

Final Report for the San Pablo Avenue Complete Streets Study

Prepared for:
Cities of San Pablo and Richmond



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EXECUTIVE SUMMARY

INTRODUCTION

The San Pablo Avenue Complete Streets Study focuses on improvements to multimodal access and safety along San Pablo Avenue between Rivers Street to the south and Hilltop Drive to the north in the cities of Richmond and San Pablo, California. The study identifies needs and prioritizes improvements to facilitate auto, pedestrian, bicycle and transit trips within and through the corridor.

The City of San Pablo partnered with the City of Richmond and Contra Costa Health Services (CCHS) to engage residents, key stakeholders and partner agencies. All workshops were conducted in both Spanish and English and childcare was provided. The following community workshops were held to gather input from stakeholders throughout this project:

- Community Workshop #1 – Community Walk and Design Workshop, to identify priorities and challenges and to develop potential solutions for the corridor
- Community Workshop #2 – Complete Streets Design Options for San Pablo Avenue, to discuss and gather feedback about conceptual alternatives in order to identify a preferred alternative
- Community Workshop #3 – Discussion of Proposed Design, to present the preferred alternative and discuss questions and critical issues

EXISTING CONDITIONS AND NEEDS ASSESSMENT

Pedestrians and bicyclists traveling along San Pablo Avenue face significant challenges. The existing environment does not effectively accommodate pedestrians and bicyclists for several reasons:

- The posted speed limit increases from south to north through the study area, from 35 mph at Rivers Street, to 45 mph at Robert Miller Drive, to 50 mph at the approach to Hilltop Drive.
- Vehicle lanes are very wide.
- Sidewalks are missing between Rivers Street and Hilltop Drive.
- Intersection crossing treatments are limited and marked crosswalks are present only at Rivers Street and Hilltop Drive.
- San Pablo Avenue includes two lanes in each direction and left turn lanes at most intersections. A wide, dedicated right turn lane on San Pablo Avenue at the northbound approach to Robert Miller Drive leads to high speed turns and a double left turn lane on Robert Miller Drive at the eastbound approach to San Pablo Avenue also leads to high speed turns and creates visibility conflicts with pedestrians.
- Designated bicycle facilities are not present along San Pablo Avenue within the study area.

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CORRIDOR IMPROVEMENTS

Baseline Improvements

A number of baseline corridor improvements were identified to address basic pedestrian and bicycle safety and mobility in the corridor, and were considered in the development of all concept alternatives:

- Basic pedestrian facilities are necessary between Rivers Street and Hilltop Drive.
- Intersections should be redesigned with smaller corner radii and marked crosswalks to reduce speeds, improve visibility and emphasize pedestrian safety and access.
- Marked crosswalk and pedestrian signal heads should be provided at the Robert Miller Drive intersection
- The northbound, right-turn slip lane from San Pablo Avenue onto Robert Miller Drive should be repurposed as a shared pedestrian and bicycle facility, and northbound right turning vehicles should access Robert Miller Drive from a new right turn lane within a compact intersection that can continue to accommodate truck traffic.
- Designated bicycle facilities are necessary and should at least provide access between Rivers Street and Robert Miller Drive to connect to Hilltop Mall.
- Bicycle lanes should be buffered¹ due to the highway-like vehicle conditions, especially north of Robert Miller Drive.
- The existing raised median may be realigned but should be maintained as a physical barrier between northbound and southbound traffic.
- Vehicle travel lanes should be at least 11 feet wide to facilitate transit vehicle access.

Initial Concept Plans

Three concept plans were presented to the community:

- Concept 1A – Basic sidewalk plus bicycle lanes to Hilltop Mall with four vehicle lanes
 - Includes a 4-lane roadway for vehicle travel
 - Provides pedestrian facilities throughout the corridor, on both sides of San Pablo Avenue south of Robert Miller Drive and on the west side north of Robert Miller Drive; west side sidewalk connects through Wanlass Park south of Robert Miller Drive
 - Provides on-street buffered bicycle lanes in both directions between Rivers Street and Robert Miller Drive for access to Hilltop Mall
 - Requires some expansion beyond the existing paved right-of-way
- Concept 1B - Sidewalk plus full corridor bicycle lanes with four vehicle lanes
 - Includes a 4-lane roadway for vehicle travel

¹ A buffered bicycle lane includes a standard width bicycle lane adjacent to the curb or edge of road, with an additional buffer between the bicycle lane and nearest vehicle lane. Depending on the specific setting, the buffer can be painted or physically separated with flexible bollards or landscaping.

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- Provides pedestrian facilities adjacent to the roadway throughout the corridor, on both sides of San Pablo Avenue south of Robert Miller Drive and on the west side north of Robert Miller Drive
- Provides on-street buffered bicycle lanes throughout the corridor in both directions between Rivers Street and Hilltop Drive
- Requires significant expansion beyond the existing paved right-of-way with retaining walls at several locations
- Concept 2 - Sidewalks and full corridor bicycle lanes with two vehicle lanes
 - Includes a 2-lane roadway with reduction in travel lanes
 - Provides pedestrian facilities adjacent to the roadway throughout the corridor, on both sides of San Pablo Avenue south of Robert Miller Drive and on the west side north of Robert Miller Drive
 - Provides on-street buffered bicycle lanes in both directions between Rivers Street and Hilltop Drive
 - Requires minimal expansion beyond the existing paved right-of-way

PREFERRED CONCEPT PLAN

The workshop and team charrette identified a preferred alternative based on a combination of elements from Concept Plan #1B (primary) and Concept Plan #1A (secondary), including:

- West-side sidewalk adjacent to the roadway throughout the corridor
- East-side sidewalk connecting Rivers Street and Robert Miller Drive
- Additional west-side pedestrian connection path between Robert Miller Drive and Wanlass Park following the existing right-of-way
- Northbound and southbound buffered bicycle lanes between Rivers Street and Hilltop Drive
- New traffic signal at La Puerta Drive
- Reconfiguration of Robert Miller Drive intersection to continue accommodating existing truck traffic and create a conventional three-way, signalized intersection with pedestrian crossings at all three legs
- Enhancements to the Rivers Street and San Pablo Avenue intersection with a focus on improving pedestrian crossings and visibility on the northwest corner

FINAL PLAN

The final community workshop provided feedback and highlighted the importance of high visibility crossing treatments for both bicyclists and pedestrians. The preferred concept plan was updated to address this and the Final Plan also includes the following details:

- Throughout the corridor:
 - Green bicycle lanes
 - Continuous bicycle lanes through intersections, including across all minor street crossings, with green skip-striping through the intersections adjacent to the striped crosswalks
- Between Robert Miller Drive and Rivers Street:

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- Speed feedback sign in the southbound direction
- At Robert Miller Drive:
 - Continuous northbound bicycle lane through the Robert Miller Drive intersection, with green skip-striping
 - Continuous southbound bicycle lane as a solid green lane across the west edge of the intersection
 - A continuous bicycle lane for through, southbound bicycle traffic and a jug-handle turning/queuing area for left-turning southbound bicycle traffic to the right of the through bicycle lane, which directs left turning bicyclists to the skip striping across the intersection, connecting to the eastbound bicycle lane on Robert Miller Drive
 - A “mixing zone,” where the westbound bicycle lane on Robert Miller Drive meets the proposed right and left turn lanes is marked with 50 feet of skip striping across the entire width of the right lane, followed by 50 feet of solid green bicycle left- and right-turning lanes at the approach to the intersection
- At Hilltop Drive:
 - At Hilltop Drive the northbound bicycle lane continues through the intersection with green skip striping, as at minor street crossings
 - Shared pedestrian and bicycle crosswalk across the north leg of the intersection at Hilltop Drive

IMPLEMENTATION

The cities of San Pablo and Richmond submitted a request for funding for environmental review, final design and implementation of the Final Concept to the Metropolitan Transportation Commission (MTC) in Spring 2013 through the One Bay Area Grant (OBAG) call for projects. The project was awarded full funding through this highly competitive process. The cities are now preparing to release a Request for Proposals from teams for the implementation effort.

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INTRODUCTION

The *San Pablo Avenue Complete Streets Study* seeks to improve multimodal access and safety along San Pablo Avenue between Rivers Street to the south and Hilltop Drive to the north. Through this corridor, San Pablo Avenue functions as a high-speed arterial. It also serves as the main connection for local trips between northern San Pablo residential neighborhoods, central San Pablo, Hilltop Mall, Contra Costa College and other important destinations. The corridor lacks designated facilities for pedestrians and bicyclists, creating a very challenging environment for walking, bicycling and transit use. Despite these conditions, people walk and bike the corridor every day.

This study is funded by a Caltrans Environmental Justice (EJ) Transportation Planning Grant. The State Highway Account funds projects with EJ grants to promote community involvement in planning and improve mobility, access and safety while facilitating economic opportunity, equity, environmental protection and affordable housing for low-income, minority and Native American communities. EJ grant-funded projects focus on transportation and community development issues that address the interests of under-represented communities by supporting livable and sustainable community concepts with a transportation mobility objective to improve quality of life.

The *San Pablo Avenue Complete Streets Study* is focused on improving multimodal access, safety and connections along the San Pablo corridor by identifying needs and prioritizing improvements to facilitate pedestrian, bicycle and transit trips. This process has been driven by a public outreach effort that brought together surrounding residents, business owners, partner agencies and other key stakeholders to ensure that the final plan recommendations are both relevant to, and supported by, the local community.

