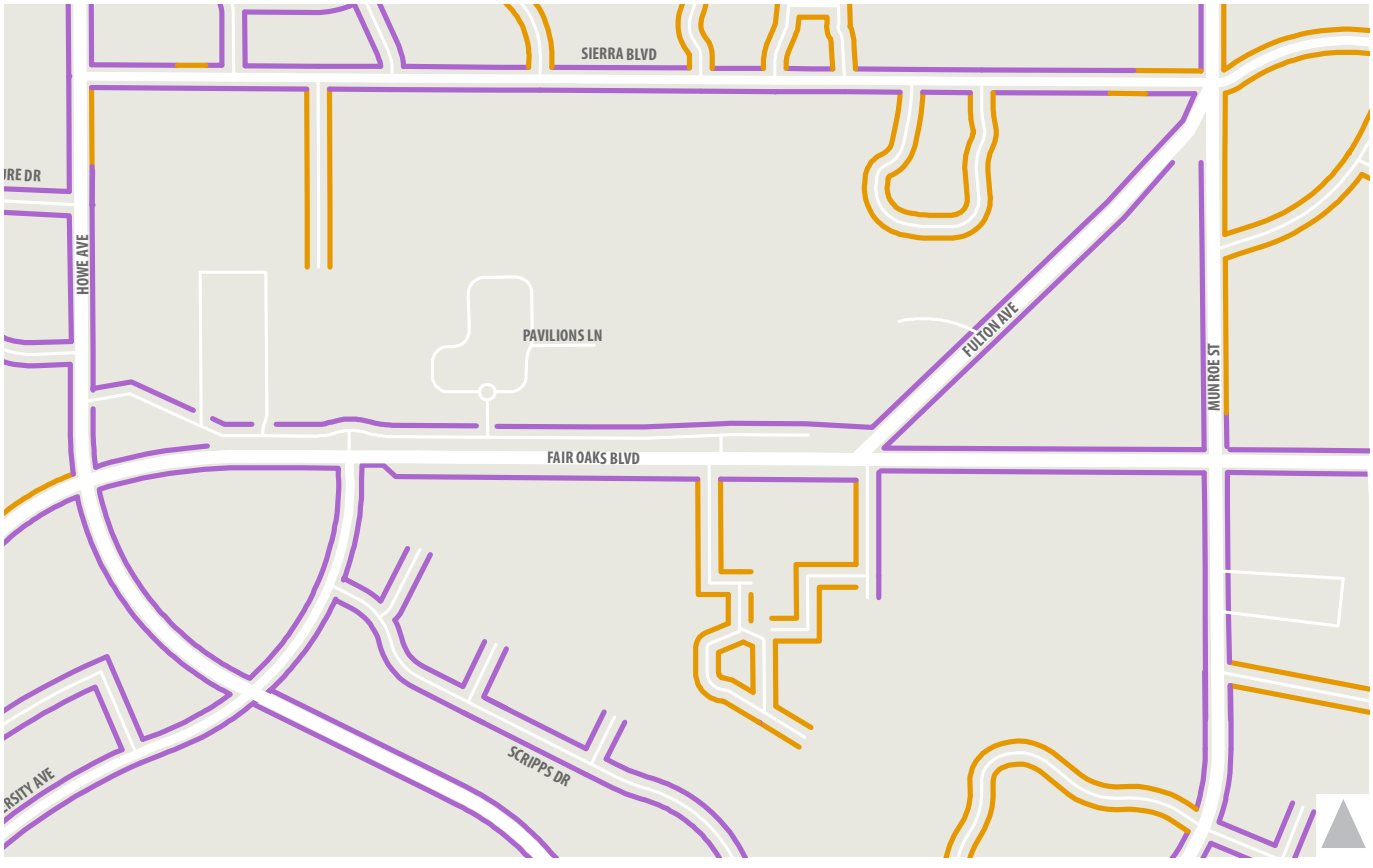
Figures 7 and 8 show existing pedestrian facilities and Level of Traffic Stress (discussed below). The Fair Oaks Boulevard corridor has sidewalks, but frequent driveways make the pedestrian experience less attractive.

3.3.2 PEDESTRIAN STREETSCORE+ LEVEL OF TRAFFIC STRESS

The Pedestrian Streestcore+ Level of Traffic Stress (LTS) refers to the pedestrian comfort associated with a roadway or intersection.

The Pedestrian LTS methodology builds on Mekuria, Furth, and Nixon's 2012 Low Stress Bicycling and Network Connectivity report and LTS methodology with a corresponding index for pedestrian comfort. A tool to evaluate Pedestrian and Bicycle LTS called Streetscore+ was developed by Fehr & Peers and includes recommended parameters for the pedestrian environment provided by the NACTO Urban Streets Design Guide (USDG) and additional considerations of comfort informed

FIGURE 7: EXISTING PEDESTRIAN FACILITIES



by practitioner and best practice experience. Roadway segments and intersection approaches receive individual scores based on different considerations. The following factors are considered in developing the Pedestrian Streetscore+ for roadways and intersections:

ROADWAYS

- Usable sidewalk space
- Driveways
- Pedestrian-scale lighting
- Street trees and landscaping
- Speed
- Sidewalk quality
- Number of travel lanes
- Heavy vehicle volume
- Crosswalk frequency

INTERSECTIONS

- Crossing distance
- Accessibility
- Channelized right-turns
- Leading pedestrian intervals (LPIs) and pedestrian scrambles

FIGURE 8: EXISTING PEDESTRIAN TRAFFIC STRESS

The Pedestrian Streetscore+ uses a scale that ranges from 1 to 4:

- Streetscore+ 1: Highly comfortable, pedestrian-friendly, and easily navigable for pedestrians of all ages and abilities, including seniors or school-aged children walking unaccompanied to school. These streets provide an ideal "pedestrian-friendly" environment.

- Streetscore+ 2: Generally comfortable for many pedestrians, but parents may not feel comfortable with children walking alone. Seniors may have concerns about the walking environment and take more caution. These streets may be part of a "pedestrian-friendly" environment where it intersects with a more auto-oriented roadway or other environmental constraints.

- Streetscore+ 3: Walking is uncomfortable but possible. Minimum sidewalk and crossing facilities may be present, but barriers are also present that make the walking experience uninviting and uncomfortable.

- Streetscore+ 4: Walking is a barrier and is very uncomfortable or even impossible. Streets have limited or no accommodation for pedestrians and are inhospitable and possibly unsafe environment for pedestrians.

The Pedestrian Streetscore+ results show the majority of roads in the study area are very uncomfortable or impossible for pedestrians, due in part to the high number of driveways. At best, the roads are uncomfortable but possible for pedestrians to navigate, including American

River Drive and Munroe Street south of Fair Oaks Boulevard. These roads have lower traffic volumes and travel speeds, as well as prevalent sidewalks. Intersections within the study area that have shorter crossing distances are typically more comfortable for pedestrians. Intersections along Howe Avenue and Fair Oaks Boulevard stand out as points of conflict as they are very uncomfortable or impossible for pedestrians to cross.

3.3 BICYCLISTS

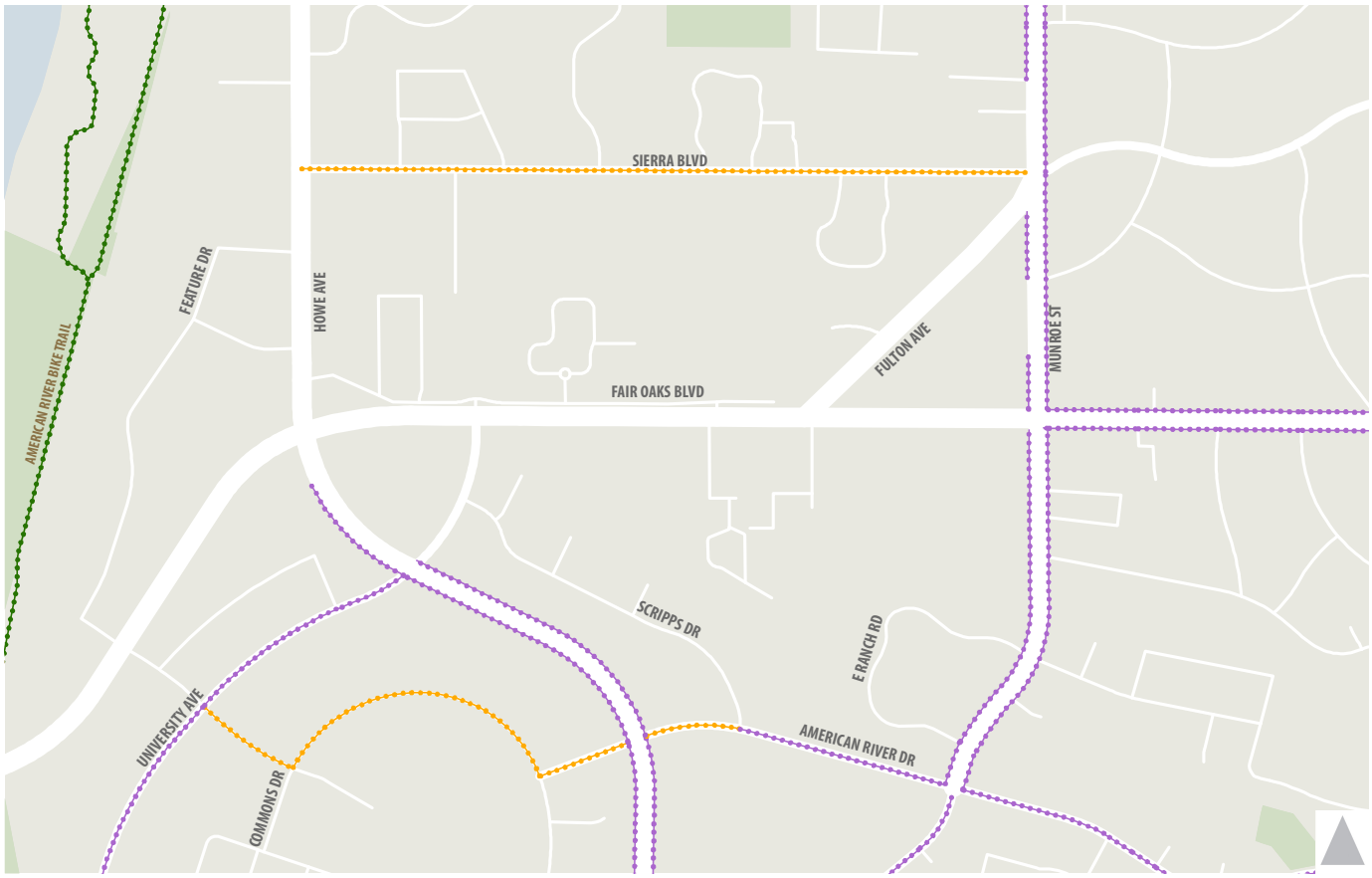
This section analyzes the performance and comfort of the Fair Oaks Boulevard study area for bicyclists. The findings from this analysis provide a framework for shaping recommendations on the corridor.

Key themes include the locations of existing and proposed bicyclist infrastructure, and bicyclist LTS on the corridor.

3.3.1 EXISTING BICYCLE INFRASTRUCTURE

Figures 9 and 10 show existing bicycle facilities in the study area and present a bicyclists level of traffic stress. As shown and discussed previously, there are no bicycle facilities on Fair Oaks Boulevard from Howe Avenue to Munroe Street. The study corridor presents an obvious gap in the existing bicycle infrastructure. Although the west end of the study corridor is only about half a mile from the American River Trail Class I Bike Path, there are no dedicated bicycle facilities that connect directly to it.

FIGURE 9: EXISTING BICYCLE FACILITIES



3.3.2 STREETSCORE+ LEVEL OF TRAFFIC STRESS

Bicycle LTS refers to the comfort associated with roadways, or the mental ease people experience riding on them. Metrics for bicycling LTS were developed at the Mineta Transportation Institute (MTI) and published in the report "Low-Stress Bicycling and Network Connectivity."[1] The criteria establish a "weakest link" approach, as roadways are classified based on their segments with the highest level of traffic stress, assuming that only those that are comfortable riding under the higher stress would travel on that road. Factors influencing LTS include:

- Number of travel lanes
- Speed of traffic
- Number of vehicles
- Presence of bike lanes
- Width of bike lanes
- Presence of physical barrier

Bicycle riders vary in experience, skill, ability, and confidence. As such, they rely on the bikeway system to cater to their specific needs and abilities. Some cyclists are more comfortable riding in traffic and value bikeways and routes that are direct and limit unnecessary delay. They more comfortably utilize facilities that share the roadway with automobiles or have limited bicycle infrastructure. People with limited bicycling confidence and lower or developing skill levels such as children and older adult riders may desire more separation from traffic to feel comfortable enough to ride. Different bicycle types also require more space in bicycle facilities, such as trailers for children or cargo or adult tricycles. For these reasons, facilities should be designed to accommodate the lowest skill levels, especially in heavily traveled areas.

FIGURE 10: EXISTING BICYCLE TRAFFIC STRESS

Recent research has correlated these different bicycle riders with the level of "traffic stress" they are willing to experience while cycling. Bicycle LTS criteria span from 1 to 4, with 1 being the least stressful and 4 being the most stressful:

- LTS 1: Most children and elderly riders can tolerate this level of stress and feel safe and comfortable. LTS 1 roadways typically require more separation from traffic.

[1] *Mekuria, Maaza C., Peter G. Furth, and Hilary Nixon, (2012). Low-Stress Bicycling and Network Connectivity. San Jose, California: Mineta Transportation Institute.*

» LTS 2: This is the highest level of stress that the mainstream adult population will tolerate while still feeling safe.

» LTS 3: Bicyclists who are considered "enthused and confident" but still prefer having their own dedicated space for riding will tolerate this level of stress and feel safe while bicycling.

» LTS 4: For bicyclists, this is tolerated only by those characterized as "strong and fearless," which comprises a small percentage of the population. These roadways have high speed limits, multiple travel lanes, limited or non-existent bike lanes and signage, and large distances to cross at intersections.

The Fehr & Peers Streetscore+ tool was used to analyze the level of traffic stress for bicyclists. Figure 10 depicts the level of traffic stress determined for each segment of the project study area.