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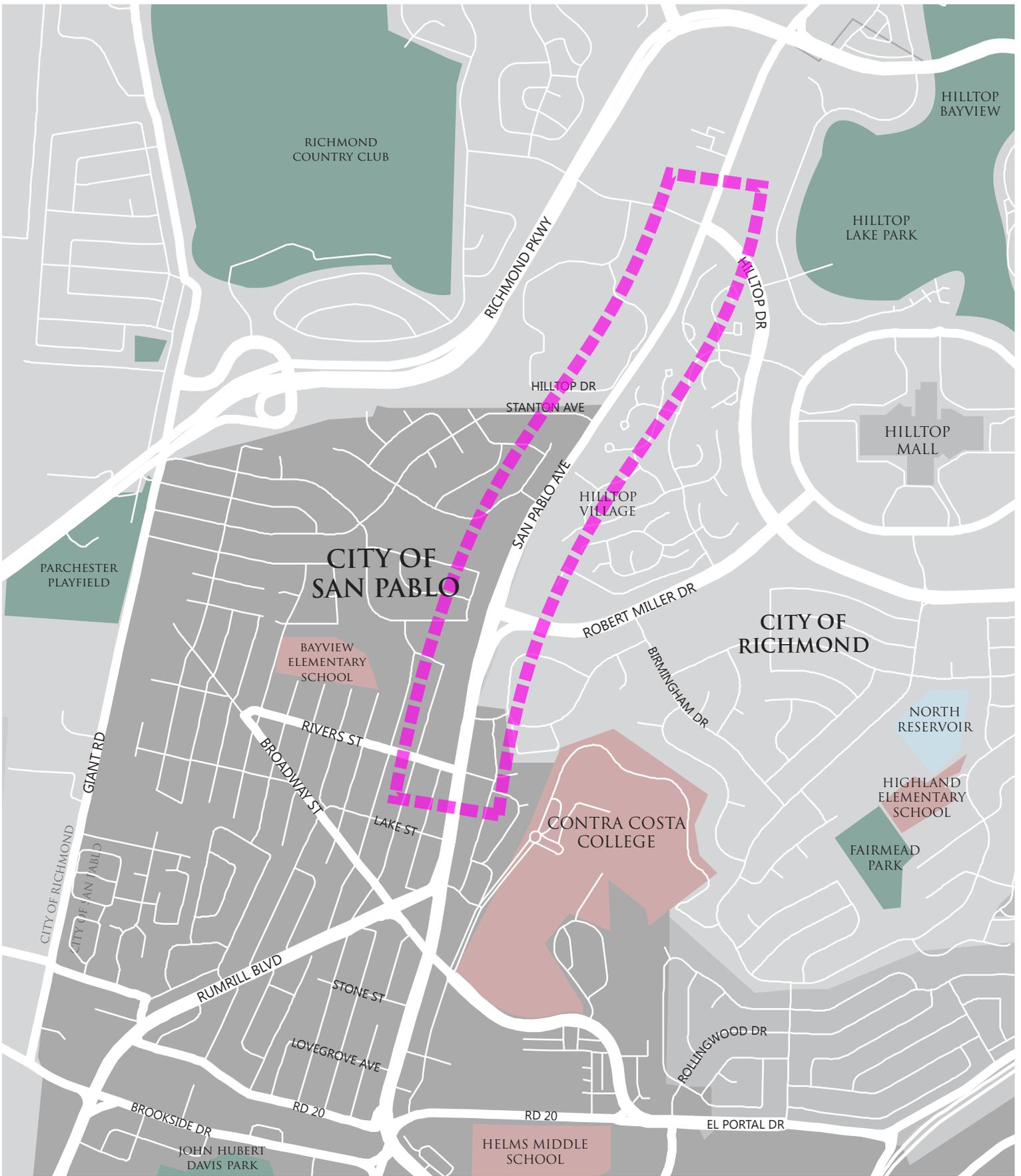
BACKGROUND

Improving multimodal access and connections along the San Pablo Avenue corridor is a key objective of multiple plans adopted by the City of San Pablo and City of Richmond. The San Pablo Avenue Complete Streets Study will accomplish this objective by identifying needs and prioritizing improvements to facilitate pedestrian, bicycle and motorized transit access and improve safety for all users.

The study segment of San Pablo Avenue between Rivers Street and Hilltop Drive marks the northern end of San Pablo's urban core, as it transitions into a more suburban context. The City of San Pablo borders the west edge of San Pablo Avenue from Stanton Avenue and south. The City of Richmond borders the east edge of San Pablo Avenue from Lancaster Drive and north. The San Pablo Avenue roadway is within the City of Richmond's jurisdiction for the majority of the study area.

Contra Costa College is located just east of San Pablo Avenue between Broadway Street and Rivers Street, within the City of San Pablo. Hilltop Mall is located east of the study area, accessible from San Pablo Avenue via Hilltop Drive and Robert Miller Drive, within the City of Richmond. These two land uses are the largest destinations in the study area, and attract regional users. All other streets within the study area serve residential neighborhoods, local primary schools, local government services, and neighborhood parks. Bayview Elementary School is located west of the study area on 16th Street in the City of San Pablo, less than half a mile from San Pablo Avenue. Highland Elementary School is located east of the study area on Moyers Road in the City of Richmond, approximately 1.3 miles from San Pablo Avenue. Helms Middle School is located just south of the study area on Road 20 in the City of San Pablo, approximately one mile from San Pablo Avenue.

Interstate 80 runs parallel to San Pablo Avenue, approximately one mile east of the study area. San Pablo Avenue is often used as a local alternate route to I-80, and the routes are parallel from the City of Richmond to the south through the City of Hercules to the north. **Figure 1** shows the study area and nearby land uses.



Not to Scale

San Pablo Avenue Complete Streets Corridor Study Area

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PUBLIC OUTREACH

This project used a robust and non-traditional public outreach approach to ensure that the final plan recommendations were both relevant to, and supported by, the local community. The City of San Pablo partnered with the City of Richmond and Contra Costa Health Services (CCHS) to engage residents, key stakeholders and partner agencies.

CCHS staff conducted extensive outreach to schools, community groups, neighborhood councils and public programs, in addition to canvassing the corridor and adjacent neighborhoods. Additionally, CCHS worked to ensure that community residents had the knowledge to fully participate in the decision making process. Specifically, CCHS conducted a series of trainings for local groups on the principles and practice of complete streets, environmental justice, and healthy and safe built environments. These workshops developed a particularly strong relationship with First 5 Contra Costa and their West County Regional Group. This group of First 5 representatives became informed and vocal partners in the process, attending workshops, contributing ideas, and helping to mobilize other residents. Ultimately, the participation of the West County Regional group helped to ensure that local knowledge and priorities were centered in the final plan.

Public participation drove the planning process throughout this project and the project schedule was built around three Community Workshops that were held to gather input from stakeholders:

- **Community Workshop #1 - September 27, 2012, Community Walk and Design Workshop**
During the initial phase of the project, residents and stakeholders were invited to walk the corridor with the project team to identify priorities and challenges, and to develop potential solutions for the corridor.
- **Community Workshop #2 - November 15, 2012, Complete Streets Design Options for San Pablo Avenue**
The project team translated the stakeholder input and existing conditions analysis into conceptual alternatives and presented these for discussion and public feedback at the second community workshop in order to identify a preferred alternative.
- **Community Workshop #3 - February 19, 2013, Discussion of Proposed Design**
The project team refined the preferred alternative based on local and regional priorities and presented this at the final community workshop to discuss details, technical questions and critical issues.

All workshops were conducted in both Spanish and English. Childcare was provided to facilitate participation of parents with young children who may not otherwise be able to attend evening meetings. All workshops were held during the evening, and a light meal was provided for all participants and their children.

Summaries of stakeholder input and community workshop details are included throughout this report within the descriptions of Corridor Improvements, Initial Concept Plans and the Preferred Concept Plan.

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EXISTING CONDITIONS AND NEEDS ASSESSMENT

STUDY PURPOSE AND NEED

The posted speed limit along San Pablo Avenue increases progressively from 35 mph at Rivers Street to 50 mph at Hilltop Drive. Pedestrian and bicycle facilities such as sidewalks, bicycle lanes and marked crossings are few, and the distances between controlled intersections are increasingly wide. These attributes create a challenging environment for walking and bicycling, which affects public transit access. As a result, the corridor functions as a high-speed arterial for vehicles, rather than a key multimodal regional connector. Despite these existing conditions, San Pablo residents do walk and bicycle along this roadway. Future changes to surrounding land uses, particularly in the Hilltop area, will likely increase demand for walking and bicycling facilities along this corridor.



High speed limit on San Pablo Avenue

Safety and Access

Pedestrians and bicyclists traveling along San Pablo Avenue face significant challenges. The study area is dominated by high speed traffic along the wide arterial with few crossing opportunities. Pedestrians are legally allowed to cross the roadway at all intersections unless otherwise marked. The east leg of the San Pablo Avenue and Hilltop Drive intersection is officially closed to pedestrians. While all other unmarked intersections within the study area are legal crossings, only two intersections are signalized with marked crosswalks across San Pablo Avenue: Rivers Street and Hilltop Drive. These marked, controlled crossings are over one mile in distance from one another.

In addition, the corridor is largely isolated from surrounding neighborhoods. Cross streets are curved and separated from the historical grid network immediately south of the study area. There are no “eyes on the street,” meaning that pedestrians, cyclists, and public transit dependent individuals are not only exposed to high speed traffic, but may feel alone and vulnerable when walking or bicycling in this environment. The grade and curvature of the roadway further contributes to this experience



Sidewalk gaps on San Pablo Avenue

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by limiting sightlines and visibility. Substantial physical changes to the corridor and greater connectivity to adjacent land uses will be required to change this experience. Thoughtful streetscape and landscape design will be important elements in addressing these issues.

While San Pablo Avenue does not provide dedicated facilities to accommodate bicyclists and pedestrians today, these roadway users are already present. Signs of current use include “goat tracks” (as shown in the photo) along the sparsely vegetated roadway embankments without sidewalks. Additional pedestrian and bicycle volumes would likely result from infrastructure improvements for these users.

Pedestrian and Bicycle Collision Analysis

Data on pedestrian-vehicle and bicycle-vehicle collisions in and around the study area also illustrate patterns of use. **Figure 2** shows the locations of pedestrian and bicyclists involved in collisions with vehicles between 2000 and 2010, from the Statewide Integrated Traffic Records System (SWITRS), a database of collision information gathered from collision scenes. This data set only includes information from reported collisions, which typically undercounts actual collisions involving pedestrians and bicycles.

Clusters of pedestrian and bicycle collisions or “hot spot” locations may indicate difficult conditions and areas of high pedestrian and bicycle activity. However, the absence of collisions does not necessarily suggest that a location is safer, but instead may reflect that people do not feel comfortable walking or bicycling there.

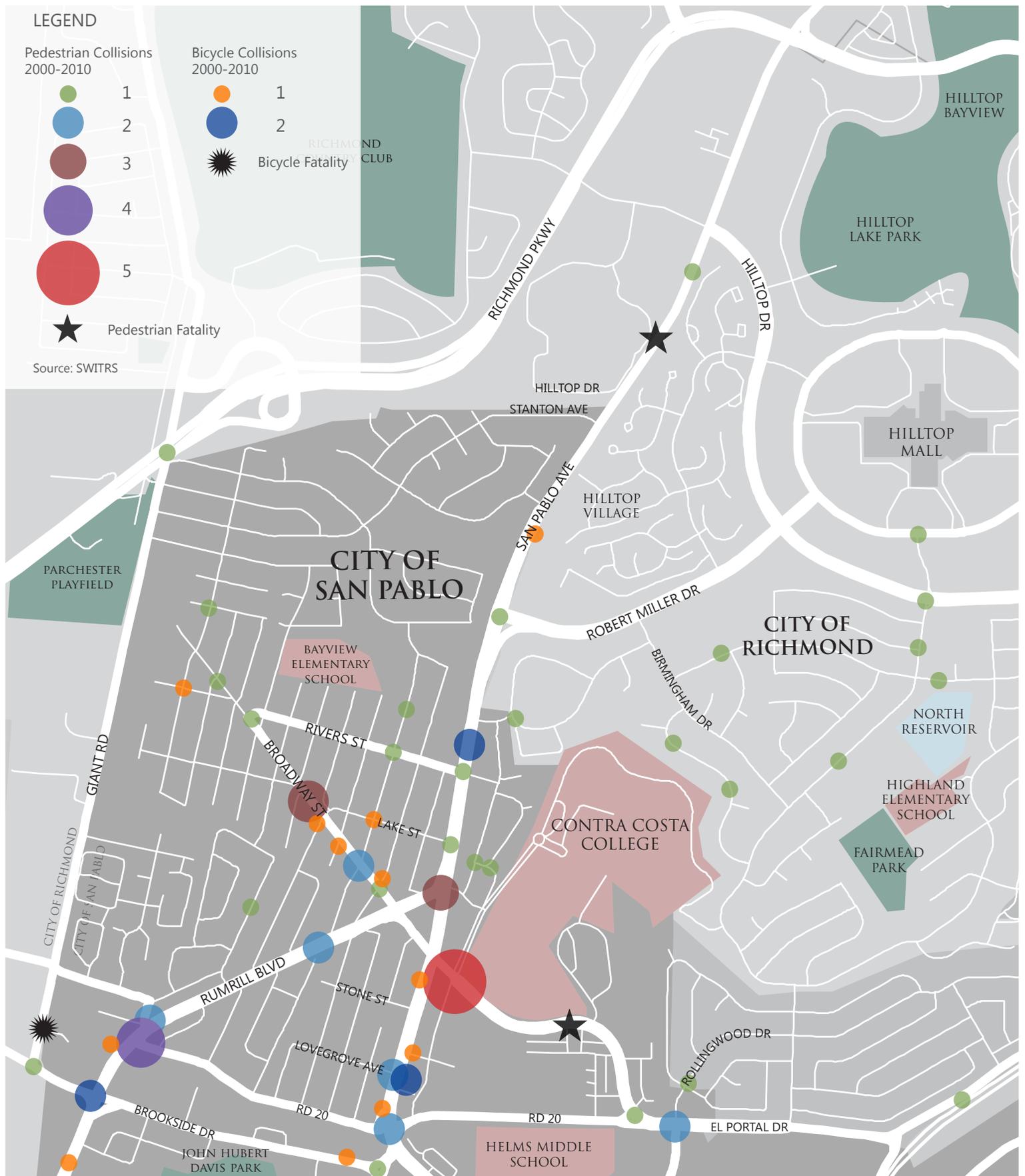
Pedestrian collisions were reported on San Pablo Avenue at the following locations:

- Fatality collision between Hilltop Drive and Stanton Avenue
- Collision just south of Hilltop Drive
- Collision at the Robert Miller Drive intersection
- Collision at the Rivers Street intersection

Bicycle collisions were reported on San Pablo Avenue at the following locations:

- Two collisions at the Rivers Street intersection
- Collision just south of Stanton Avenue

Several other clusters of bicycle collisions were reported near the study area on San Pablo Avenue south of Rivers street, on Broadway Street west of San Pablo Avenue, on Rumrill Boulevard and on Brookside Drive. One bicycle fatality was recorded on Giant Road near Trenton Boulevard, just over one mile from the study area. The study corridor and surrounding streets are used for bicycling with the current traffic and road facility conditions, which indicates that bicycle activity would likely increase if conditions are improved.



PEDESTRIAN AND BICYCLE COLLISIONS 2000-2010

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Existing and Future Pedestrians and Bicycle Commuters

Knowing how many people walk and bike, and for what purposes, can help the Cities of San Pablo and Richmond develop effective projects and programs to better serve the community. A common term used in describing travel demand is “mode split.” Mode split refers to the form of transportation a person chooses to take, such as walking, bicycling, public transit, or driving, and is often used in evaluating commuter alternatives, where the objective is to increase the percentage of people selecting an alternative means of transportation to the single-occupant (or drive-alone) automobile. The table below presents 2006-2010 American Community Survey data for the journey-to-work mode split for the Cities of San Pablo and Richmond, compared to the United States, California and Contra Costa County. As shown, driving is the predominate means of commuting in San Pablo and Richmond, but at a much lower share compared to county, state, and national levels. The walk and bike modes are both low, but transit is higher than average, especially in Richmond.

TABLE 1: EXISTING JOURNEY TO WORK					
Mode	United States	California	Contra Costa County	City of Richmond	City of San Pablo
Drive Alone	76%	73%	70%	63%	62%
Carpool	10%	12%	12%	16%	21%
Transit	5%	5%	9%	15%	10%
Bike	<1%	1%	<1%	<1%	<1%
Walk	3%	3%	2%	2%	1%
Other	5%	6%	6%	4%	6%
Total	100%	100%	100%	100%	100%

Source: 2006-09 U.S. Census Bureau American Community Survey (ACS) and 2006-2010 ACS

Walking or biking to work is not always an accurate indicator of overall pedestrian and bicycle activity, since commute trips only represent a portion of all trips taken by residents. Residents also take walking and biking trips when traveling between their home and transit, or between their vehicle and transit. Additionally, the journey-to-work data does not represent the trips San Pablo and Richmond residents take to go shopping, to school, or to social activities. Journey-to-work data should not be misinterpreted for several reasons:

- Journey-to-work data only represents commute trips, which tend to be longer than shopping, school, recreation, and other trips, and are therefore less compatible with walking.
- Journey-to-work data does not account for commuters with multiple modes of travel to and from work, such as commuters who walk to a bus stop before transferring to transit for the remainder of their journey to work.

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- No separate accounting of shopping, school, or recreational trips is made in the Census; these trips make up more than half of the person² trips on a typical weekday and a significantly greater proportion on the weekend. These trips also tend to be short to medium in length and are therefore very well suited for walking.
- Journey-to-work reports information for adult work trips, but does not request data on school trips, which are much more likely to be walking trips because school-aged individuals cannot drive until the latter half of their high school years.

The following table summarizes walking estimates for commute and non-commute trips. According to the U.S. Census American Community Survey data (2009 updates) approximately 25,500 student age persons live in San Pablo and Richmond. The MTC estimates that approximately five percent of students walk to school in the Bay Area; therefore, San Pablo and Richmond would have approximately 1,270 students walking to school. Approximately 7,700 San Pablo and Richmond workers commute by transit. BART and AC Transit estimate that approximately two percent of transit riders throughout their service area walk to transit stops, which would amount to approximately 150 transit riders in San Pablo and Richmond. Since Richmond and San Pablo both have higher than average numbers of people who take transit, more than 2 percent of transit riders likely walk to transit.

TABLE 2: SAN PABLO AND RICHMOND WALKERS BY TRIP GROUP

Trip Group	Daily Walk Commuters	Percentage of Walking Trips
Workers (Home-to-Work Trips)	860	38%
Students (Home-to-School Trips)	1,270	56%
Transit Riders (Home-to-Transit Trips)	150	7%
Total	2280	100%

Source: 2006-2010 ACS; Fehr & Peers, 2012

Improvements to pedestrian and bicycle facilities in the study area will likely draw additional users and increase the share of pedestrian and bicycle trips in the area. This is an important strategy to meet local goals for walking and biking mode share.

² According to the FHWA, a person trip is a trip by one person in any mode of transportation. If more than one person is on the trip, each person is considered as making one person trip. For example, four persons traveling together in one auto account for four person trips.

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COORDINATION WITH LOCAL, REGIONAL, STATE AND FEDERAL PLANS AND POLICIES

A number of local, regional and state plans and policies are in place to support multimodal access and operations along San Pablo Avenue. Several recent local planning studies include design and planning recommendations for San Pablo Avenue through the cities of Richmond and San Pablo. These plans focus on San Pablo Avenue’s role as an important arterial connecting East Bay communities, and as a designated Contra Costa County Route of Regional Significance that provides regional access through Contra Costa and Alameda Counties. Key recommendations related to the San Pablo Avenue corridor study area and related landscape and engineering framework are summarized in the table below.

TABLE 3: RELATED PLANS AND STUDIES	
Document	Policies and Recommendations
City of San Pablo, <i>San Pablo General Plan 2030 (2011)</i>	<p>Land Use</p> <ul style="list-style-type: none"> Improve land use and transportation planning through policies that promote mixed use development along transit corridors and develop an interconnected system of walkways and bicycle routes. <p>Bicycle and Pedestrian Circulation</p> <ul style="list-style-type: none"> Provide Class II bicycle lanes to connect to major destinations within the City, especially Contra Costa College Prioritize street improvements in areas that do not currently include pedestrian facilities Sidewalks should be a minimum of eight feet wide in Pedestrian Priority Zones (south of Rivers Street on San Pablo Avenue) San Pablo Avenue is in the Green Street overlay zone, which comprises a network of pedestrian corridors with connections to commercial destinations, public facilities, parks and open space with street trees throughout <p>Landscape Elements</p> <ul style="list-style-type: none"> Large canopy street trees such as Oaks (<i>Quercus</i> sp.) or London Plane Trees (<i>Platanus</i> sp.) throughout the city, and a coordinated color palette and pedestrian-scale amenities along San Pablo Avenue to promote the creation of a festive walking atmosphere <p>Healthy Transportation and Physical Activity (from Chapter 8, Health)</p> <ul style="list-style-type: none"> Ensure that San Pablo residents have access to a variety of transportation and physical activity options Expand the multimodal transportation system and create a safe pedestrian-oriented environment Coordinate with the Safe Routes to School program in partnership with Contra Costa Health Services (Bayview Elementary School is located with the study area, approximately half a mile west of San Pablo Avenue off of Rivers Street)