The Bicyclist LTS results show most roadways within the study area are uncomfortable for bicyclists. The frontage roads are generally comfortable to ride on, and scored an LTS 2, due in part to low vehicle speeds on the frontage roads. This information presented an opportunity for future considerations of bicycle facility placement in the frontage roads, as well as potential modifications to Fair Oaks Boulevard to improve bicyclist comfort. Intersections south of Fair Oaks Boulevard are generally comfortable to ride and cross. Conflict points, such as the intersections of Fair Oaks Boulevard / Howe Avenue and Fulton Avenue / Sierra Boulevard / Munroe Street, are further analyzed in this study.

3.4 COLLISION HISTORY

UC Berkeley's Transportation Injury Mapping System (TIMS) was used to document reported collisions in the study area for the five year period from January 1, 2010 to December 31, 2014. TIMS uses collision data from the California Highway Patrol's Statewide Integrated Traffic Records system (SWITRS) to map bicycle, pedestrian, and vehicular collisions that resulted in an injury.

Figures 11 - 13 show the following information for these travel modes:

» Collision Severity – identifies the number of reported collisions that resulted in severe injury, other visible injury, or complaint of pain.

» Violation Type – classifies reported collisions into 16 different crash violation types.

» Lighting Conditions – identifies the number of collisions reported that occurred in no light, low light, and daylight conditions.

Fourteen bicycle/vehicle collisions were reported. The data show that two bicyclists were injured along Fair Oaks Boulevard from Howe Avenue to Munroe Street during the five year period. During this time, no person was killed while riding their bicycle in the study area.

During this period, 14 pedestrian/vehicle collisions occurred. These account for seven percent of the total collisions that occurred in the study area. Five of the 14 collisions occurred during a period of low light or no light. There were no pedestrian fatalities during the five year period. However, three collisions were reported with severe injury.

For vehicle collisions, unsafe speed and right-of-way were identified as the primary collision factor for 69 percent of the reported collisions. Thirty-seven of the 166 collisions occurred during a period of low light or no light.

FIGURE 11: COLLISION SEVERITY

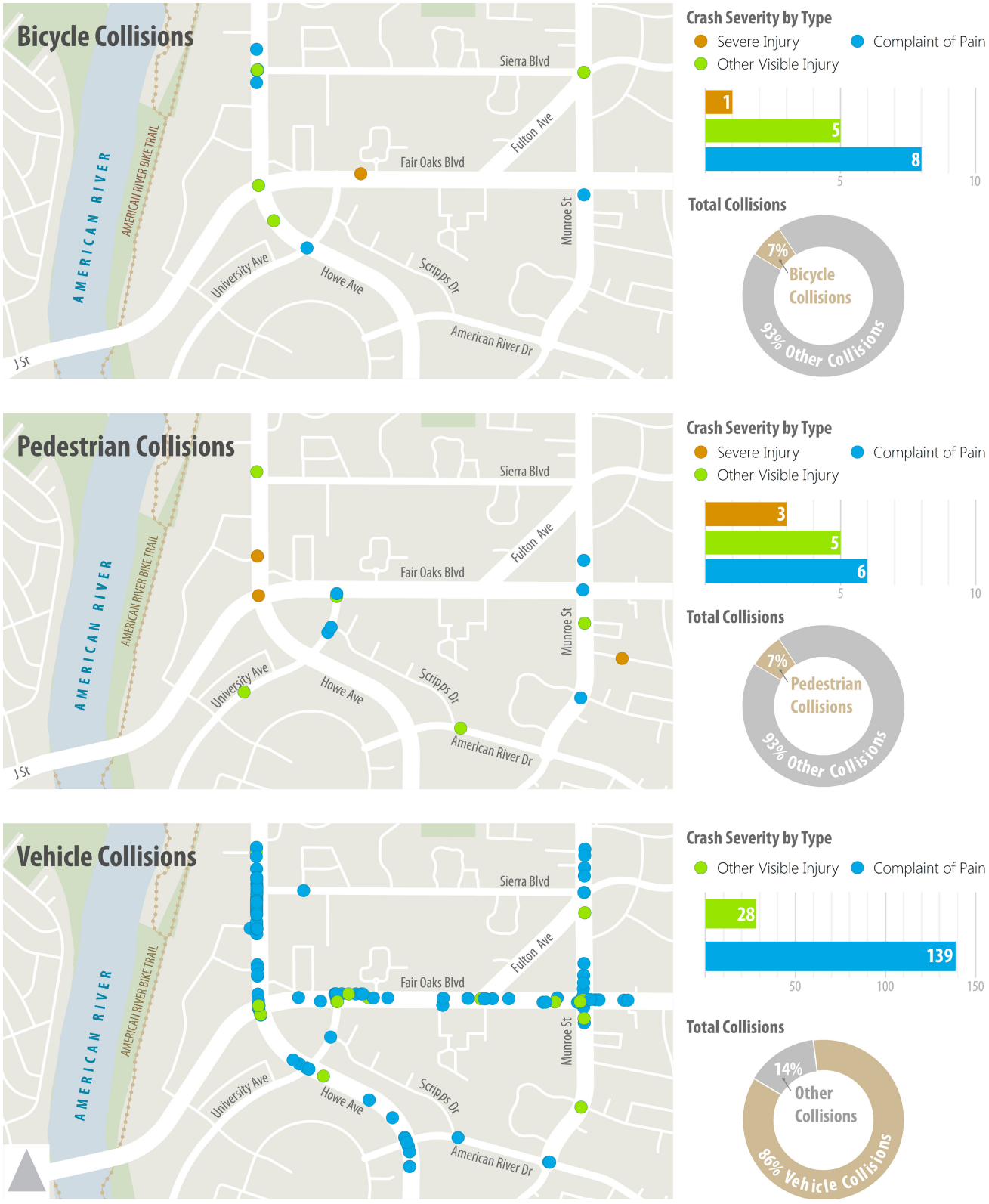


FIGURE 12: VIOLATION TYPE

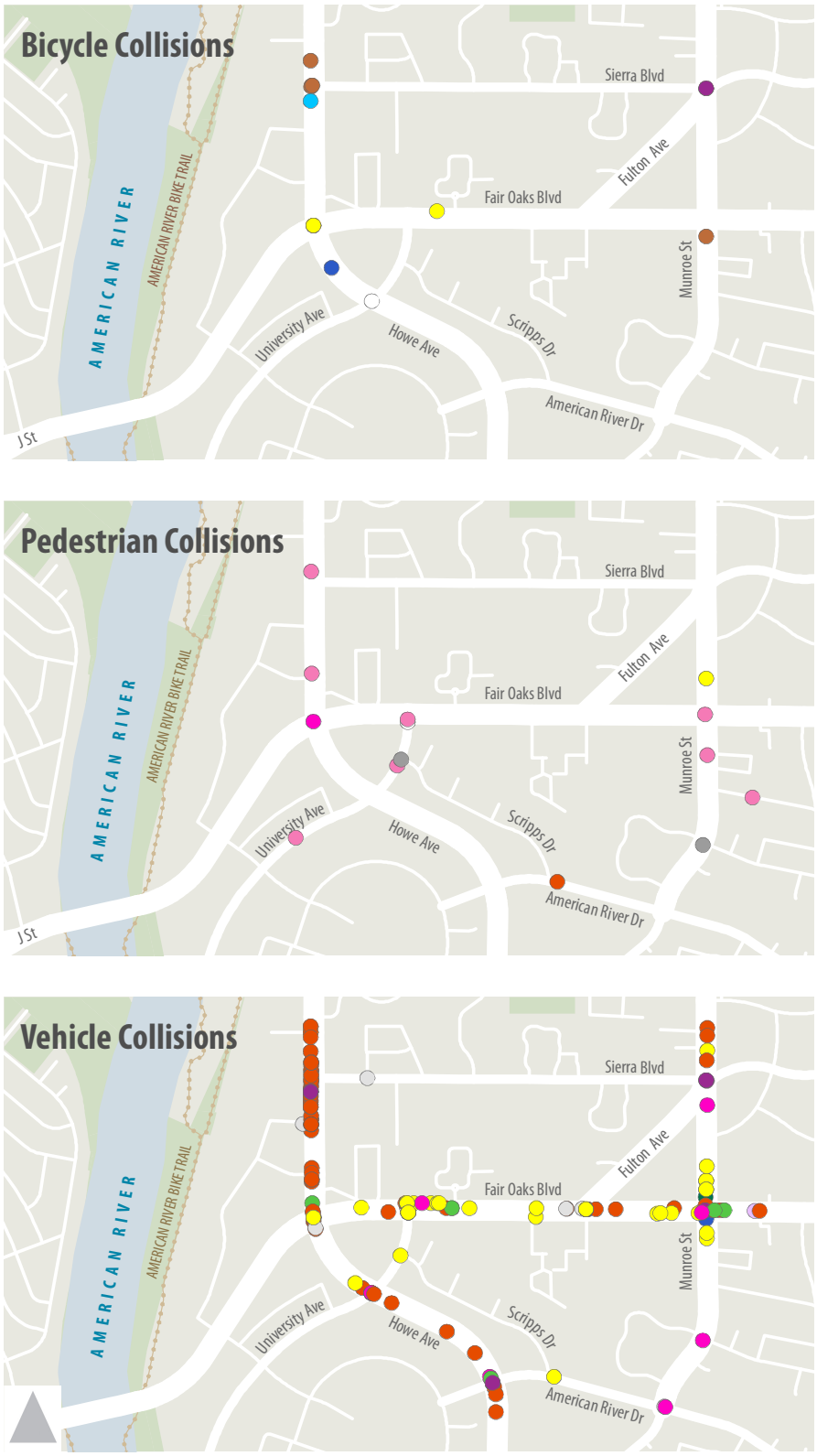
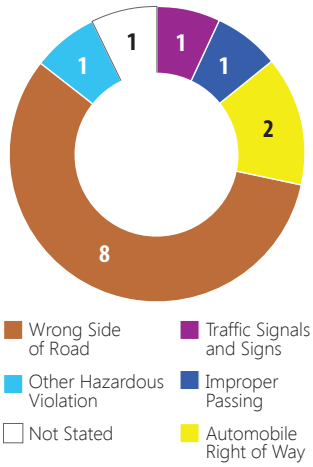
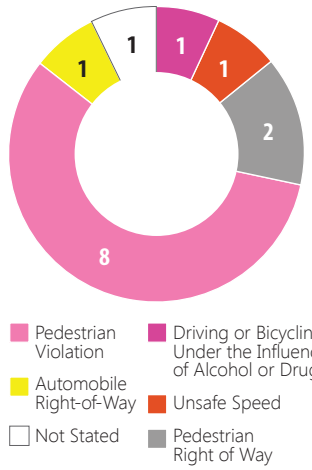
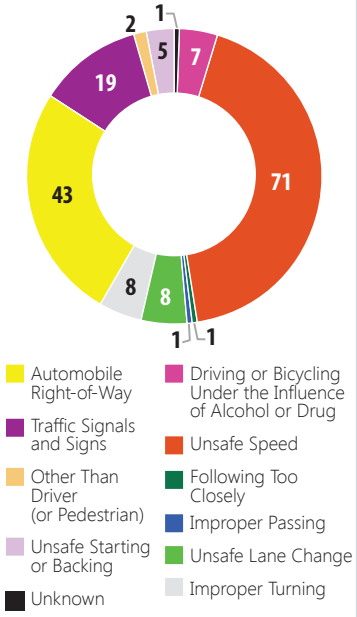


FIGURE 13: LIGHTING CONDITIONS

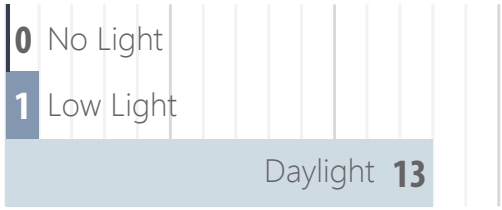
Violation Type

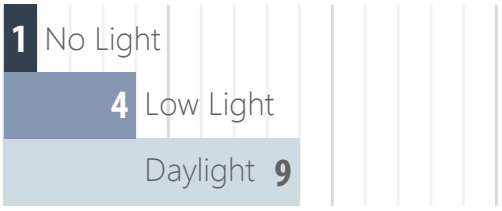


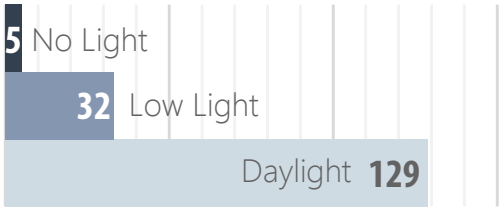




Lighting Conditions







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3.5 FIELD REVIEW

On April 21, 2016 a group of twenty-five stakeholders walked the corridor to discuss issues and opportunities. This walkability audit brought community members together to discuss different perspectives for a more complete understanding of the corridor needs.

The following key project stakeholders, advocacy groups, business owners, nearby residents, and local partners gathered to discuss issues and opportunities along the corridor: Sacramento Regional Transit (Sacramento RT), Sacramento County Department of Transportation (SacDOT), Environmental Council of Sacramento (ECOS), Sacramento City/County Bicycle Advisory Committee, SACOG, Supervisor Susan Peters Office, San Juan School District, California Highway Patrol, Loehmann's Plaza, Kaiser Permanente Medical Center, Sacramento County Planning Department, Design 4 Active Sacramento, Fehr & Peers, and local neighbors.

Key themes from the walkability audit include the locations of potential pedestrian signals, safety concerns, issues associated with travelling in frontage roads, ADA compliance, and connections to the larger community. Feedback from the walkability audit informed the presentation of existing conditions at the second public workshop. See the appendix for a detailed summary of the April 21, 2016 walkability audit.

Participants on Walkability Audit

3.6 GAP STUDY

A "gap study" was performed in Spring 2016 to better understand the amount of time available to pedestrians attempting to cross at the mid-block. The gap study demonstrates the crossing challenges pedestrians encounter travelling to their destinations.

During the PM Peak Hour, there were no gaps long enough for a pedestrian to safely cross all six lanes at the mid-block traveling at a comfortable speed. This was determined by documenting any gap in traffic that lasted longer than 20 seconds, which would allow a pedestrian to cross 80 feet travelling at 4 feet per second. However, there were multiple instances of gaps in traffic travelling in one direction. This would allow a pedestrian enough time to cross one direction of traffic, and wait in the median before crossing the second leg.