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TABLE 3: RELATED PLANS AND STUDIES	
Document	Policies and Recommendations
City of San Pablo, <i>San Pablo Avenue Specific Plan</i> (2011)	<ul style="list-style-type: none"> The study area for the Specific Plan is 2.25 linear miles along San Pablo Avenue from Hilltop Drive at the north to Rheem Avenue at the south Focus on walkability, access to destinations, a variety of housing options, community facilities and open space and improved accessibility San Pablo North segment includes Brookside Drive to Rivers Street and calls for pedestrian scale lighting, specialty paving and bus shelters Include consistent bike racks, comfortable street furnishings, street trees, curb extensions at crossings, wayfinding signage and street banners to reinforce the streets identity
City of Richmond, <i>General Plan 2030</i> (2012)	<p>Circulation</p> <ul style="list-style-type: none"> Make improvements to the network of existing streets, sidewalks and trails to enhance safety and comfort for pedestrians and bicyclists Promote walkable neighborhoods and livable streets Create a safe and well-maintained circulation system Ensure an efficient movement of goods Promote sustainable and green practices Promote walking and bicycling as a safe and convenient mode of transportation Allow flexible Level of Service (LOS) standards to create streets that balance all modes of travel Identify gaps in the network, major travel routes and priority safety improvements Require concurrent infrastructure development for projects that may have a significant impact on the existing circulation system including streets, trails, sidewalks, bicycle paths and public transit Promote mixed-use urban streets that balance public transit, walking and bicycling with other modes of travel and plan, construct and maintain a safe, comprehensive and integrated bicycle and pedestrian system <p>Energy and Climate Change</p> <ul style="list-style-type: none"> Work toward creation of an urban landscape that will reduce reliance on private automobiles Encourage safe and convenient bicycle use by residents, employees and visitors <p>Landscape Design and Development Guidelines</p> <ul style="list-style-type: none"> The Public Works Department document discusses appropriate plant materials and water efficient irrigation and landscape design requirements <p>Community and Wellness</p> <ul style="list-style-type: none"> Connect major destinations such as parks, open spaces, civic facilities, employment centers and retail and recreation areas with pedestrian and bicycle infrastructure Promote shared roadways in residential streets Require new development and redevelopment projects to provide pedestrian and bicycle amenities, streetscape improvements and linkages to planned and completed City and regional multi-use trails Develop safe routes to schools and out-of-school programs that allow access by bicycle and pedestrian paths or reliable and safe transit

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TABLE 3: RELATED PLANS AND STUDIES	
Document	Policies and Recommendations
Richmond Bicycle & Pedestrian Master Plans (2010)	<ul style="list-style-type: none"> Implement Class II Bicycle Lane on San Pablo Avenue, Robert Miller Drive and Hilltop Drive Create streets, sidewalks and surroundings that “calm” traffic, improve the comfort and mobility for people of all ages and abilities, and provide a positive environment for interaction and community pride Implement pedestrian-friendly design solutions in locations where there have been collisions involving pedestrians, and focus on “change areas” in the new General Plan, which present opportunities for revitalization Give special attention to the neighborhood streets; railroad tracks and crossings; corridors that change from residential to commercial and industrial development; dead-end locations; and freeway on and off ramps and overpasses Street trees were identified as a top priority for pedestrian plan improvements
Richmond’s <i>Parks and Public Landscaping Standards</i>	<ul style="list-style-type: none"> Specifies materials and procedures for proper landscape installation including irrigation, soil preparation, planting and hardscape features
CCTA West County (WCCTAC) <i>Action Plan Update</i> (2009)	<p>San Pablo Avenue Regional Route of Significance Recommendations</p> <ul style="list-style-type: none"> Create alternate parallel bikeways such as the Richmond Greenway and links to the Bay Trail Monitor and potentially expand San Pablo Avenue Rapid Bus Continue funding for SMART Corridor to provide real-time traffic information Maintain LOS E or better on all SPA intersections Discourage I-80 diversion traffic <p>Multi-Modal Transportation Service Objectives for WCCTAC</p> <ul style="list-style-type: none"> Maintain levels of transit satisfaction (3.2/5.0 on AC Transit Passenger survey) Maintain SOV rate of less than 75% during peak periods Increase transit ridership by 10% between 2007-2012 Increase bicycle and pedestrian mode splits to 3% for commute trips by 2012 Maintain 2007-levels of on-time performance for buses
WCCTAC Transit Enhancement Strategic Plan	<p>Contra Costa College (CCC) Transit Hub evaluated to increase transit ridership with specific strategies that improve access to transit centers and routes</p> <ul style="list-style-type: none"> The facility serves buses, and provides both a location to access CCC, as well as a transfer point for local and regional AC Transit and WestCAT bus routes Connecting roadways, including San Pablo Avenue, Rivers Street and Robert Miller Drive have heavy, fast moving traffic and are challenging areas to walk and bicycle New sidewalks and streetscape improvement projects are recommended at several locations throughout the study area

These local plans are in keeping with the goals and priorities of regional and state plans:

- The **Contra Costa Countywide Pedestrian and Bicycle Plan** (2009) outlines goals and key investments to reduce the rate of pedestrian and bicycle fatalities and injuries and increase the share of all trips made by walking and bicycling in Contra Costa County. The plan encourages

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local jurisdictions to plan for improvements to pedestrian and bicycle infrastructure with local pedestrian and bicycle plans and identifies San Pablo Avenue as a key north-south multi-jurisdictional connection.

- The Metropolitan Transportation Commission (MTC) has a **Regional Bicycle Plan** for the San Francisco Bay Area. The regional bicycle network includes 319 miles of bike routes in Contra Costa County, of which 181 miles (almost 60 percent) have been built or are fully funded and awaiting development.
- In 2001 Caltrans adopted a routine accommodation policy for the state in the form of **Deputy Directive 64, "Accommodating Nonmotorized Travel."** The directive was updated in 2008 as "Complete Streets—Integrating the Transportation System." The new policy required Caltrans to recognize bicycle, pedestrian, and transit modes as integral elements of the transportation system in the context of all transportation improvements. Although this section of San Pablo Avenue is controlled by the City of Richmond, it serves as an important regional and alternate route to I-80.
- Assembly Bill 1358, the **"California Complete Streets Act of 2008,"** requires "that the legislative body of a city or county, upon any substantive revision of the circulation element of the general plan, modify the circulation element to plan for a balanced, multimodal transportation network that meets the needs of all users [including] motorists, pedestrians, bicyclists, children, persons with disabilities, seniors, movers of commercial goods, and users of public transportation...."
- In June 2006, the MTC adopted a complete streets/routine accommodation policy for the region. The policy states that projects funded all or in part with regional funds "shall consider the accommodation of bicycle and pedestrian facilities, as described in Caltrans Deputy Directive 64" in the full project cost. The "Complete Streets Checklist" was developed based on this requirement and local planning partners, in this case CCTA, are responsible for ensuring that checklists have been submitted for projects with MTC funding. A jurisdiction can also meet this requirement through a general plan that complies with the California Complete Streets Act of 2008." This is so they can be eligible from the One Bay Area Grant Program (OBAG), which is a \$320 million four-year funding stream that integrates federal funding and Senate Bill 375 and Sustainable Communities Strategy.

The local, regional and state plans summarized above emphasize the importance of multimodal access – to provide local connections along San Pablo Avenue and to improve regional routes and pedestrian and bicycle connectivity. For example, the City of San Pablo *San Pablo Avenue Specific Plan* focuses on walkability and access to destinations from San Pablo Avenue, and the *Richmond Bicycle and Pedestrian Master Plans* call for Class II bicycle lanes on San Pablo Avenue, Robert Miller Drive, and Hilltop Drive. The CCTA West County *Action Plan Update* identifies San Pablo Avenue as a route of regional significance, and recommends efforts to increase pedestrian and bicycle mode splits and discourage I-80 diversion traffic. This study's focus on improving multimodal access and safety along San Pablo Avenue is consistent with the specific goals and priorities in these plans.

EXISTING CONDITIONS

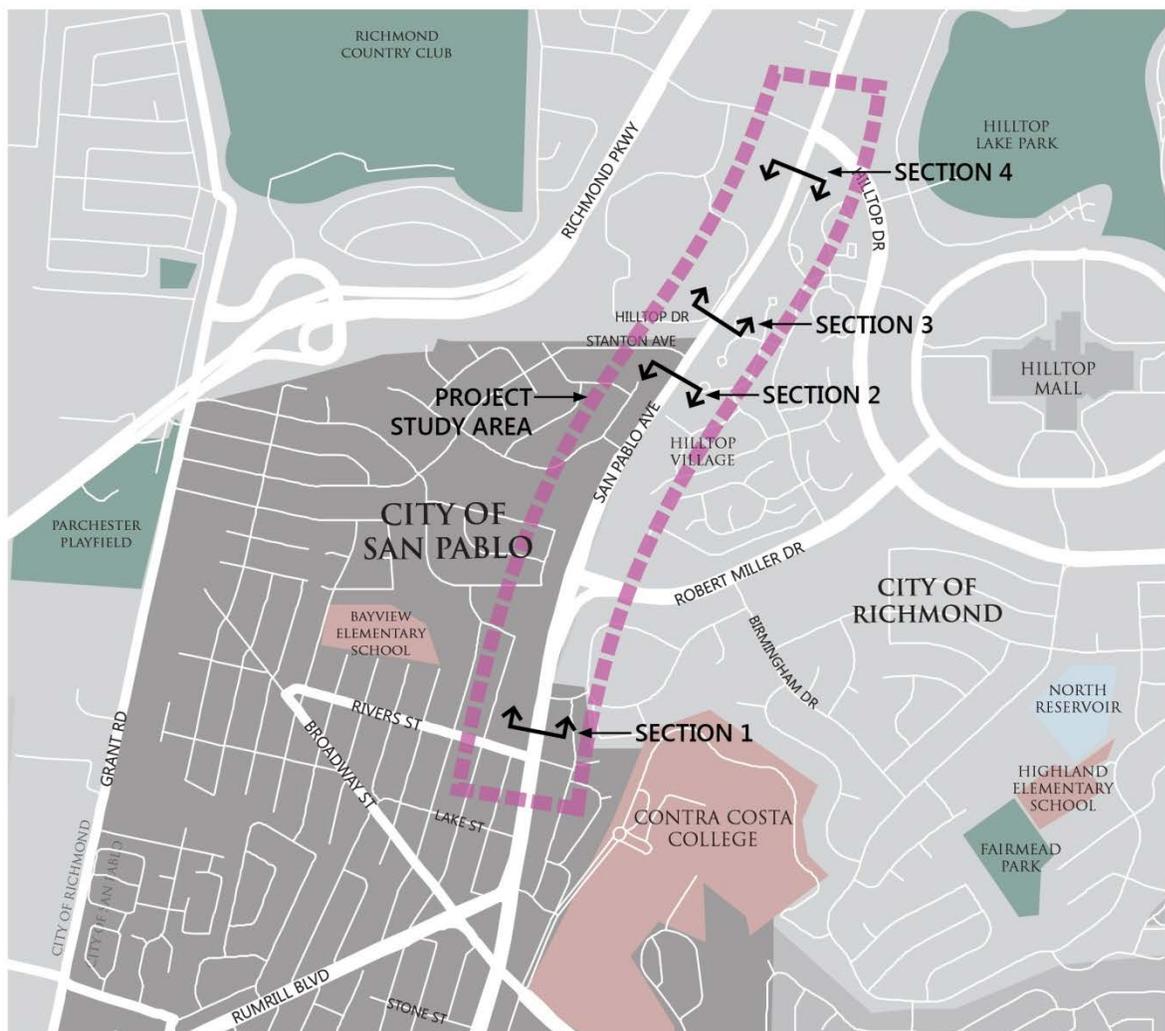
Transportation

The San Pablo Avenue corridor is a regional north-south route through San Pablo and Richmond. San Pablo Avenue is a four-lane arterial and connects Richmond Parkway and regional highway access at the north to the denser street grid in San Pablo at the south. The study area, between Rivers Street and