While on the walkability audit, participants witnessed multiple examples of pedestrians crossing illegally east of University Avenue, and between Fulton Avenue and Munroe Street.

Collision Near University Avenue and Fair Oaks Boulevard

3.7 BIG DATA

Big data, anonymous GPS data, was used to understand three crucial questions:

» Who are the users of Fair Oaks Boulevard?

» What are the common travel patterns?

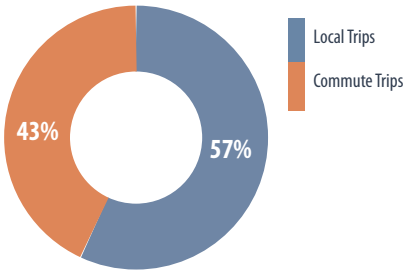
» How do travel patterns change by user type?

The data showed that approximately 60% of trips using Fair Oaks Boulevard start or end locally (i.e. within ½ mile of the corridor). Of the commute trips, about half travel between downtown/ south Sacramento and the region between I-80 and the American River.

Fehr & Peers also analyzed changes to travel patterns through the course of a typical weekday. Commute trips characterize the majority of users on Fair Oaks Boulevard during the AM and PM peak hours, representing 83% of westbound trips and 63% of eastbound trips, respectively, while local trips characterize the majority (2/3) of users during the midday hours, see Figure 14. This information indicates that trips to the Fair Oaks Boulevard Commercial Corridor represent a higher proportion of users on Fair Oaks Boulevard during the midday hours than during the peak hours. Additionally, the high proportion of local trips during the midday hours indicates that there is high potential for many existing local auto trips to shift to walking or biking with improved infrastructure.

FIGURE 14: WHO'S USING FAIR OAKS BOULEVARD?

Daily Users of Fair Oaks Blvd

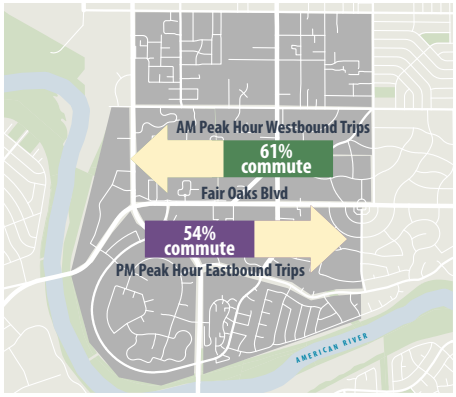


About **60%** of trips using Fair Oaks Boulevard are local and begin and end within ½ mile of the corridor.

About ½ of commute trips travel between downtown/south Sacramento and the region between I-80 and the American River.

Commute Trips

During the **peak hours**, Fair Oaks Boulevard serves mostly commute trips that travel through the corridor without stopping.

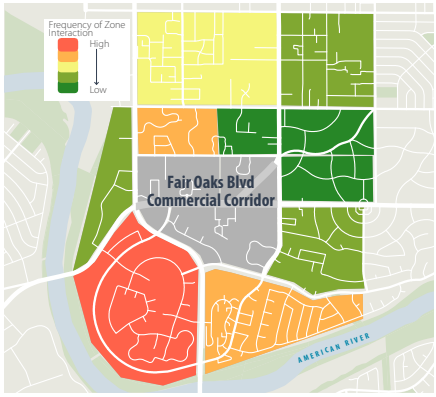


Travel between downtown/south Sacramento and the region between I-80 and the American river represents...

- **83%** of westbound commute trips during the **AM peak hour**
- **63%** of eastbound commute trips during the **PM peak hour**

Local Trips

During the **midday**, **2/3** of all trips on Fair Oaks Boulevard start or end locally.



High amount of interaction (**red**) indicates areas that would have the **highest** potential of benefitting from improved bicycle and pedestrian connectivity.

When analyzing the different users separately, commute trips are highly directional, which confirms the strong interaction between the jobs center in Sacramento and the suburban communities to the east. Neighborhoods that have high localized interaction with the Fair Oaks Boulevard Commercial Corridor were also identified. This information helps to prioritize bicycle and pedestrian improvements access to and along Fair Oaks Boulevard, which would improve safety, encourage more active lifestyles, and promote vibrancy of the community.

3.8 PRESENTATION OF EXISTING CONDITIONS

On May 12, 2016 the Sacramento County Department of Transportation hosted a community workshop, attended by over 60 community members. The purpose of this meeting was to review existing conditions and solicit input on corridor concepts. The meeting built on a previous public meeting, held in October 2014.

The format of the meeting was an "open house" style walk about without a formal presentation. Attendees visited 12 presentation boards and were encouraged to provide input and ask questions. Among the topics presented were the following:

- Project Background
- Project Timeline
- What We Heard From You (summary of comments and feedback received at the first public meeting in October 2014)
- Who Is Using the Corridor
- Intersection Level of Service / Delay
- Pedestrian Existing Conditions / Level of Traffic Stress
- Bicycle Existing Conditions / Level of Traffic Stress
- Collision Data
- Traffic Conflict Map
- Corridor Concepts and Potential Alternatives Brainstorming

In addition to the presentation boards, an interactive board with street components allowed participants to arrange their ideal Fair Oaks Boulevard, including vehicle lanes, bike lanes, sidewalks, medians, trees, and other street facilities. The project team periodically took pictures of the concepts. The prevailing concept that came out of this activity was the desire to add more trees to the street.

While facilitating the challenges and opportunities board, the project team heard a variety of opinions about Fair Oaks Boulevard today. Attendees expressed concerns about high vehicle speeds and high traffic volumes. Residents who live nearby the study corridor expressed concerns about increased traffic in their neighborhoods if traffic calming measures are implemented on Fair Oaks Boulevard.

The team also heard many comments about the quality of existing infrastructure, including the poor quality of sidewalks, which appear to be out of compliance with Americans with Disabilities Act (ADA) standards.

Additionally, many felt it was necessary to add bike lanes to the corridor. Many suggested a holistic approach to the Sacramento County bicycle network that considers how people will get to the corridor and how the potential bicycle facilities would connect with the existing and future network. See appendix for a detailed summary of the May 12, 2016 workshop.

Participants at Public Workshop


McDonald's
STOP

4.0 CORRIDOR VISION

To meet the needs of the different users of Fair Oaks Boulevard a comprehensive list of complete street tools have been considered along the corridor. The following toolkit highlights the opportunities and challenges with implementing specific streetscape elements on Fair Oaks Boulevard and were used to create the concepts for consideration by the stakeholders.

4.1 COMPLETE STREET TOOLKIT

STREETSCAPE & GREEN INFRASTRUCTURE

Streetscape and Green Infrastructure generally refers to the natural and built components of the street corridor. Visual elements of a streetscape include paving, sidewalks, adjoining buildings, street furniture, landscaping, lighting, wayfinding signage, advertising, identifying landmarks, and public art. Green Infrastructure can include natural and engineered methods to capture and filter stormwater run-off, buffer the roadway heat island effect, conserve water, reduce noise and air quality impacts, and re-cycle materials.

An Example of Streetscape Features used as a Gathering Place

These elements all combine to define the design quality of the street, projecting the street's character and perceptions to the street users. Often, the streetscape can set the "tone" of the surrounding community and businesses to the user as they travel to their destination.

Within the study area of the Fair Oaks Complete Street Master Plan, much of the design context is already well crafted and defined by the existing architecture and amenities of the retail/restaurant/business and residential centers, and from the large trees established over the previous decades. This existing "tone"

may be described as a post-modern/contemporary style. Improving the streetscape with a similar design context will further unify the corridor and promote additional investment nearby.

The design intent will apply streetscape development components that enhance the look and function of the corridor, supporting "complete street" accessibility, and contributing to the goals of the Fair Oaks Boulevard Complete Street Master Plan.

While aesthetics are an important consideration in the streetscape; the development components' design should be tempered by the need to be cost effective and practical.

Existing Amenities at the Pavilions Retail and Restaurant Complex

Maintenance of streetscape facilities should be given high consideration. Durable, long lasting, vandal resistant components should be specified. Hazardous materials are to be avoided. Re-cycled products and products with sustainable life-cycles should be used whenever possible. Energy efficient fixtures should be easy to service or repair and use readily available replacement parts.

Homeless camping and panhandling are evident in the area and create health and safety issues for the homeless, as well as the corridor users and maintenance staff.

Design of "defensible" streetscape space, utilizing crime prevention strategies, should also be implemented.

Wider Separated Sidewalks

The County has identified Fair Oaks Boulevard as not only a candidate "Smart Growth Street" in the General Plan, but as both a Pedestrian District and Commercial Corridor Segment in the County of Sacramento, Municipal Services Agency, Improvement Standards.

Although Fair Oaks Boulevard has continuous sidewalks, there is opportunity to enhance the current pedestrian environment by separating the sidewalk and increasing it to at least eight feet wide as part of roadway improvements or as part of a developer enhancement of the business frontage. Removing utility conflicts, increasing frontage landscaping, and adding streetscape amenities like benches should be considered.

Existing Separated Sidewalk on Fair Oaks Boulevard

Landscaping

Landscape plants provide a variety of benefits within the streetscape. Studies have documented that shade trees and other associated landscaping entice users to visit businesses more often, to stay longer, to spend at higher price points, and to recommend the area to other people.

For residents, landscaped streetscapes encourage active use (walking and cycling) and create a sense of security, community pride, and emotional well-being. Shade trees and other landscaping are proven to be a vital component of a healthy community and provide environmental mitigation of urban impacts.

The Fair Oaks Boulevard study area already benefits from a high level of landscaping due to the existing plantings on the center and frontage medians. The previous investment into landscaping and the tree canopy in this area has significantly contributed to the Fair Oaks Boulevard corridor's success.

Additionally, there is abundant and well maintained private landscaping within most of the adjacent land uses (retail/restaurant/business plazas, residential developments).

Existing Mature Sycamore Shade Trees within Corridor Medians

However, it should be noted that an abundance of turf grass lawn exists in the frontage medians on the Fair Oaks Boulevard corridor between Howe Avenue and Munroe Street. This lawn is attractive, yet it is a high water using plant which also requires intense maintenance (weekly mowing, frequent irrigation monitoring). Turf lawn typically requires chemical based management (fertilizers, weed and pest control products) for ultimate growth. The existing trees in the lawn areas are not as healthy as they could be if they were surrounded by more compatible plants and appropriate irrigation systems.

Abundance of Frontage Median Turf Lawn Grass (note irrigation stress)

These lawn areas do not meet current State mandated water conservation (MWELO) requirements and are at odds with the "River Friendly Design" guidelines adopted by the County. Additionally, the landscaping

within all the medians on Fair Oaks Boulevard often struggle from inadequate watering due to outdated/ antiquated irrigation systems.

Converting this lawn area to a more interesting, resilient and seasonally attractive shrub and groundcover planting, which is also water conserving and lower maintenance, is recommended. At the same time, the irrigation systems should be re-habilitated and upgraded with modern "water-wise" irrigation components.

Surface drainage of the streets appears to be exclusively a catch and release system of catch basins and underground pipes. Integrating Green Street drainage facilities (stormwater retention swales, bio-filtration, groundwater recharge) should be incorporated where possible. However, the existing trees occupy most of the median space which could potentially be dug out and re-purposed as stormwater retention and filtration basins. Preserving the trees to accommodate storm water management swales will be challenging.

Designing the street landscaping following County Water Conservation Ordinance, Stormwater Quality Design Guidelines, River Friendly Design Guidelines, and Community Development Design guidelines will provide a more sustainable corridor which contributes to healthy community and environmental goals.

In the study area, there are historically local plantings of English Walnut trees that were associated with the early agricultural use of the area. Even older naturally occurring Valley Oaks of great size and heritage age can still be found here. Over time, some of these heritage trees have perished and have been removed due to their age and/or structural threat to adjacent uses. Coincidently, the existing overhead powerlines crossing the corridor have resulted in the removal of a dozen or so mature large sycamore trees due to federally mandated powerline clearance issues. Replacement of removed trees with new trees, where possible within the streetscape of Fair Oaks Boulevard, is recommended. Preservation of existing trees during roadway design and existing tree protection during construction, per the "County Tree Preservation and Protection" ordinance and the "County Standard Specifications", is recommended.

Storm Water Planter on Freedom Park Drive in Sacramento County

Existing Center Median Complements the Private Landscaping in the Background

Distinctive plant palettes should be used for the corridor. Median plantings must be suitable for the harsh conditions often found in roadway conditions (reflected heat, auto emissions, wind, etc.).

The specific plant palette suggested for the Fair Oaks Boulevard corridor study area is described in the appendix.

Hardscaping

Colored paving with jointed patterns can be used as a tool to create visual interest as well as alert a pedestrian to an intersection (conflict zone) and to delineate pedestrian plazas.

While there are many examples of aesthetically pleasing paved surfaces (decorative brick pavers and interesting color banding and joints) in the shopping and business centers which adjoin the existing roadway in this area, there is a stark contrast with the street hardscape in the boulevard, which is typically standard gray concrete and black asphalt.

Examples of Existing Paved Surfaces Adjacent to the Corridor

Some older sidewalks in the corridor are broken or cracked. They are often shared by both cyclist and walkers and they generally need wider widths and more aesthetic treatment to be inviting, pleasing and comfortable travel routes. In these long linear sidewalks, a simple "tiled" scoring pattern (2'x2', 3'x3', or 4'x4' square, depending on the sidewalk width) can be worked into the standard concrete finish to break-up the expanse and create an urban and business corridor aesthetic. This pattern could be saw-cut into existing sidewalks and tooled into new sidewalks.

Score-Lines are a Simple and Cost Effective Enhancement of Standard Sidewalks

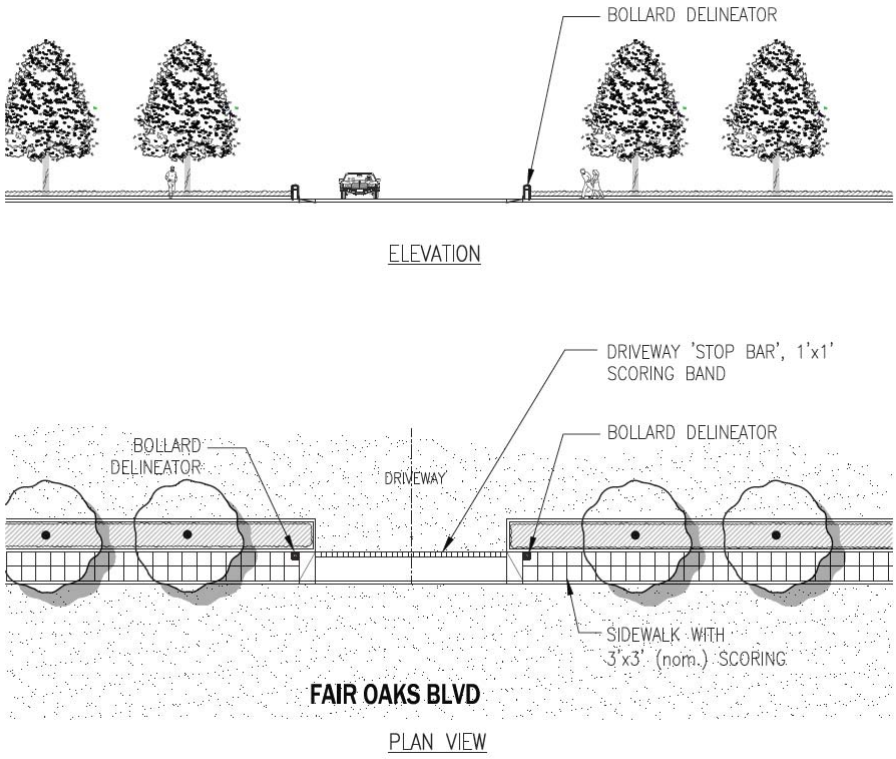
The interaction of the pedestrian sidewalks with the many driveway crossings is currently less than ideal due to the length of the driveways, the rolled curb instead of vertical curb facing in some areas, and the un-defined pedestrian travel path. Although completely legal, the frequency of the numerous driveways can result in pedestrian and cyclist stress as they must navigate across the "free-for-all" driveway accesses. This becomes more of an issue after dark in low light situations.

One enhancement would be to delineate driveways clearly using a combination of score lines in the concrete, with short bollards on either side, to give drivers and pedestrians visual ques

Numerous Driveway Crossings are Undefined and Auto Oriented, Unwelcoming to Pedestrians.

where driveways and pedestrians simultaneously occur.

Additionally, to clearly delineate boulevard pedestrian crossings, colored or patterned roadway pavement could be utilized within cross-walks at intersections and mid-block crossings. This treatment may slow traffic and create a more aesthetic and well defined pedestrian environment.



Proposed Driveway Delineation

Examples of Crosswalk Paving with Thermoplastic Imprint

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Lighting

Traffic signal and street light infrastructure in the study area is composed of utilitarian/standard galvanized steel components. Traffic signals are mounted on galvanized steel mast arms connected to steel poles. The ubiquitous "Cobra-head" street light fixtures, mounted on steel poles, are typically located in the frontage median adjacent to the Fair Oaks Boulevard corridor. While these street lights illuminate the traffic lanes of this wide boulevard, the pedestrian sidewalks are not separately lit.

To provide an enhanced design aesthetic, similar in character to the private improvements on adjacent business and residential properties, the corridor's lighting system could be upgraded with decorative light poles and matching fixtures. Existing galvanized steel light poles and mast arms on traffic signal and streetlights could be painted to provide an instantly "fresh" look to them, coordinating the color with other site furnishings in the streetscape.

To increase pedestrian security and to create a sense o f a pedestrian district, pedestrian scale lighting could be added to illuminate the walkways at night. Driveways could be better delineated at night by using lighted bollards on both sides to aid in pedestrian and cyclist safety.

All lighting components should be selected from a common design theme and be compatible with each other.

Typical Existing Traffic Signal and Street Lighting

(Above and Left) Suggested Traffic Signal Enhancements and Additional Pedestrian Scale Decorative Lighting.

Architectural Features

Many of the adjacent commercial/retail/ business land uses have done an excellent job of providing pedestrian oriented architectural amenities on their properties.

In contrast, currently there are few interesting public spaces occurring along theFair Oaks Boulevard streetscape corridor. There are no pedestrian facilities such as benches, trash receptacles, water fountains, wayfinding signage or bus shelters. Cyclists do not have access to demarcated travel lanes or amenities such as bicycle parking racks.

It would be desirable to have the streetscape corridor more connected to the adjacent properties while providing an enhanced, comfortable, and functional pedestrian "promenade" experience.

The streetscape should be enhanced with architectural features complementary to adjacent properties. Benches, trash receptacles, bus stops, median fencing, and decorative street lighting should be provided at regular intervals on both the north and south sides of Fair Oaks Boulevard throughout the study area.

Street furniture and fixtures shouldcomplement the desired character of the corridor. For user convienence, benches and trash receptacles should be placed approximately every 500 feet. All elements should be selected from a common design theme and be compatible with each other.

Examples of Adjacent Architectural Features found within Adjacent Properties on Fair Oaks Boulevard.

Currently, the Corridor Streetscape does Not Complement the Adjacent Properties.

Place-Making

To be described as a "Pedestrian District", the streetscape improvements on Fair Oaks Boulevard will need to better accommodate the pedestrian, cycling, and transit users, creating a sense of place for them with safe travel and active design features. Ultimately, the streetscape can help create a community identity and destination that one wants to "go-to" rather than simply drive through.

The Fair Oaks Boulevard complete street experience should feel like a "promenade" for pedestrians to walk about and for travelers in vehicles or on bicycles to notice and access business storefronts. Connections from the boulevard to open space and adjacent land uses can facilitate the promenade experience.

Although there is not a contrived and marketed "branding" or thematic symbology occurring on this section of Fair Oaks Boulevard, it seems that the abundance of landscaping in the medians and the well-crafted architectural amenities on the adjacent properties give this area its character and identify in themselves.

Other commercial corridors have strived to brand themselves with names and points-of-unique-interest such as monuments and identifiers, public art, plazas, banners, wayfinding signage, and recurring medallions. These techniques could be incorporated here, if so desired by the community.

Where possible, plazas, public parks or pedestrian and cyclist stop/rest stations should be created to allow opportunities for "active design" and "healthy community" activities. One opportunity for this could occur at the existing under-utilized open space area at the northeast corner of Fair Oaks Boulevard and Howe Avenue.

This space is approximately ½ acre in size, is near adjacent high density apartments, and has a well-covered shade tree canopy and the potential to become an active public space. Providing connections to the boulevard, while controlling access and homeless camping issues, could activate the space.

It is also has a highly visible, prominent focal point which is readily seen by the many travelers at the Fair Oaks Boulevard at Howe Avenue intersection. This open space and prominence could be enhanced as a regulated "pop-up" space with a Public Art sculptural piece or some other identifying monument.

Existing Commercial Developments and Abundant Landscaping Provide Area Identity

PEDESTRIAN CROSSINGS

Crosswalks

Marked crosswalks feature striping and other enhancements to delineate a street crossing for pedestrians. There are two types of marked crosswalks: controlled and uncontrolled. At uncontrolled crosswalks, drivers are legally required to yield to pedestrians, but do not have to stop when a pedestrian is not present. On Fair Oaks Boulevard the pedestrian crossings of the frontage roads are candidates for uncontrolled crossings due the relatively low speed and low volume of traffic. Controlled crosswalks are located at intersections with stop signs or traffic signals and would be used at the crossings of the traveled lanes of Fair Oaks Boulevard, University Avenue, Fulton Avenue, and Fairgate Road.

Existing Crosswalk at Fair Oaks Boulvard and Munroe Street

Median Refuge Islands

Median refuge islands provide a safe space in longer crosswalks. They are particularly helpful for older adults and people with disabilities, who may require more time to get across the street, or need to pause in between long crossing segments. Median refuge islands are recommended to be at least six feet wide, and preferably ten feet wide. The center turn lane and medians of Fair Oaks Boulevard offer the opportunity to create pedestrian refuge islands at proposed signalized pedestrian crossings. In addition, the pedestrian path of travel of the refuge can be angled in the direction of travel to increase eye contact between pedestrians and drivers.

Example of High Visibility Crosswalk and Refuge Island

Bulb-Outs

Bulb-outs are another way to decrease the crossing distance at intersections. They are beneficial to pedestrians because they decrease the distance needed to cross lanes of vehicle traffic. In addition, bulb-outs improve the visibility of pedestrians waiting to cross. Bulb-outs can be used on roadways with on-street parking, specifically the frontage roads or Fulton Avenue within the project area.

Example of Bulb-Out

Rectangular Rapid Flashing Beacons

Rectangular Rapid Flashing Beacons (RRFB) provide a pedestrian actuated flashing warning light indicating that pedestrians are crossing. They are a lower cost alternative to traffic signals. When combined with other pedestrian treatments such as median refuge islands or bulb-outs, they can have even more impact on improving visibility of pedestrians and studies have shown that they increase yielding by motorists. These treatments are typically powered by solar panels but can also be wired to a traditional power source. RRFB are appropriate for slower speed roadways with typically only two lanes of traffic. If warranted, they could be installed in the project area at the uncontrolled crossings of the low volume frontage roads.

Example of Rectangular Rapid Flashing Beacon

Pedestrian Hybrid Beacons

Pedestrian Hybrid Beacons (PHBs), also known as High-intensity Activated crossWalKs or HAWK signals, require vehicles to stop at a red light to allow pedestrians to cross. PHBs are ideal for roadways that are higher speeds and volumes than a rectangular rapid flashing beacon, but do not require a full pedestrian signal. They should only be installed in locations that include a marked crosswalk. The multi-lane crossings of Fair Oaks Boulevard may be an ideal location for either a PHB or pedestrian signal.

Pedestrian Hybrid Beacons operate with the following phases:

- Flashing Yellow – Upon actuation, beacon flashes yellow
- Solid Yellow – Alerts drivers that pedestrians will soon cross
- Solid Red – Drivers must stop and remain stopped
- Flashing Red – Drivers stop and proceed when clear, as they would with a stop sign
- No Indication – When not actuated, signal is dark, unlike standard signals

Example of Pedestrian Hybrid Beacon on Stockton Boulevard in the City of Sacramento

BIKEWAY TYPES AND ENHANCEMENTS

Bikeways are identified by four primary types: Class I bike paths (including shared use paths), Class II bike lanes, Class III bike routes, and Class IV separated bikeways.

Class I Bikeway (Bike Path)

Bike paths, often referred to as shared-use paths or trails, are off-street facilities that provide exclusive use for non-motorized travel, including bicyclists and pedestrians. The American River Parkway Bike Trail is a Class I Bike Path located less than a half-mile from the project corridor. Fair Oaks Boulevard may offer opportunities to include new bike paths or connections to the American River Trail.

Important considerations when designing a Class I Bikeway:

- Separation from traffic
- Shade to encourage use
- Connections with other bikeways and activity centers
- Well-designed street crossings, bike and pedestrian activated traffic signals, median islands, and warning signs
- Curb ramps and curb cuts that are convenient and conform to the Americans with Disabilities Act (ADA)
- Adequate trail width, sight distance, and drainage

FIGURE 15: CLASS I - MULTI-USE PATH

Provides a completely separated right-of-way for exclusive use of bicycles and pedestrians with crossflow minimized.

MUTCD R44A (CA)

Class II Bikeway (Bike Lane)

Class II bike lanes are on-street facilities that use striping, stencils, and signage to denote preferential or exclusive use by bicyclists. On-street bikes lanes are located adjacent to motor vehicle traffic. Bike lanes are intended to alert drivers about the predictable movements of bicyclists, and provide adequate space for comfortable riding. Current County standards require bike lanes on all new collectors, arterials, and thoroughfares. Class II bike lanes are a cost effective way to add bicycle facilities within the project area, including on Fair Oaks Boulevard, but they may not be comfortable for all riders based on the volume and speed of the adjacent traffic.

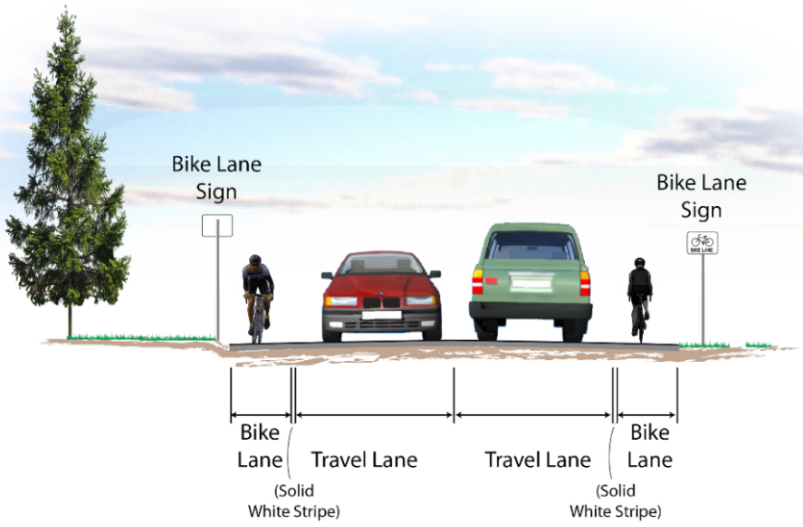


FIGURE 16: CLASS II - BIKE LANE

Provides a striped lane for one-way bike travel on a street or highway.

MUTCD R81 (CA)

Class III Bikeway (Bike Route)

Class III bike routes are on-street pavement markings or signage that inform both bicycle riders and drivers that they are sharing the roadway. Shared-lane markings, or sharrows, can be used to highlight bike routes and help bike riders avoid parked car door zones. Bike routes typically connect the bicycle roadway network and can be utilized to connect bicycle lanes or paths along corridors that do not provide enough space for dedicated lanes on low-speed and low-volume streets. The frontage roads along Fair Oaks Boulevard may be appropriate locations for Class III bike routes connecting to other dedicated facilities at each end.