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Hilltop Drive, runs parallel to I-80, and connects Hilltop Shopping Center and Contra Costa College to the surrounding residential neighborhoods, local neighborhood parks and Bayview Elementary School. The current corridor conditions favor vehicle travel, but with a major transit hub located immediately south at Contra Costa College, regional recreational destinations to the west along the shoreline of the Bay, residential development and plans for increased commercial development in the future, this could become an important multimodal corridor in the future. See **Figure 3, Figure 4, Figure 5, Figure 6 and Figure 7** for the cross-sections depicting the existing roadway network. *Note for all cross sections: Right-of-way widths are measured from available City GIS data. Dimensions for roadway width are approximate where noted.*



Map Source: Fehr & Peers

Figure 3 – Key Map for Existing Conditions Sections

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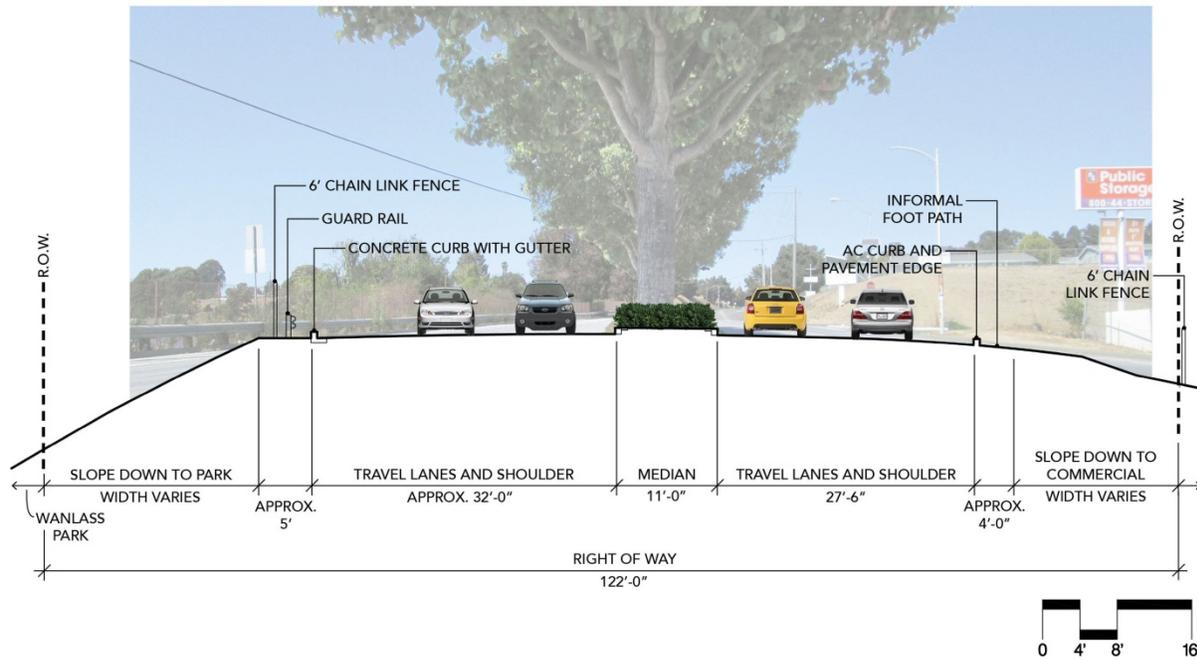


Figure 4 – San Pablo Avenue Section 1 – Looking northbound near Lancaster Drive

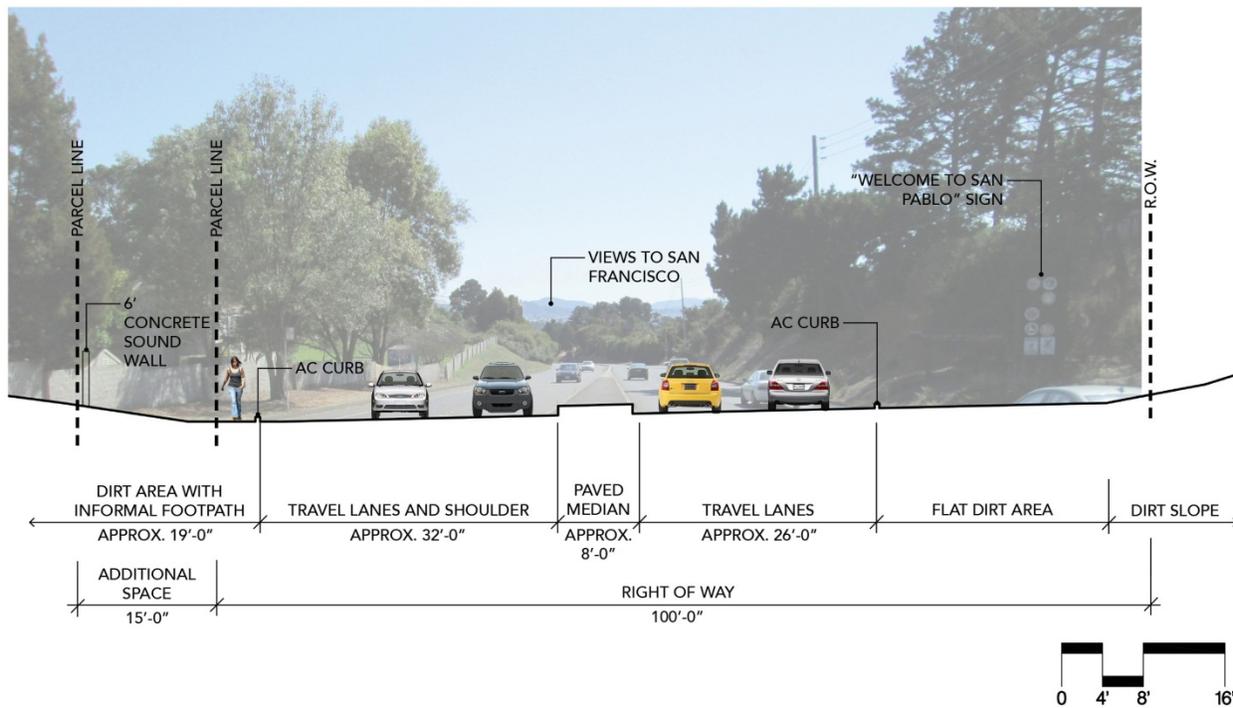


Figure 5 – San Pablo Avenue Section 2 – Looking southbound near Stanton Avenue

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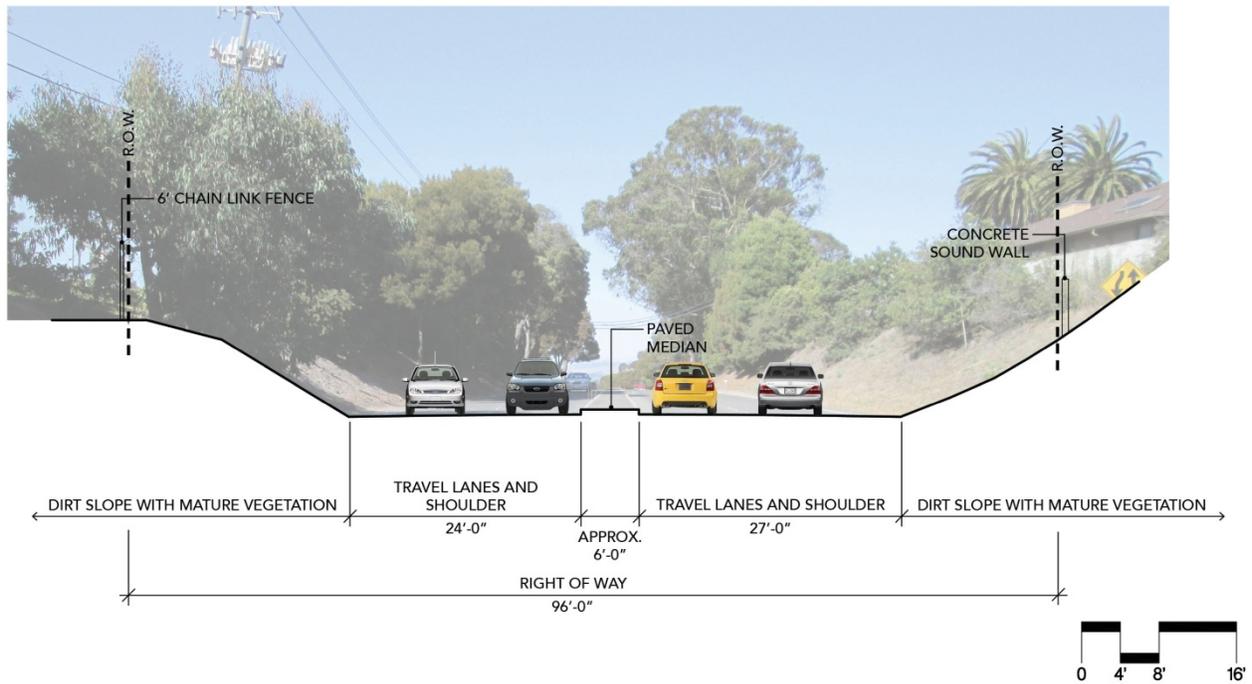