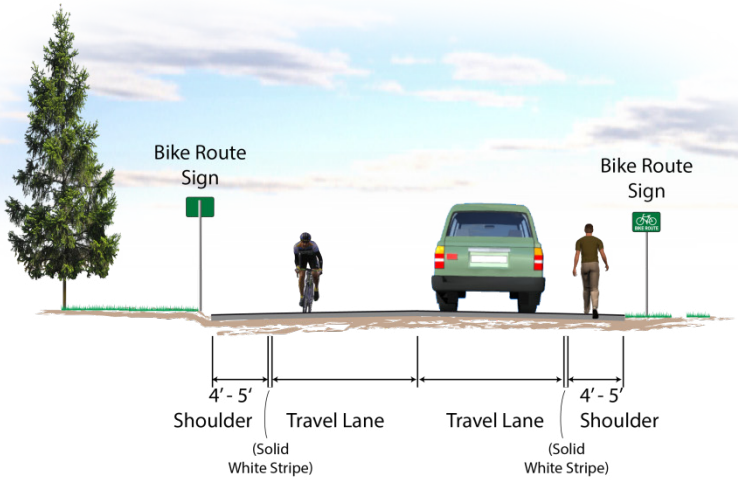


FIGURE 17: CLASS III - BIKE ROUTE

Provides a shared use with pedestrians or motor vehicle traffic, typically on lower volume roadways.

MUTCD D11-1

MUTCD R4-11

Class IV Bikeways (Separated Bikeways)

Class IV separated bikeways, commonly known as "cycle tracks," are physically separated bicycle facilities that are distinct from the sidewalk and designed for exclusive use by bicyclists. They are located within the street right-of-way, but provide similar comfort when compared to Class I multi-use paths. The key feature of a separated bikeway is a vertical element that provides further separation from motor vehicle traffic. Common vertical elements used for separation include a vertical curb, a painted buffer with flexible posts, parked cars, a landscaped area, or a fixed barrier. Separated bikeways may also be constructed by creating a bike lane at a height above the vehicular lanes. Separated bikeways can be either one-way or two-way, accommodating a single direction of travel or both.

The preferred bike lane width for a separated bikeway is seven feet to allow for passing and maintenance. Minimum buffer width should be three feet.

Streets with high vehicular volumes and speeds are appropriate candidates for separated bikeways since they increase the separation between bicyclists and motor vehicle traffic. Separated bikeways necessitate wider right-of-way than Class II and III facilities and are best placed in areas with fewer driveways, and thus require careful planning. Adjacent to the travel lanes of Fair Oaks Boulevard is a prime candidate for a separated bikeway.

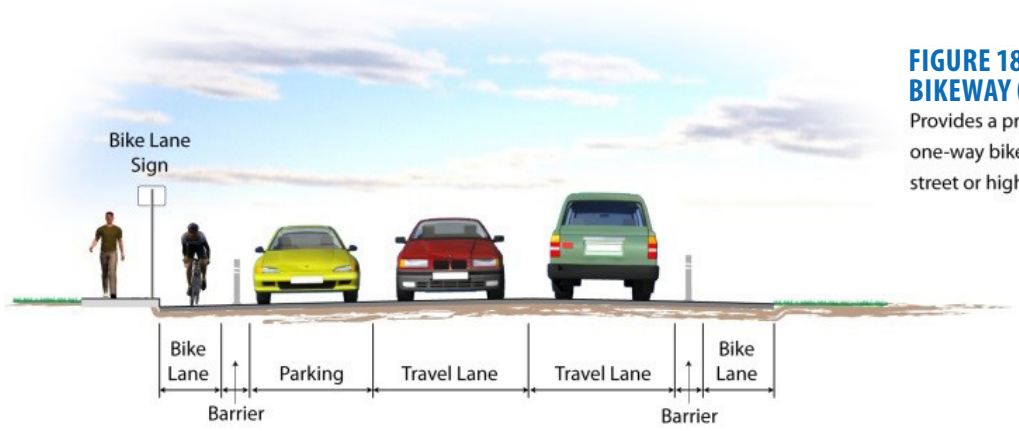


FIGURE 18: CLASS IV - SEPARATED BIKEWAY (ONE-WAY CYCLE TRACK)
Provides a protected lane for one-way bike travel on a street or highway.

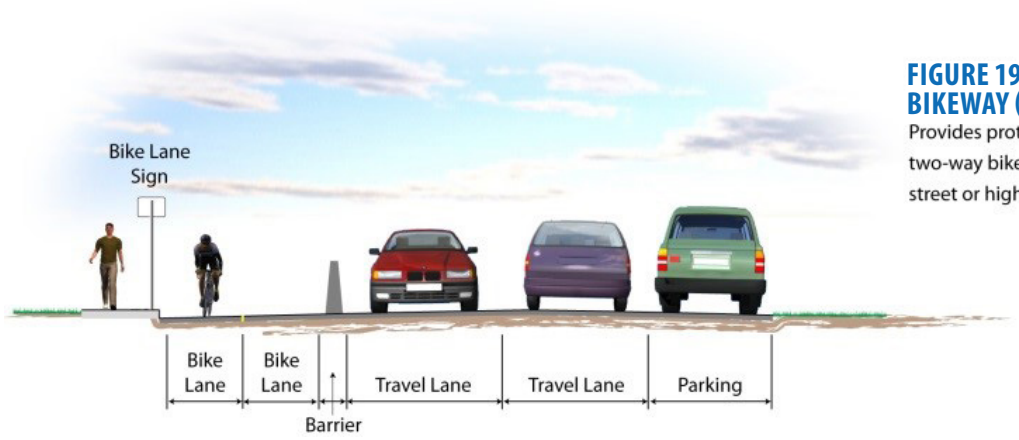


FIGURE 19: CLASS IV - SEPARATED BIKEWAY (TWO-WAY CYCLE TRACK)
Provides protected lanes for two-way bike travel on a street or highway.

Green Colored Pavement

Green bike lanes include colored pavement to call attention visually to conflict areas between bicyclists and motorists. Green markings are more likely to be used in high volume intersections and busy driveway locations. Recommended best practices for green bike lanes include:

- Focus green markings in locations that impact safety
- Use sparingly and prioritize high conflict areas to maximize effectiveness
- Use as a supplement to required markings
- Use skipped green in weaving areas

Green Colored Pavement Emphasizing Bike Lane

Green Colored Pavement in a Conflict Zone

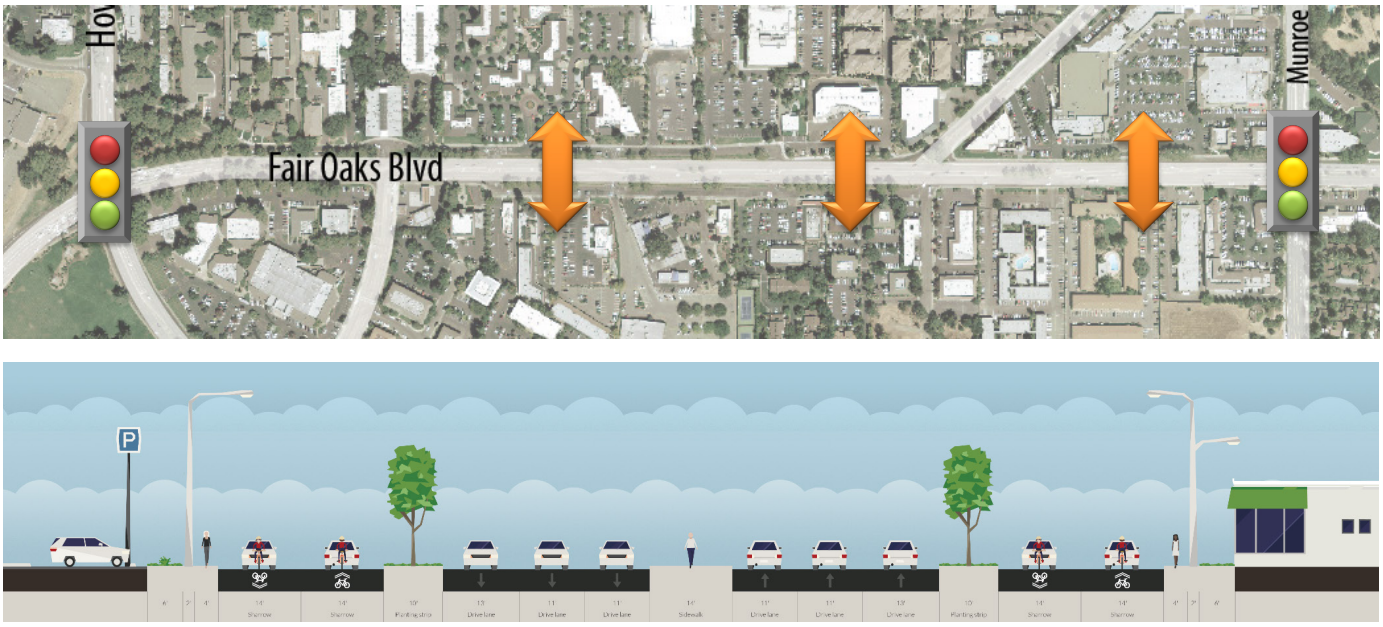
4.2 FAIR OAKS BOULEVARD CONCEPTS

To better understands the needs of the various users along the project corridor selected complete streets tools were combined to create corridor concepts around a basic theme or goal. These concepts were compared and contrasted and also vetted with project stakeholders and the community.

CONCEPT 1

Concept 1 is the least impactful of the concepts with a goal of achieving the basic needs of the corridor at the least project cost. The six travel lanes and all of the frontage roads are maintained as they are today. Class II bike lanes are added to the west of University Drive and East of Fulton Avenue along Fair Oaks Boulevard. In the central portion, Class III bike route and sharrows are added to the frontage roads for cyclists. Three signalized pedestrian crossings with median refuge areas are added near Pavilions, Zinfandel Grill, and Loehmann's Plaza. Pedestrian ramps and crosswalks are improved at all three cross streets, University Avenue, Fairgate Road, and Fulton Avenue. Traffic patterns would remain mostly unchanged except for the removal of some of the left turn access onto Fair Oaks Boulevard as feasible.

FIGURE 20: CONCEPT 1 CROSS-SECTION

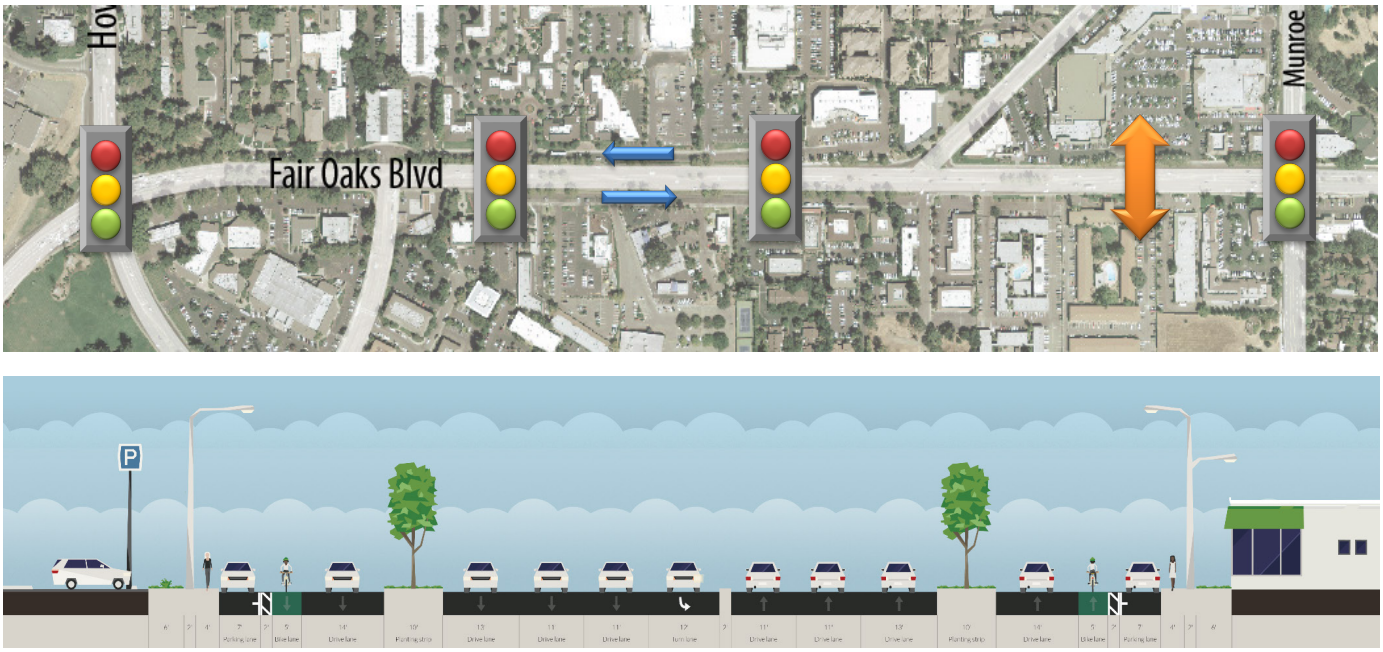


- **6 Travel Lanes, Two-way Frontage**
- **3 New Pedestrian Crossings**
- **Sidewalk Enhancements**
- **Bike Route with Frontage Roads**
- **Bike Lanes on ends of Fair Oaks Blvd**
- **Minimal Changes to Traffic Patterns**

CONCEPT 2

The second concept's goal is to achieve continuous Class II bike lanes along the entire corridor and creates simplified access to the frontage roadways with new traffic signals. The six travel lanes on Fair Oaks Boulevard are maintained, but the frontage roads are converted to one-way. The south frontage road would operate in the eastbound direction with complementary eastbound bike lanes. Conversely the north frontage road would be westbound. Two new full traffic signals would be added at the entrances to the frontage roadways allowing controlled left turns in and out of the frontage roads. A pedestrian only signal would be added near Loehman's Plaza. This concept also has the benefit of being able to increase the amount of parking along the frontage roads as needed by the adjacent businesses. There are moderate anticipated changes to the traffic patterns with the one-way frontage operations and the potential for wrong way driver and bicycle rider movements.