Figure 6 – San Pablo Avenue Section 3 – Looking northbound at crest of hill

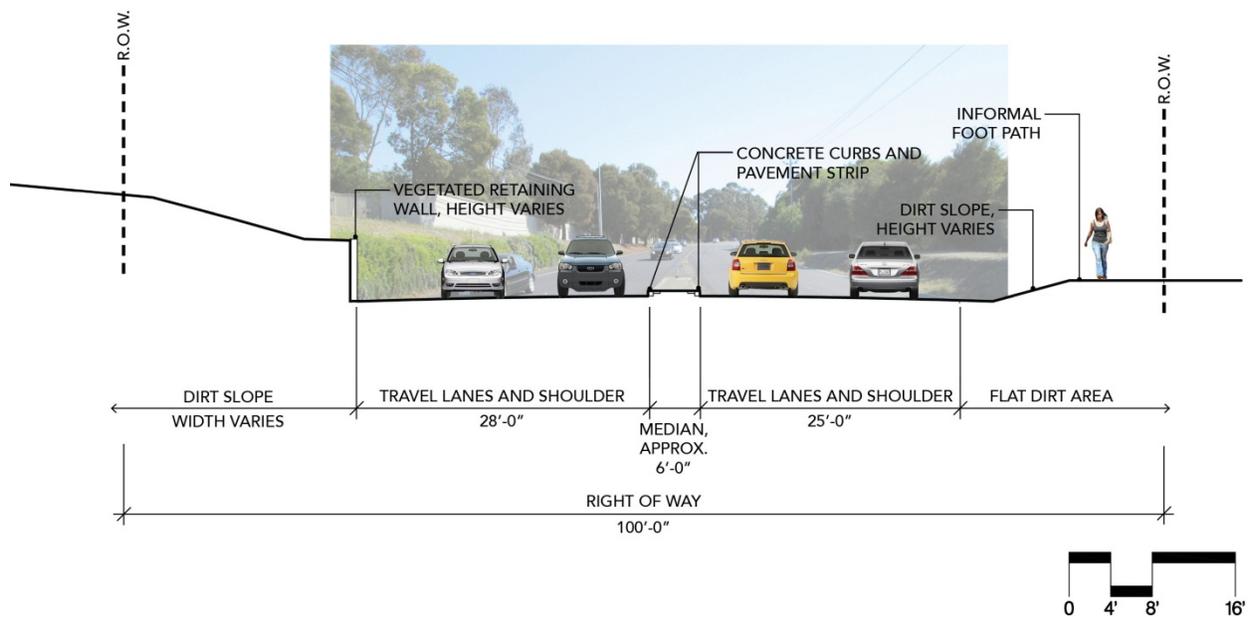


Figure 7 – San Pablo Avenue Section 4 – Looking southbound near Hilltop Drive

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The posted speed limits for the study sections are as follows:

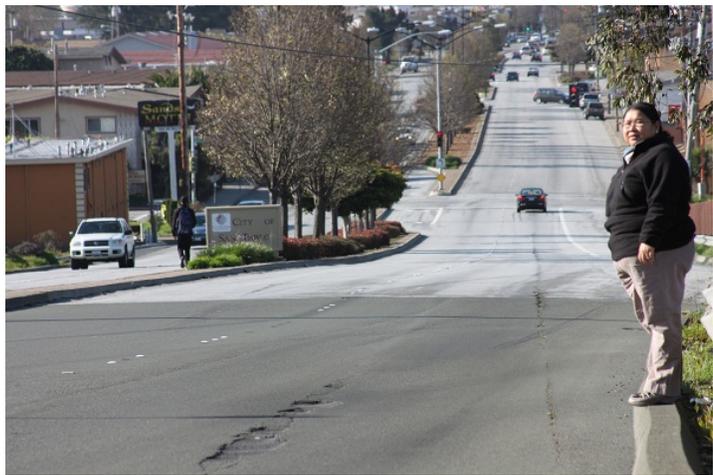
- Section 1: 35 mph
- Section 2: 45 mph
- Sections 3 and 4: 50 mph

The surrounding street network in the study area is mostly local neighborhood streets. Many of the larger connecting streets wind around hills in this part of San Pablo. The small local streets in the north half of the study area are short cul-de-sacs and in the south half of the study area are traditional street grids.

Pedestrian Facilities

Sidewalk Conditions

Sidewalks are not present along San Pablo Avenue between Rivers Street and Hilltop Drive. The roadway includes a paved shoulder and curb, creating a clear edge to the road. The unimproved landscaped area on either side of the road serves as an informal footpath, with worn “goat tracks” visible on the east side, where the flat area ranges from just wide enough for a narrow path to over 15 feet wide. The tracks indicate consistent use by pedestrians, though it is far from ADA compliant.



Pedestrians on side of road in foreground and walking on paved median in background

Sidewalks are present on the connecting side streets of La Puerta Drive and Lancaster Drive, which connect to suburban residential developments, and on Roberts Street, which connects to a traditional street grid on both sides of San Pablo Avenue. Robert Miller Drive, which leads to residential streets and Hilltop Mall, does not have sidewalks.

In addition to the “goat tracks,” pedestrians are often seen walking on the raised concrete median.

Crossing and Intersection Treatments

Rivers Street/San Pablo Avenue

Marked crosswalks with ADA compliant curb ramps and pedestrian signals are provided at the west, south and east legs of the Rivers Street and San Pablo Avenue intersection. A marked crosswalk leg is missing on the north leg of the Rivers Street and San Pablo Avenue intersection, though this location is still a legal unmarked crossing as it is not signed as closed.

Sightlines are extremely limited at the northwest corner due to the roadway grade and presence of utility boxes and poles at this location. Pedestrians crossing the west leg of the intersection cannot be seen by drivers traveling southbound on San Pablo Avenue until vehicles are just a few feet from the crosswalk. This limited stopping sight distance combined with high vehicle speeds create a difficult crossing experience and should be addressed in the recommended pedestrian improvements.

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Hilltop Drive/San Pablo Avenue

Marked crosswalks are also provided at the north, west and south legs of the Hilltop Drive and San Pablo Avenue intersection. The east leg of the Hilltop Drive and San Pablo Avenue intersection is closed to pedestrian crossings and the curb ramps at this intersection have not yet been upgraded with ADA compliant domes.

None of the other San Pablo Avenue crossings in the study corridor have marked crosswalks or pedestrian signals. The distance between the Rivers Street and Hilltop Drive crossings is just over one mile, which is a considerable distance between marked crossings. In a typical urban context, pedestrian crossings should be provided every 300-800 feet, or wherever key pedestrian destinations are present. **Figure 8** shows the locations of missing sidewalks, as well as existing pedestrian crossings and existing and proposed bicycle facilities.

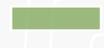


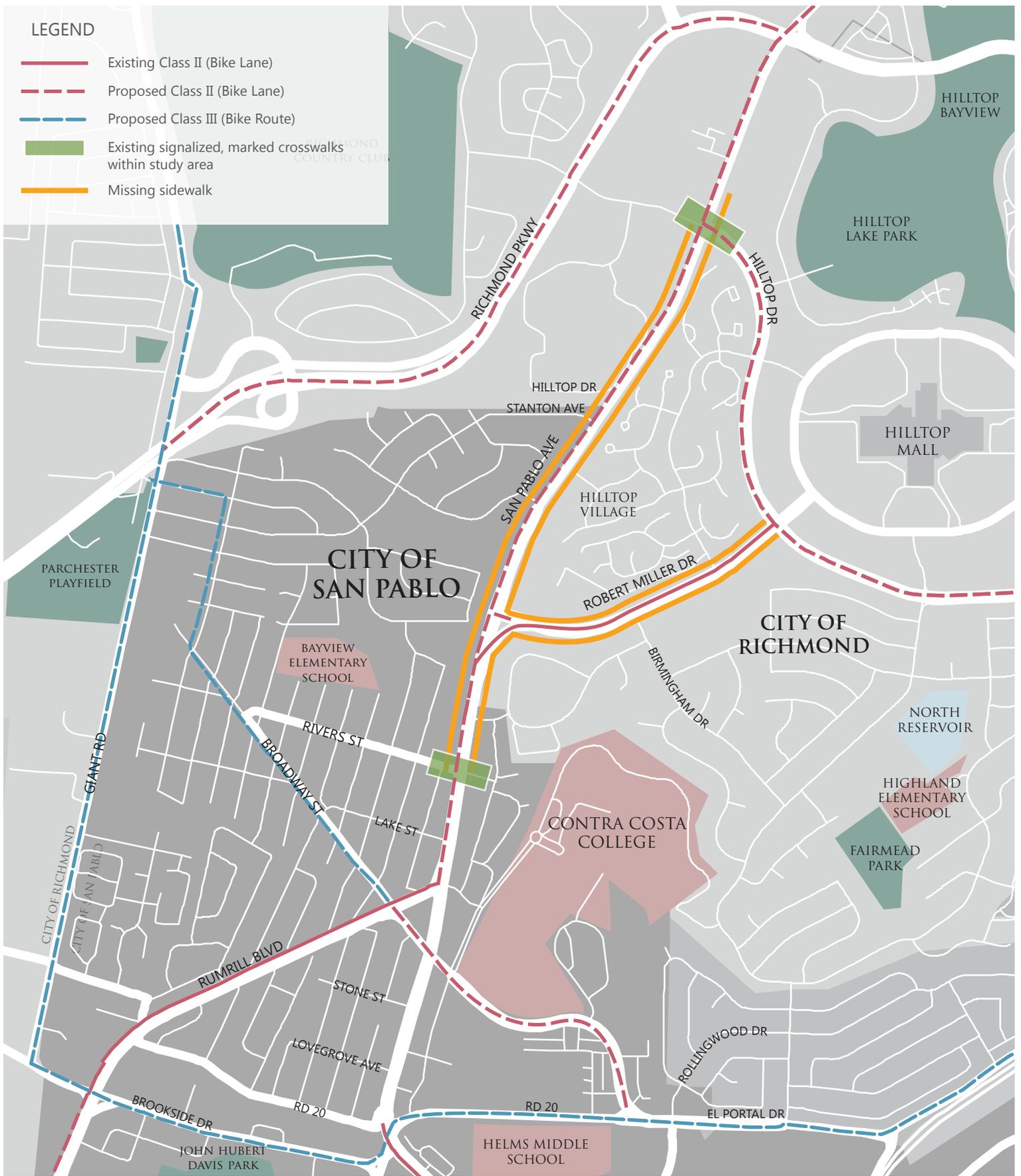
Closed pedestrian crossing at Hilltop Drive and San Pablo Avenue

Surrounding Street Network

Minor streets along this corridor are mostly two-lane residential streets, and do not likely create barriers to pedestrians. However, San Pablo Avenue includes two lanes in each direction, and left turn lanes at most intersections. Similarly, Robert Miller Drive includes two lanes in each direction. There is a wide dedicated right turn lane on San Pablo Avenue at the northbound approach to Robert Miller Drive, and two free southbound lanes on San Pablo Avenue crossing Robert Miller Drive. These wide intersections create a significant barrier to pedestrians and present challenging crossing conditions for both pedestrians and bicyclists.