FIGURE 21: CONCEPT 2 CROSS-SECTION

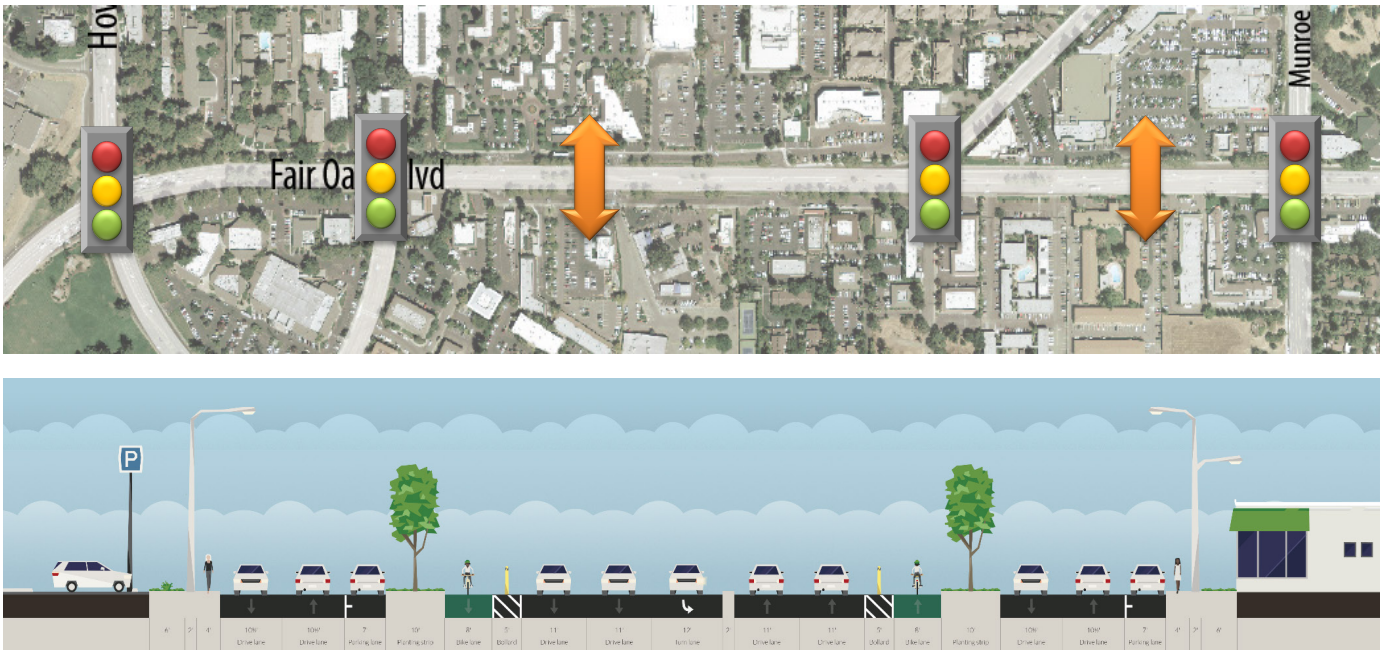


- **6 Travel Lanes, One-way Frontage**
- **3 New Pedestrian Crossings**
- **Sidewalk Enhancements**
- **Bike Lanes with Frontage Roads**
- **Bike Lanes on ends of Fair Oaks Blvd**
- **Moderate Changes to Traffic Patterns**

CONCEPT 3

The final concept's goal is to create a lower stress environment for bicycle riders and pedestrians. This concept focuses on slowing travel speeds and creating a Class IV Separated Bikeway along the project length. The number of travel lanes on Fair Oaks Boulevard are reduced to four lanes and the frontage roads are maintained in their existing two-way operation. Two new traffic signals are added at the University Drive and Fulton Avenue intersections. The traffic signals would allow for left turn access to and from these side streets that does not exist today. In particular, the Fulton Ave / Fair Oaks Boulevard signal would require enhancements to the intersection at Munroe Street / Fulton Ave / Sierra Boulevard. In addition, two new signalized pedestrian crossings or pedestrian hybrid beacons would be added near the Pavilions Shopping Center and Loehmann's Plaza. This option creates four signalized crossings of Fair Oaks Boulevard. The outside travel lane on the corridor would be converted to a Class IV Separated Bikeway with the use of a raised median curb and pavement delineation.

FIGURE 22: CONCEPT 3 CROSS-SECTION



- **4 Travel Lanes, Two-way Frontage**
- **4 New Pedestrian Crossings**
- **Sidewalk Enhancements**
- **Protected Bikeways on Fair Oaks Blvd**
- **Major Changes to Traffic Patterns**
- **Sierra Intersection Modifications**

TABLE 1: ALTERNATIVE COMPARISON

	CONCEPT		
	One	*Two*	*Three*
Cost	○	●	●
Remove Driver Conflict	○	◒	●
Accomodate Bike Rider	○	◒	●
Pedestrian Improvments	●	●	●
Changes in Traffic Patterns	○	○	◒
Impact to Business Access	○	◒	○
Frontage Parking	◒	●	◒

○ Low ◒ Medium ● High

4.3 ALTERNATIVES CONSIDERED BUT REJECTED

Concepts were explored that eliminated the frontage roads along Fair Oaks Boulevard in order to create pedestrian and bicycle enhancements as well as simplify the traffic operations along the corridor. After initial analysis both alternatives were rejected because significant driveway consolidation and elimination would be required. Currently the frontage roads act to consolidate driveway access, relative to Fair Oaks Boulevard, to a limited number of intersections. The medians contain many of the mature trees along the corridor and would result in a significant loss to the tree canopy. If in the future a large scale private redevelopment and consolidation of the parcels occurs it may be beneficial to reevaluate the removal of the frontage roads.

4.4 PRESENTATION OF THE PROPOSED CONCEPTS

A series of stakeholder and public outreach meetings occurred in September 2016 to solicit feedback.

4.4.1 CITY AND COUNTY BICYCLE ADVISORY COMMITTEE

On September 13th, 2016 the project team presented the overall project need and purpose along with the corridor concepts to the City and County Bicycle Advisory Committee (SABAC). The Committee members were in general support of the project with specific desires to see lower stress bikeways developed along the corridor.

4.4.2 PUBLIC WORKSHOP

The Sacramento County Department of Transportation and Fehr & Peers hosted a public meeting on September 15th, 2016 for the Fair Oaks Boulevard Complete Streets Project. More than 60 community members attended the meeting in the Sierra Oaks K-8 School Multi-Purpose Room, located at 171 Mills Road, Sacramento, CA 95864.

The purpose of the meeting was to engage the public to collect feedback on corridor concepts. The project team incorporated the feedback received at the meeting to develop a preferred alternative for the corridor. The meeting built on a previous meeting held in May 2016.

The format of the meeting included an "open house" style walk about as well as a formal presentation. Attendees visited multiple presentation boards and strip maps of proposed concepts and were encouraged to provide input and ask questions.

Fehr & Peers led a brief presentation that included background information about the project and three concepts based on stakeholder comments received at the May meeting.

After the presentation, participants were invited to fill out an exit survey. The table and chart at right summarizes exit survey feedback.

The survey responses showed that the majority of the participants were receptive to substantial changes on the corridor. While some survey responses included comments discouraging the reduction of travel lanes, Concept 3 had the highest support and showed the highest potential to

replace vehicle trips with walking or riding a bike.

4.4.3 ARDEN ARCADE COMMUNITY PLANNING ADVISORY COUNCIL

As a follow up to the public workshop, the team presented the corridor concepts to the Arden Arcade Community Planning Advisory Council, AACPAC, on September 22nd, 2016. There were approximately 20 community members in the audience in addition to the AACPAC members. The team answered questions clarifying the concepts and received input on removing proposed pedestrian connections to the Sierra Oaks Vista neighborhood on the east side of Munroe Street.

4.4.4 PROPERTY OWNERS

While developing the concepts for the corridor the project team held several small group stakeholder meetings with interested owners of property and businesses along Fair Oaks Boulevard between Howe Avenue and Munroe Street. Culminating in a letter of support, dated October 5th, 2016, the group advocated for near term crossing improvements and slowing traffic speeds while maintaining business access and providing better bicycle and pedestrian facilities; including a separated bikeway. See the appendices for the full letter.

FIGURE 23: SURVEY RESULTS

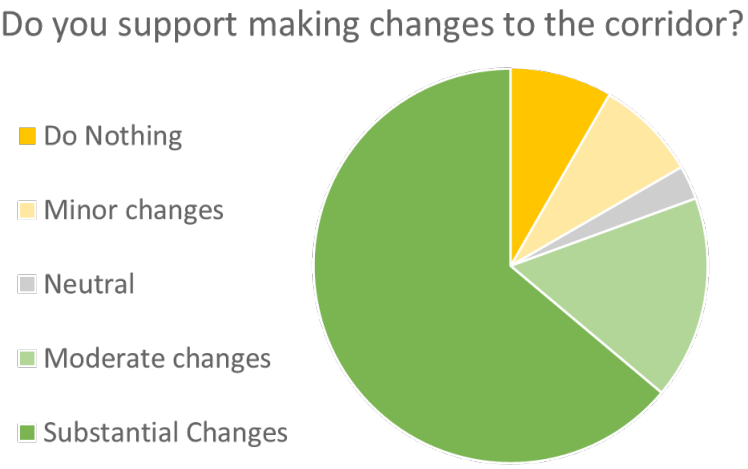


TABLE 2: SURVEY RESULTS

	SURVEY QUESTION	1	2	3	4	5
	Do you support maintaining the corridor in its current state (do nothing)?	(x3) (Do nothing)	(x3)	(x1)	(x6)	(x24) (Substantial changes)
CONCEPT 1	Do you support Concept 1 (6 lanes, pedestrian signals, bike routes, improved sidewalks)?	(x14) (Do not support)	(x9)	(x7)	(x5)	(x8) (Strongly support)
CONCEPT 1	Would you consider replacing automobile trips with walking or riding a bike with Concept 1?	(x28) (Unlikely)	(x4)	(x6)	(x1)	(x7) (Very likely)
CONCEPT 2	Do you support Concept 2 (6 lanes, frontage road signals, bike routes, improved sidewalks)?	(x13) (Do not support)	(x3)	(x11)	(x8)	(x9) (Strongly support)
CONCEPT 2	Would you consider replacing automobile trips with walking or riding a bike with Concept 2?	(x17) (Unlikely)	(x6)	(x3)	(x1)	(x13) (Very likely)
CONCEPT 3	Do you support Concept 3 (4 lanes, traffic signals at Fulton and University, protected bikeways, improved sidewalks)?	(x13) (Do not support)	(x5)	(x2)	(x6)	(x24) (Strongly support)
CONCEPT 3	Would you consider replacing automobile trips with walking or riding a bike with Concept 3?	(x11) (Unlikely)	(x3)	(x9)	(x3)	(x21) (Very likely)


RIGHT LANE
MUST
TURN RIGHT

5.0 RECOMMENDED ALTERNATIVE

After receiving input from the stakeholders and the public, conducting additional traffic analysis, and creating a planning level cost estimate, a preferred alternative was developed. The final recommendations were presented to the public on November 2nd, 2016 at a public workshop.

5.1 SHORT-TERM CORRIDOR IMPROVEMENTS

With the Bicycle and Pedestrian Grant from SACOG, the first phase of improvements can be implemented within the next one to two years. The immediate improvements would be to add two new pedestrian only signals with the possibility of converting them to pedestrian hybrid beacons with the full buildout, near the Pavilions shopping center and Loehmann's Plaza. The improvements would include bulb-outs at the frontage roads, high visibility crosswalk treatments of the frontage roads, pedestrian refuge islands at the medians, and pedestrian actuated signals that would stop traffic on Fair Oaks Boulevard. The project would include signal interconnect to the adjacent existing traffic signals to optimize and coordinate the new signals to minimize traffic interruption.

Visualization of Proposed Crossing Improvements

5.2 LONG RANGE CORRIDOR IMPROVEMENTS

5.2.1 TRANSPORTATION IMPROVEMENTS

The preferred alternative was developed based on major themes from Concept 3. New traffic signals will be added at the University Avenue / Fair Oaks Boulevard and Fulton Avenue / Fair Oaks Boulevard Intersections in addition to two new pedestrian signals or hybrid beacons near Pavilions and Loehmann's Plaza. Significant changes would be made at the Munroe Street / Sierra Boulevard intersection to accommodate new northbound traffic coming from Fulton Avenue.

The outside travel lane on Fair Oaks Boulevard will be converted to separated bikeways along with green paint conflict marking and upgraded signals to accommodate bicycle riders. The pedestrian realm would be enhanced with wider sidewalks where appropriate in addition to improvements to the crosswalks at the side streets. Pedestrian scale street lighting, new canopy trees, and landscaping will be enhanced with roadway modifications.

FIGURE 24: IMPROVED FIVE-LEGGED INTERSECTION AT FULTON AVENUE / SIERRA BOULEVARD / MUNROE STREET

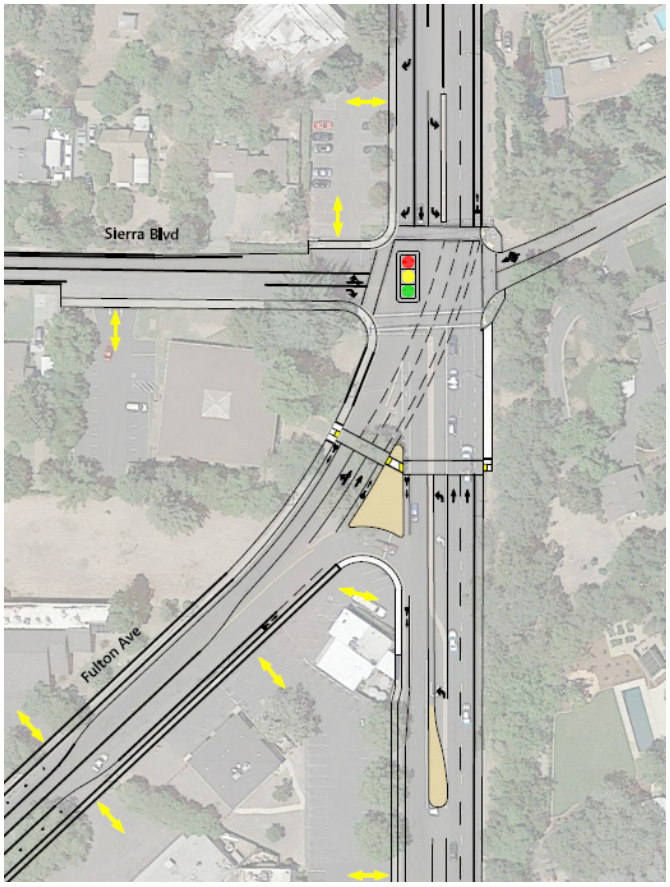
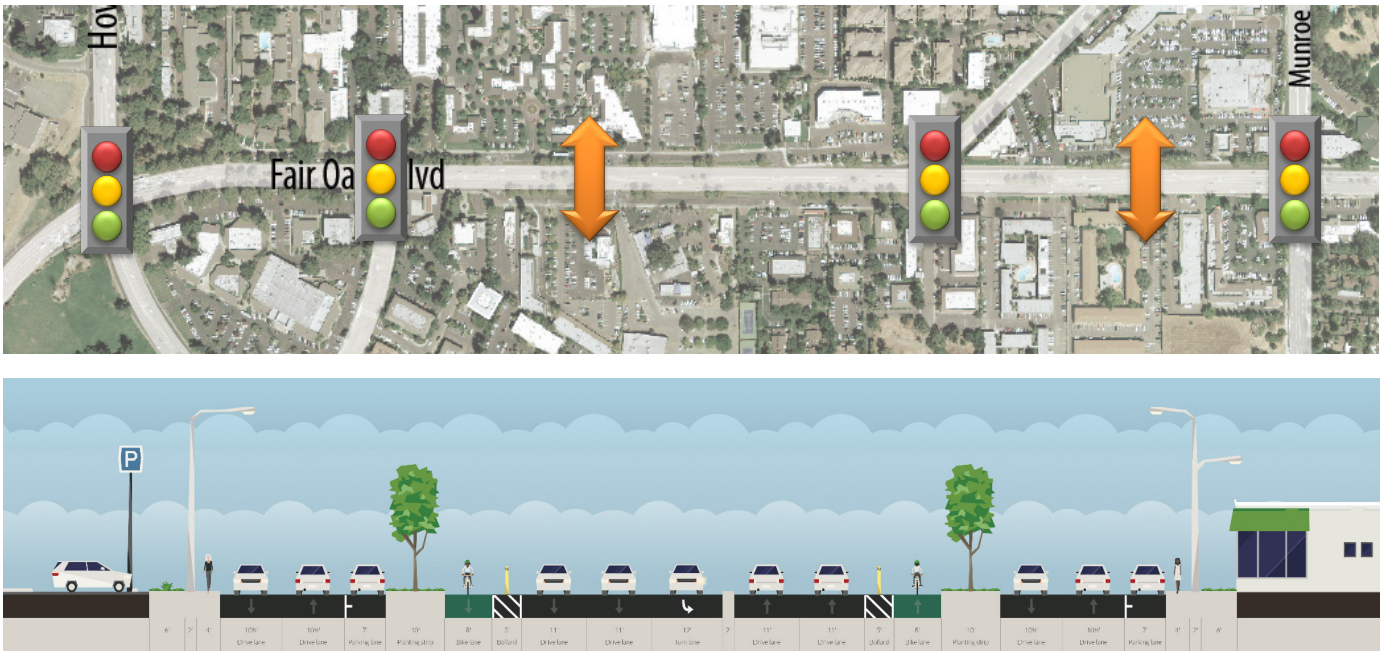


FIGURE 25: PREFERRED ALTERNATIVE CROSS-SECTION



SACRAMENTO COUNTY

PLACEHOLDER FOR FOLDOUT MAP

PLACEHOLDER FOR FOLDOUT MAP

5.3 RECOMMENDED FUTURE STUDIES

As part of the master planning process and community outreach, numerous projects outside of the study corridor were identified for future study and analysis.

5.3.1 MUNROE STREET SOUTH OF FAIR OAKS BOULEVARD AND LATHAM DRIVE

The City of Sacramento staff is currently looking at pedestrian crossing improvements to Munroe Street at Latham Drive. The project team heard numerous comments at the workshops that this improvement is still a very high priority project for the neighborhood and should be implemented as soon as funding is procured. The need for the project will increase over time with pedestrian improvements to the Fair Oaks Boulevard corridor as more people choose to walk and ride. The County has identified completing the sidewalk gap on the east side of Munroe Street just south of Fair Oaks Boulevard as a priority as funding becomes available.

5.3.2 FAIR OAKS BOULEVARD – MUNROE STREET TO WATT AVENUE

The segment of Fair Oaks Boulevard, to the east of the study area, from Munroe Street to Watt Avenue is currently a five lane roadway with two travel lanes in each direction and a two-way left turn lane. There is a narrow Class II bike lane next to a roadside ditch. The posted speed is 40 mph and the area is not conducive to walking on the shoulder. There was a desire expressed by the public to add sidewalks to connect the neighborhood to both retail destinations at either end. The project is on the County's sidewalk infill request list and is noted as a high priority project in the Pedestrian Master Plan.

5.3.3 SIERRA BOULEVARD – HOWE AVENUE TO MUNROE STREET

Sierra Boulevard to the north of the study area has implemented traffic calming measures and has seen a noticeable difference in the speed of cars traveling along the boulevard. Although much of Sierra Boulevard has sidewalks, some of them even separated to County Standards, there are numerous gaps in the pedestrian route. Access to transit and other destinations would be significantly improved with sidewalk gap closures.

5.3.4 FAIR OAKS BOULEVARD – AMERICAN RIVER PARKWAY TO HOWE AVENUE

Within the City of Sacramento, this section of Fair Oaks Boulevard should be evaluated to extend the proposed bikeway improvements to the American River Parkway bike trail and beyond to CSUS. There are currently two westbound lanes, which are compatible to the future project and no pedestrian or bicycle facilities exist on the north side of the J Street Bridge. Fortunately, there are three eastbound lanes that will need to be reduced or modified to match future project conditions and a pedestrian path on the south side of the J Street Bridge. It may be feasible to construct a two-way cycle track on the south side of Fair Oaks Boulevard with minimal right of way acquisition, but additional study is required

5.3.5 AMERICAN RIVER DRIVE

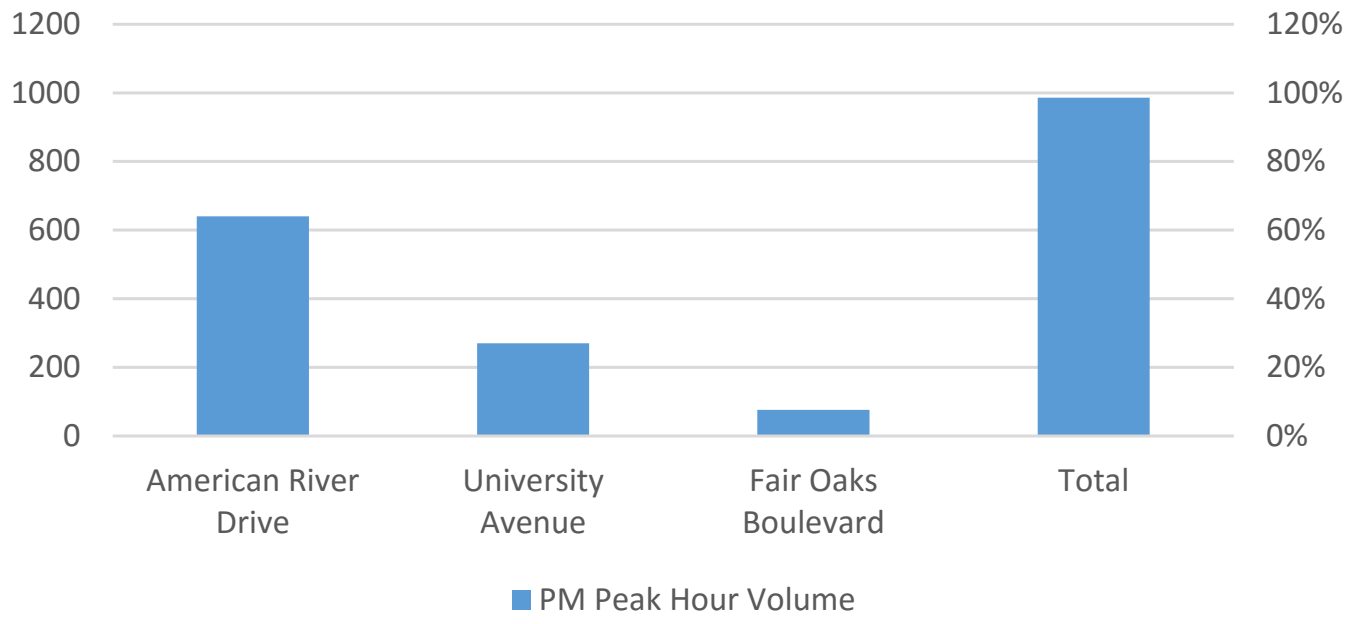
One of the key areas of concern from the neighborhood was along American River Drive, where residents are impacted by high volumes of traffic using American River Drive to bypass congestion at the Howe Avenue/Fair Oaks Boulevard intersection. This results in high delays and long vehicle queues that impact residential access, as well as higher vehicle speeds on less congested segments of American River Drive during the peak hours.

As discussed in Chapter 2.0, the study corridor is located at the confluence of two of the five river crossings at J Street and Howe Avenue. With so few river crossings, demand for the J Street and Howe Avenue crossings is substantial, especially during the evening commute period. Due to significant delays and long vehicle queues on the approaches to the Howe Avenue / Fair Oaks Boulevard intersection, drivers use roadways like American River Drive to bypass the intersection's congestion. Today, 65 percent of the traffic traveling northbound on Howe Avenue during the PM peak hour (i.e., with a destination to the north and east), make a northbound right-turn on American River Drive.

Consequently, a lot of the traffic using American River Drive during the PM peak hour does not live in the neighborhood. This condition will not change in the future as peak hour travel conditions on the study corridor are expected to remain similar to today, since travel demand is constrained by the river crossing and by the capacity of the Howe Avenue / Fair Oaks Boulevard intersection.

As the project is implemented on Fair Oaks Boulevard it will be necessary to monitor potential traffic changes in the area. Monitoring should include regular peak period traffic counts and vehicle speeds.

FIGURE 26: EXISTING NORTHBOUND HOWE AVENUE RIGHT-TURN VOLUME (PM PEAK HOUR CONDITIONS)



SACRAMENTO COUNTY


76
SPECIALTY
RETAIL CENTER

6.0 TRAFFIC OPERATIONS

This chapter discusses the short-term and long-range traffic operations with the recommended alternative. The operations analysis presents corridor performance measures including intersection level of service and delay, corridor travel time for all vehicles entering the corridor, average vehicle speed, and mid-corridor spot speed.

6.1 ANALYSIS PERIOD

The transportation analysis is conducted under existing conditions, due to limited capacity of the transportation system to deliver traffic to the study corridor and due to low population and employment growth forecasts along the corridor.

As discussed previously, the American River has only five crossings west of the City of Folsom to provide critical arterial-level access for communities north and south of the river. The study corridor is located at the confluence of two of the five river crossings, at J Street and Howe Avenue. Consequently, demand for the J Street and Howe Avenue crossings is substantial, especially during the evening commute period, and as a result peak hour travel on Fair Oaks Boulevard is metered, meaning that there is more demand for travel than can be delivered to the corridor. This condition will not change in the future as peak hour travel conditions on the study corridor are expected to remain similar to today, due to capacity constraints at the river crossings and by the capacity of the Howe Avenue/Fair Oaks Boulevard intersection. These constraints are manifest in the long vehicle queues drivers experience today.

The Fair Oaks Boulevard corridor and surrounding community hosts a vibrant and diverse mix of land uses. These uses include a concentration of employers that support 5,900 retail and non-retail jobs and a blend of housing products that include over 2,800 single family and multi-family households. The primary corridor is largely built out and has relatively low vacancy rates, compared to less centrally located commercial areas in more suburban areas of our region. This speaks to the success of the community, but also to the likelihood of significant population and employment growth in the corridor. The Sacramento Area Council of Governments (SACOG) forecasts growth of about 150 households and 180 non-retail employees (i.e., employment equivalent to about 40,000 square feet of office land use) north and south of and along Fair Oaks Boulevard.

6.2 ANALYSIS METHODS

Corridor operations were analyzed using methodologies from the Highway Capacity Manual (Transportation Research Board, 2010). The analysis procedures were applied using the Synchro/SimTraffic 9 software. Traffic simulation analysis was selected as the analysis method so that the queue interactions between adjacent signals and between turn pockets and through lanes could be modeled more accurately. In addition, the software more accurately models the interaction of vehicles and pedestrians to capture the effect on intersection operations. A 15-minute analysis period was selected, and an average of ten simulation model runs are reported.

The simulation model was calibrated to local conditions by adjusting driver and vehicle parameters based on past experience on northern California projects. The model was validated to observed queues at the study intersections during the peak hours. To validate the model, the peak hour factor was applied in the simulation model so that the observed queue lengths would be modeled accurately. To be consistent with the County of Sacramento's standard analysis procedures, the analysis results were generated with the peak hour factor set to 1.0 to represent average hourly conditions.

6.3 ANALYSIS THRESHOLDS

The Sacramento County General Plan Policy CI-9 identifies LOS E as acceptable for roadway system operations in urban areas. The City's 2035 General Plan (adopted on March 3, 2015) identifies LOS F for Howe Avenue from US 50 to Fair Oaks Boulevard. In addition, Policy M 1.2.2(E) acknowledges that if maintaining an identified LOS standard would, in the City's judgement be infeasible and/or conflict with the achievement of other goals, LOS F conditions (or worsening LOS F conditions) may be acceptable provided that provisions are made to improve the overall system, promote non-vehicular transportation, or implement vehicle trip reduction measures as part of a development project or a city initiated project.

6.4 CORRIDOR PERFORMANCE (INTERSECTION LOS & DELAY)

Table 3 compares existing PM peak hour intersection operations on Fair Oaks Boulevard between Howe Avenue and Munroe Street and at the Fulton Avenue/Munroe Street/Sierra Boulevard intersection (including the Munroe Street / U-turn movement) to operations with the proposed sort-term and long-range improvements of the recommended alternative.