LEGEND

-  Existing Class II (Bike Lane)
-  Proposed Class II (Bike Lane)
-  Proposed Class III (Bike Route)
-  Existing signalized, marked crosswalks within study area
-  Missing sidewalk



Not to Scale

EXISTING AND PROPOSED PEDESTRIAN AND BICYCLE FACILITIES

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Bicycle Facilities

Designated bicycle facilities are not present along San Pablo Avenue within the study area. The City of San Pablo has proposed a Class II bicycle lane³ on San Pablo Avenue, which would connect to the existing bicycle lanes along Rumrill Boulevard and the proposed El Portal Drive Class II bicycle lanes south of the study area. The City of Richmond recently installed Class II lanes on Robert Miller Drive connecting to Hilltop Drive, another proposed bikeway. Beyond the study area, bicycle lanes are proposed on Richmond Parkway and on Broadway Street east of San Pablo Avenue. Class III bicycle routes⁴ are proposed on Broadway Street west of San Pablo Avenue, Brookside Drive, El Portal Road and Giant Road.

The proposed San Pablo Avenue bicycle lanes must fit into the limited right-of-way, where the road is dominated by high speed traffic, or will require extensive retaining walls for roadway widening. Conventional bicycle lanes through this study area would serve only the most confident bicyclist, willing to ride up steep grades adjacent to heavy vehicle traffic. See **Figure 8** for locations of existing and proposed bicycle and pedestrian facilities.

Transit Service

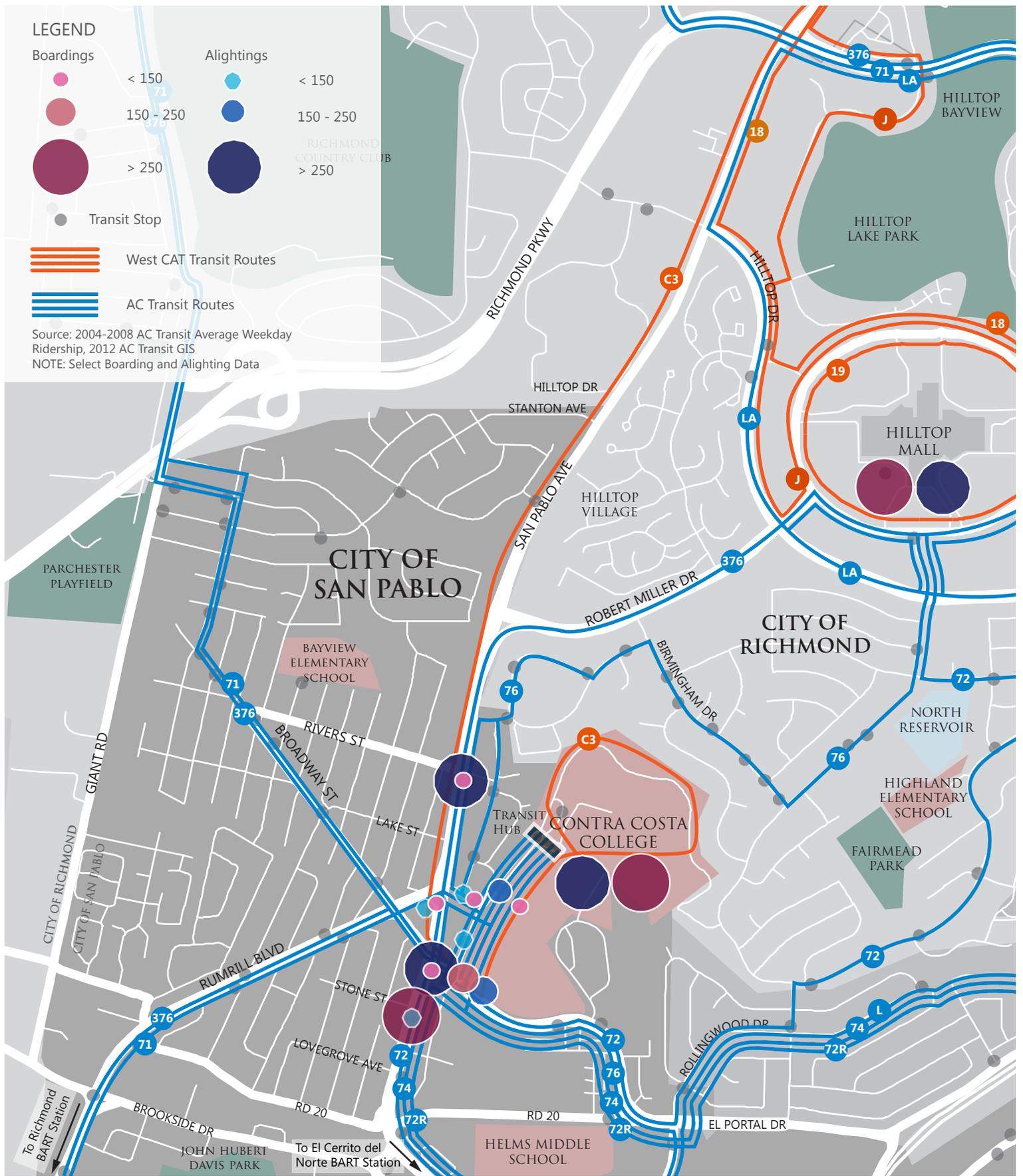
AC Transit and WestCat bus services provide direction connections along and near San Pablo Avenue to Contra Costa College, Hilltop Mall and other regional transit stops/stations. Contra Costa College is an important transit hub for San Pablo, with connections to multiple AC Transit and WestCAT bus lines. Six AC Transit routes (71, 72, 72R, 74, 76 and 376) and one WestCAT route (C3) provide service to Contra Costa College. Four AC Transit routes (72, 76, 376 and LA) and three WestCAT routes (18, 19 and J) provide service to Hilltop Mall. These routes also connect the study area to other local destinations, and to the El Cerrito Del Norte BART station.

Figure 9 illustrates AC Transit and WestCAT bus routes with connections to other regional transit. The AC Transit boarding and alighting data included on this figure indicate which of the select local transit stops likely generate the highest levels of pedestrian activity, and may also indicate focus areas for transit access improvements. Contra Costa College and Hilltop Mall are both busy transit hubs. The intersections of San Pablo Avenue and Rivers Street, and San Pablo Avenue and El Portal Drive are also busy transit locations. These locations are all important multimodal destinations where improvements to the pedestrian and bicycle environments could have a meaningful impact.

Though residents have expressed interest in additional transit service, no transit providers currently stop within the study area.

³ According to California Bikeway Classifications, a Class II bicycle lane is a striped lane for one-way bicycle travel on a street or highway.

⁴ According to California Bikeway Classifications, a Class III bicycle route is designated for shared use with motor vehicle traffic. These routes may be marked with "sharrows," painted roadway share-the-road stencils.



Not to Scale

STUDY AREA TRANSIT NETWORK WITH SELECT BOARDINGS AND ALIGHTINGS DATA

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Auto and Truck Traffic Conditions

San Pablo Avenue includes two travel lanes in each direction through the study corridor, with a dedicated right turn lane at Robert Miller Drive, and left turn pockets at Robert Miller Drive, La Puerta Drive and Stanton Avenue. Existing lane configurations are shown on **Figure 10**. Interstate 80 runs parallel to San Pablo Avenue approximately one mile east of the study area. San Pablo Avenue is often used as a local alternate route to I-80.

Auto Traffic Volumes

AM and PM peak hour vehicle volumes were provided by the City of Richmond at the following locations along San Pablo Avenue:

TABLE 4: EXISTING VEHICLE VOLUMES		
Location	AM Peak Hour	PM Peak Hour
North of Lake Street (located one block south of the southern Rivers Street study area boundary)	Northbound: 680 Southbound: 500	Northbound: 476 Southbound: 747
North of Stanton Avenue	Northbound: 517 Southbound: 829	Northbound: 853 Southbound: 518

Source: City of Richmond, May 2012

The City of San Pablo provided September 2010 data for traffic volumes at the Rivers Street intersection; however, these volumes were not consistent with the City of Richmond’s data or field observations. Upon investigation, it was found that El Portal Drive was closed at the time that these counts were collected, which resulted in vehicle volumes nearly twice those of the ones listed in Table 4. While this data is an extreme outlier, it is an important reminder that San Pablo Avenue serves as a critical alternate route to I-80. All design alternatives take this role of regional importance into consideration and this was a contributing factor in the selection of the preferred alternative.

Auto Vehicle Speeds and Sightlines

The posted speed limit on San Pablo Avenue is 35 mph from Rivers Street to Robert Miller Drive, 45 mph from Robert Miller Drive to Stanton Avenue, and 50 mph from Stanton Avenue to Hilltop Drive. Although speed survey data was not available, downhill vehicle speeds have been observed to exceed the posted speed limit due to the grade in some locations as well as roadway design that facilitates high speeds. Several points along the corridor have limited sight distance due to turns in the road, with the most limited sight lines between Robert Miller Drive and Stanton Avenue.

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Trucks

San Pablo Avenue is one of three designated truck routes in the City of San Pablo, along with San Pablo Dam Road and Giant Road, and is also a designated truck route in the City of Richmond. It is the primary alternative truck route to I-80, as many other roads in the City of San Pablo cannot accommodate truck traffic. As a result, truck traffic is higher on San Pablo Avenue than all other roads in the study area. The presence of heavy truck traffic on this corridor makes the implementation of pedestrian and bicycle improvements especially important for multi-modal safety. The importance of accommodating regional truck access on San Pablo Avenue has informed the preferred alternative design, which does accommodate this function.

Parking

On-Street Parking

On-street parking is not permitted on San Pablo Avenue, Hilltop Drive or Robert Miller Drive. However, on-street parking is permitted on residential side streets, including Rivers Street, La Puerta Drive and Stanton Avenue.

Off-Street Parking

Off-street parking is available at residential developments in the study area, and at major destinations, including Hilltop Mall, Contra Costa College and various local churches and parks. All Contra Costa College parking is permit-only. Daily parking passes cost three dollars and term-length parking passes cost 40 dollars.

Safety, Education and Enforcement

Several local organizations participate in efforts to improve safety and provide education to local pedestrians and bicyclists:

- **Contra Costa Health Services (CCHS)** – is responsible for the CCHS Injury Prevention Project and locates and prioritizes hotspots for pedestrian and bicycle improvements.
- **Safe Routes to School (SR2S)** – State and federal SR2S funds have been used by local jurisdictions, in partnership with CCHS, for pedestrian and bicycle safety education and activities in select middle and elementary schools.
- **Richmond Bicycle/Pedestrian Advisory Committee (RBPAC)** – undertakes various cycling education and awareness activities in cooperation with the City of Richmond.
- **Richmond Spokes** – trains young people to maintain bicycles and provides job skill training.
- **East Bay Bicycle Coalition** – focuses on the development of local bicycle transportation plans throughout the East Bay.

The City of San Pablo Police Department includes a Bicycle Patrol Unit comprised of four specially trained bike patrol officers. The Bike Unit provides standard patrol throughout the city, and also provides bike patrol presentations to grammar schools upon request. The San Pablo Police Department is also responsible for code enforcement.