As shown in Table 3, the addition of the short-term and long-range improvements would result in the following changes to operations at the study intersections:

Howe Avenue/Fair Oaks Boulevard – The addition of the short-term and long-range improvements would worsen LOS F conditions.

University Avenue/Fair Oaks Boulevard – With the short-term improvements, the addition of two pedestrian signals will result in increased delay for the westbound left-turn movement that would cause the LOS to change from LOS E to LOS F. This change in operation is primarily due to the change in arrival patterns associated with the pedestrian signals east of the intersection that create more platooned (i.e., less random) arrivals to the westbound left-turn movement.

With the long-range improvements, reduction in eastbound and westbound lanes would result in increased delay even with the addition of a traffic signal that would cause the LOS to change from LOS E (for the WB left-turn movement) to LOS F (average delay for all movements). The northbound and southbound approaches will experience the highest delay.

TABLE 3: PEAK HOUR INTERSECTION OPERATIONS – EXISTING CONDITIONS WITH RECOMMENDED ALTERNATIVE

INTERSECTION	CONTROL		PM PEAK HOUR[1]		
	Current Configuration	*Recommended Alternative*	*Current Configuration*	*Recommended Alternative*	
				Short-Term	*Long-Range2*
Howe Ave/Fair Oaks Blvd	Signal	Signal	**F / 106**	**F / 108**	**F / 122**
University Ave/Fair Oaks Blvd	SSSC	Signal	E / 48 (WB LT)	**F / 59 (WB LT)**	**F / 82**
Fulton Ave/Fairgate Rd/Fair Oaks Blvd	SSSC	Signal	**F / 70 (NB LT)**	**F / 71 (NB LT)**	D / 54
Munroe St/Fair Oaks Blvd	Signal	Signal	D / 48	D / 52	D / 47
Fulton Ave/Munroe St/Sierra Blvd	Signal	Signal	B / 20	B / 19	D / 35
Munroe St/U-turn	UNC		**F / 50 (SB UT)**	E / 45 (SB UT)	-
Fair Oaks Blvd/Pavilions Crossing		Signal	-	A / 9	B / 13
Fair Oaks Blvd/Loehmann's Crossing		Signal	-	C / 34	D / 36

Notes:

AWSC = All-way Stop Control. SSSC = Side-street Stop Control, UNC = Uncontrolled.

[1]Average delay (rounded to the nearest second) and LOS for signalized and all-way stop-controlled intersections is the weighted average for all movements. Average delay and LOS at side-street stop-controlled intersections shown for both worst-case side street movement (in parentheses) and intersection as a whole.

[2]LOS results for the Long-Range improvements assume

Bold text identifies facility that operates at or worse than identified LOS threshold.

Source: Fehr & Peers, 2017

Fulton Avenue/Fairgate Road/Fair Oaks Boulevard – With the short-term improvements, the addition of two pedestrian signals will result in one second increase in delay for the northbound left-turn movement, which operates at LOS F with the current configuration. Although the pedestrian signals will change vehicle arrival patterns, the break in eastbound and westbound traffic flow on Fair Oaks Boulevard will create gaps in traffic for vehicles entering and existing Fairgate Road.

With the long-range improvements, the addition of traffic signal control would result in LOS D operation. The southbound approach would experience the highest delay.

Munroe Street/Fair Oaks Boulevard – The intersection would continue to operate at LOS D with the short-term and long-range improvements. Delay would increase from 48 to 52 seconds with short-term improvements due the pedestrian crossing at Loehmann's Plaza. Delay would decrease from 48 to 47 seconds with long-range improvements due to the proposed traffic signal at the Fair Oaks Boulevard/Fulton Avenue intersection.

Fulton Avenue/Munroe Street/Sierra Boulevard – The intersection would continue to operate at LOS B with the short-term improvements. With the long-range improvements, which include modification to the intersection to accommodate northbound through movements, the intersection would operate at LOS D.

Munroe Street/U-turn – With the short-term improvements, the intersection would continue to operate at the LOS E/F threshold.

Fair Oaks Boulevard/Pavilions Crossing – The intersection would operate at LOS A and B with the short-term and long-term improvements, respectively.

Fair Oaks Boulevard /Loehmann's Crossing – The intersection would operate at LOS C and D with the short-term and long-term improvements, respectively. The delay is higher than at the other pedestrian crossings, since turning movements at the adjacent driveways are included in the intersection.

6.5 CORRIDOR PERFORMANCE (VEHICLE QUEUES)

Table 4 compares existing PM peak hour corridor travel time on Fair Oaks Boulevard between Howe Avenue and Munroe Street to operations with the proposed short-term and long-range improvements of the recommended alternative.

TABLE 4: AVERAGE MAXIMUM QUEUE LENGTH – EXISTING CONDITIONS WITH RECOMMENDED ALTERNATIVE

INTERSECTION	STORAGE [FEET]	AVERAGE MAXIMUM QUEUE [FEET]		
		Current Configuration	*Recommended Alternative*	
			Short-Term	*Long-Range2*
Eastbound				
University Ave/Fair Oaks Blvd	800 (210 LT)	150 (LT)	200	875
Fulton Ave/Fairgate Rd/Fair Oaks Blvd	450 (215 LT)	n/a	n/a	575
Munroe St/Fair Oaks Blvd	375 (230 LT)	575	400	400
Fair Oaks Blvd/Pavilions Crossing	160	n/a	350	450
Fair Oaks Blvd/Loehmann's Crossing	650	n/a	450	600
Westbound				
University Ave/Fair Oaks Blvd	600 (190 LT)	450 (LT)	250 (LT)	475
Fulton Ave/Fairgate Rd/Fair Oaks Blvd	300 (155 LT)	100 (LT)	100 (LT)	475
Munroe St/Fair Oaks Blvd	800 (290 LT)	375	425	400
Fair Oaks Blvd/Pavilions Crossing	140	n/a	350	400
Fair Oaks Blvd/Loehmann's Crossing	440	n/a	300	300

Notes:

Bold text identifies maximum queue that exceeds available storage.

Source: Fehr & Peers, 2017

6.6 CORRIDOR PERFORMANCE (TRAVEL TIME)

Table 5 compares existing PM peak hour corridor travel time on Fair Oaks Boulevard between Howe Avenue and Munroe Street to operations with the proposed short-term and long-range improvements of the recommended alternative.

As shown in Table 5, average travel time will increase with the short-term and long-range improvements. With the short-term improvements, average travel time will increase by about 30 seconds (eastbound and westbound) due to the addition of the two pedestrian signals. With the long-range improvements, average travel time will increase by about 2.4 minutes eastbound and by about 1.7 minutes westbound, due to the addition of the two pedestrian signals and two full-access traffic signals.

Intersection at Fair Oaks Boulevard and Howe Avenue

TABLE 5: PEAK HOUR TRAVEL TIME – EXISTING CONDITIONS WITH RECOMMENDED ALTERNATIVE

PERFORMANCE MEASURE	OFF-PEAK CURRENT CONFIGURATION	PM PEAK HOUR[1]				
		Current Configuration	*Recommended Alternative*		*Difference*	
			Short-Term	*Long-Range[2]*	*Short-Term*	*Long-Range[2]*
Eastbound						
Average Travel Time [Minutes][1]	1.5	2.1	2.7	4.5	+0.6	+2.4
Westbound						
Average Travel Time [Minutes][1]	1.5	2.1	2.6	3.8	+0.5	+1.7

Notes:

[1]Average travel time for all users of the corridor, including vehicles traveling through without stopping and vehicles traveling to/from services on the corridor.

Source: Fehr & Peers, 2017

Table 6 compares eastbound PM peak hour travel time on Fair Oaks Boulevard with the long-range improvements to the current configuration. Travel times are compared for a vehicles traveling from east of Howe Avenue to west of Munroe Street to alternative routes along Sierra Boulevard and American River Drive.

As show in Table 6, travel along Fair Oaks Boulevard would be faster than using alternative routes on Sierra Boulevard or American River Drive.

FIGURE 27: EASTBOUND ROUTES THROUGH STUDY AREA

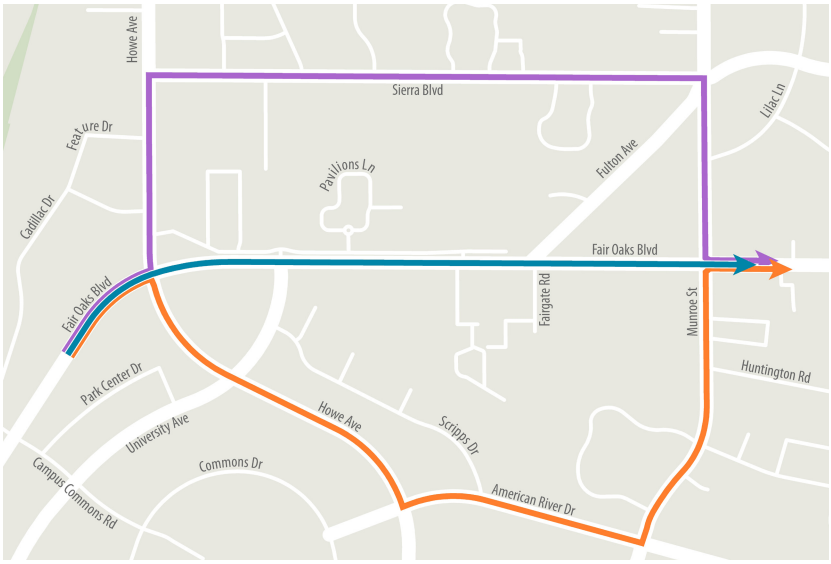


TABLE 6: TRAVEL TIME (ROUTE COMPARISON) – EXISTING CONDITIONS WITH RECOMMENDED ALTERNATIVE

PERFORMANCE MEASURE	TRAVEL ROUTE		
	Fair Oaks Boulevard	*Alternative Route*	
		Sierra Boulevard	*American River Drive*
Eastbound			
Travel Time [Minutes]1	4.9	5.9	6.7
Difference (Alternative Route – Fair Oaks Boulevard)		1.0	1.8

Source: Fehr & Peers, 2017

6.7 CORRIDOR PERFORMANCE (VEHICLE SPEED)

Table 7 compares existing PM peak hour corridor vehicle speed on Fair Oaks Boulevard between Howe Avenue and Munroe Street to operations with the proposed short-term and long-range improvements of the recommended alternative. The comparison includes average travel speed, mid-corridor spot speed, and the low and high spot speed.

As shown in Table 7, average speed will decrease with the short-term and long-range improvements. Average speed is the measured speed for all users of the corridor and include vehicles traveling through the corridor without stopping and vehicles traveling to/from services on the corridor. The mid-corridor spot speed shows less variation, but does represent the influence of traffic signal control. The mid-corridor spot speed is most representative of conditions that would be experienced by a motorist traveling through the corridor without stopping. However, during off-peak periods, spot speeds would be closer to free flow conditions, since drivers would be less likely to have to stop at signalized intersections. To corridor users that walk and bike, lower speeds create a safer and more comfortable environment.

TABLE 7: PEAK HOUR TRAVEL SPEED – EXISTING CONDITIONS WITH RECOMMENDED ALTERNATIVE

PERFORMANCE MEASURE [MILES/HOUR]	PM PEAK HOUR[1]			
	Current Configuration		*Recommended Alternative*	
	Off-Peak	*Peak*	*Short-Term*	*Long-Range*[2]
Eastbound				
Average Speed	-	29	24	13
Mid-Corridor Spot Speed	45	36	35	25
Low/High Spot Speed	-	7 / 36	5 / 36	5 / 25
Westbound				
Average Speed	-	27	22	13
Mid-Corridor Spot Speed	45	35	35	22
Low/High Spot Speed	-	4 / 38	4 / 35	4 / 22

Notes:

[1]Average speed for all users of the corridor, including vehicles traveling through without stopping and vehicles traveling to/from services on the corridor.

[2]Mid-Corridor Spot Speed measured at the current eastern access to the westbound frontage road.

Source: Fehr & Peers, 2017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7.0 FUNDING & IMPLEMENTATION

The Fair Oaks Boulevard Complete Street Master Plan is a long range planning document that has taken a holistic look at access and mobility on Fair Oaks Boulevard between Howe Avenue and Munroe Street within unincorporated County limits and City of Sacramento. The long term recommendations described in the document do not have specific funding sources identified for implementation like those in typical Capital Improvement Programs or Regional Transportation Plans. However, there are a number of ways that the improvements in the Plan can be implemented with assistance from both public and private entities.

7.1 PROJECT COSTS AND PHASING

7.1.1 LONG RANGE IMPROVEMENTS

Preliminary cost estimates for all improvements identified in the Fair Oaks Boulevard Complete Street Master Plan are approximately $6.5M -$8M between Howe Avenue and Munroe Street, excluding any cost to underground utilities. With these costs it may not be practical to construct the project in its entirety as a single construction project. Instead, the project will likely have to be phased in segments or with incremental improvements based on funding.

7.1.2 SHORT TERM IMPROVEMENTS

The two pedestrian signals currently have about $700,000 allocated for implementation of the near term project elements. These improvements can be installed after environmental clearance and final design have been completed. It is anticipated that they would be operational by 2018.

7.2 PRIVATE INVESTMENT

Private developers can be responsible for the design and construction of some of the improvements outlined in the Plan as redevelopment or frontage improvements occur. The advantage of this approach is that it reduces the amount of public money used to implement these improvements. The Plan is critical in this case as it will help ensure that property owners are developing their frontage to the same ultimate roadway cross section. The challenge with relying solely on developer driven projects is that the improvements will be constructed segmentally over a potentially much longer timeframe and will be limited to property frontages only.

7.3 PUBLIC INVESTMENT

The advantage of the publicly funded projects is that they can be built on a set timeline based on available funding and span multiple properties or jurisdictions. The challenge with public funding projects is that they are dependent on the project competing well for local, regional, State, or Federal grants. There are many funding sources that may be applicable for Fair Oaks Boulevard. The Fair Oaks Boulevard Complete Street Master Plan is a critical piece in being competitive for these various regional funding sources through their funding programs. A key set of the funding sources are available through SACOG's Regional Flexible Funding Programs including the Regional Bicycle & Pedestrian, Community Design, and Regional/Local Programs.