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Landscape Design Elements

An understanding of established design standards, concurrent planning efforts, and recently built projects in San Pablo and Richmond can help inform improvements along the San Pablo Avenue Complete Streets corridor. An overview of these precedents is included in **Table 3**, Related Plans and Studies.

Local Project Context – Park Sites

Two nearby San Pablo city parks may lend precedent and design cues for landscape improvements along the project corridor: the recently-constructed Wanlass Park on the corner of San Pablo Avenue and Rivers Street, and Kennedy Plaza at the corner of 23rd Street and Brookside Drive.

Wanlass Park is an approximately three-acre park alongside Rheem Creek that can serve this Complete Streets project as a model for sensitively designed landscape improvements, including benches made of recycled plastic, no-mow lawn areas, pervious pedestrian surfaces, native plantings, and Bay-Friendly landscape practices.



Wanlass Park

Kennedy Plaza is a small passive park alongside San Pablo Creek that offers lawn areas, seating, a covered pavilion for small gatherings, and an informational kiosk. The park's California Mission style tiled fountain, trellis, and bells structure could inform the design aesthetic of the project corridor. The plaza contains traditional wooden benches, pedestrian-scale lighting, ornamental fencing, trash receptacles, and a pop of blue elements that would all be appropriate along San Pablo Avenue.

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Kennedy Plaza (source: Google Earth)

Additionally, a small triangular piece of land (about three-quarters of an acre in size) lies within the project study area at the intersection of San Pablo Avenue and Robert Miller Drive. This area is raised slightly above the surrounding roads and is forested with mature pine trees. With the addition of a pathway and seating, this vegetated 'island' could offer an opportunity for pedestrian respite along San Pablo Avenue. The City of Richmond *Parks Master Plan* (2010) defines program-based classifications for different park types based on function, use, purpose and program. The park's classification provides guidance about landscaping elements that should be included in order to serve the nearby neighborhood. The final design for this triangle of park space should refer to these guidelines.

The Hilltop area of Richmond also offers many passive and active parks from which successful landscape elements such as plant material and site furniture can be noted and applied to the Complete Streets project. These parks, including Hilltop Lake Park and Hilltop Park, as described in the city's *Richmond Parks Master Plan*, dated December 2010, prepared by David Gates and Associates.

Corridor Elements

Landscape elements along the project corridor are relatively limited, and the majority of those that do exist only support vehicular circulation along San Pablo Avenue. Below are an inventory of these existing features and an initial recommendation of those elements that should be retained, replicated, or removed.

Landscape

Two vegetated medians are present within the project corridor. The southerly one lies directly north of Rivers Street. Its vegetated area is about 400' long and 8' wide, and contains 14 medium-sized trees of good health – Flowering Pears (*Pyrus sp.*) and Bronze Loquats (*Eriobotrya sp.*) – and a low understory of Indian Hawthorne (*Rhaphiolepis sp.*) shrubs. Non-vegetated areas between the shrub massings indicate other understory plants that have previously died or been removed. The ends of this median contain colorful low perennials – Daylily (*Hemerocallis sp.*) and Society Garlic (*Tulbaghia sp.*). All these plant species offer seasonal interest and proven durability, and should be considered for use elsewhere in the

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project corridor. This median is edged with a strip of pavers to allow safe working space for City maintenance crews and to prevent plants from growing into the travel lanes. An edge strip like this, made of permeable pavers or cobble, is recommended for any new vegetated medians. This median is consistent with a series of vegetated medians continuing south along San Pablo Avenue.



Vegetation in the southerly median

The northerly median lies directly south of Hilltop Drive, and its vegetated area is about 100' long and of varying width. It contains a low massing of Trailing Rosemary (*Rosmarinus* sp.) which is in fair health, and also contains a paved edge strip. This median would benefit from replanting with plant species that match the southerly median to 'bracket' the project corridor and help create a gateway to the Complete Streets improvements. Sightline studies will dictate whether trees are appropriate for this median.

The other medians in the project corridor are completely paved. Introducing vegetation to these medians could help to beautify the corridor, especially in locations where final design calls for removal of pavement and presents an opportunity to include new landscaping.

Vegetation along the edges of San Pablo Avenue largely consists of un-irrigated weedy grasses (mowed where needed for safety and fire suppression) with some pockets of mature shrubs and trees. No operational irrigation appears available within the right-of-way along the edges of the roadway, with the exception of a retaining wall on the eastern side of the road, just south of Hilltop Drive. That wall is covered with trailing shrubs and vines. No significant native or rare trees were noted to be impacted by design improvements along the roadway, but several mature Eucalyptus and Acacia trees are present near the crest of the project corridor (north of Stanton Avenue) that would likely require removal to accommodate design improvements.

Two creeks daylight from culverts beneath San Pablo Avenue along the project corridor – Rheem Creek flows through Wanlass Park near Rivers Street, and Karlson Creek flows out near La Puerta Drive. Riparian

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vegetation along these creek corridors includes a mixture of native plants such as Willow (*Salix* sp.) trees and invasive species.

Lighting

Lighting along the project corridor consists of tall 'cobra head' style lights designed only to provide illumination for vehicular traffic along San Pablo Avenue. Fixtures are a combination of double-headed lights installed in center medians and single-head fixtures lining either side of the roadway. Additional smaller-scale light fixtures with closer spacing would be recommended along proposed pedestrian sidewalks and paths to offer safer nighttime passage.

New light fixtures should have energy-efficient LED lighting elements, and the potential use of solar-powered lights should be explored. The recently-installed Sternberg lights at Wanlass Park may also be considered as a potential design standard that could be applied to the project corridor.



Light fixture at Wanlass Park

Fixtures/Furniture

Pedestrian amenities along the project corridor are non-existent. A design direction for site furnishings should be drawn from other portions of San Pablo Avenue and from nearby parks. Opportunities for viewing and rest areas near the crest of the project corridor should be captured, offering views of downtown San Francisco and San Pablo Bay that may be missed in a fast-moving car. Seating, trash, bike racks, drinking fountains, and interpretive features may all be considered for these rest areas.

Viewsheds

The topographical nature of the study corridor offers spectacular views of the surrounding landscape and cityscape. As mentioned above, these views can be missed when traveling in a fast-moving car, but would be easily captured and appreciated as a pedestrian. Between Robert Miller Drive and the crest of the road (which is just north of Stanton Avenue), views of San Francisco landmarks are clearly visible: Sutro Tower, the downtown skyline, and the Golden Gate Bridge lie directly ahead in the distance. On the north side of the crest of the hill, views of San Pablo Bay and the golden hills beyond can be seen and appreciated from almost anywhere on the side of the road that is not blocked by existing vegetation.

Physical Conditions

Right of Way Typical Cross Section

The existing street section for San Pablo Avenue varies substantially in physical and right-of-way width from Rivers Street to Hilltop Drive. **Table 5** lists these widths for the three study area street segments. The typical street section includes two vehicular travel lanes in each direction. A raised median (paved or landscaped) exists from Rivers Street to just north of Stanton Avenue. The majority of the segment between Stanton Avenue and Hilltop Drive does not include a median. Striped shoulders of varying widths and asphalt concrete curbs are present through much of the project area.

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TABLE 5: San Pablo Avenue Paved and Right-of-Way Width

Segment	Paved Width	Right-of-Way Width
Rivers Street – Robert Miller Drive	70'± -80'± (75'± – 100'± at intersections)	98'± -116'± (108'± –260'± at Robert Miller Drive intersection)
Robert Miller Drive – Stanton Avenue	60'± -70'± (70'± – 100'± at intersections)	98'± -116'± (108'± –260'± at Robert Miller Drive intersection)
Stanton Avenue – Hilltop Drive	45'± - 55'± (65'± – 80'± at intersections)	94'± -106'±

Table Notes:

- 1) Paved and right-of-way widths determined from GIS maps provided by the City of Richmond. The right-of-way and paved width varies through the project area.
- 2) Paved widths are measured from roadway edges, irrespective of medians, landscaped or paved.

Source: BKF, 2012.

Several existing features directly adjacent to the paved roadway would need to be accommodated or relocated to facilitate widening of the street section, if proposed. These features include street lights, trees, fire hydrants, utility poles, retaining walls and slopes of existing ground bordering San Pablo Avenue. Street lighting is consistently present between Rivers Street and Stanton Drive. No existing street lighting is in place between Stanton Drive and Hilltop Drive.

Physical constraints and potential conflicts with proposed facilities are illustrated in the Existing Conditions Assessment Figures, included **Appendix A**.



Obstructions behind existing curb

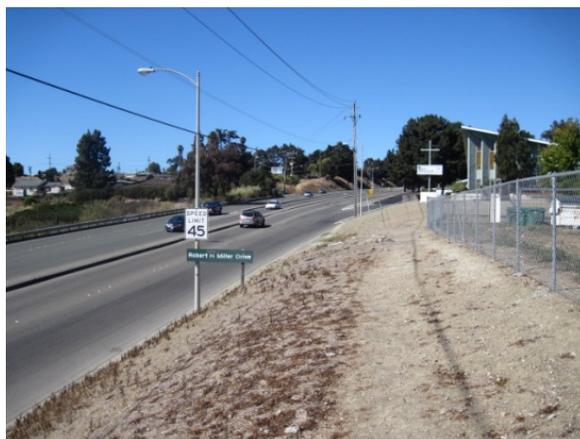
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Slope/Topographical

No existing topography survey for the project area is available at this time. The City of Richmond provided GIS maps which include elevation contours. **Table 6** provides a summary of the average street profile grades for various segments of the project. A visual inspection of the project area did not identify significant areas of excessively steep nor excessively flat cross-slopes.

The southern end of the project area, at the intersection of Rivers Street and San Pablo Avenue, represents lowest elevation within the project area. The road profile elevation (at centerline) steadily increases at an average approximate slope of 5.4% to a high point approximately 400 feet north of the intersection with Stanton Avenue representing a total elevation increase of approximately 190 feet. The road profile elevation descends from this point as San Pablo Avenue approaches Hilltop Avenue from the south falling 66 feet from its peak.



Increasing elevation approaching Robert Miller Drive from Rivers Street.

TABLE 6: San Pablo Avenue Average Profile Grade

Segment	Segment Length	Beginning Elevation	Ending Elevation	Average Grade
Rivers Street – Robert Miller Drive	1,530' ±	47' ±	130' ±	5.4% ±
Robert Miller Drive – Stanton Avenue	1,980' ±	130' ±	237' ±	5.4% ±
Stanton Avenue - 400' ± North of Stanton Avenue	400' ±	237' ±	247' ±	2.5% ±
400' ± North of Stanton Avenue – Hilltop Drive	1,700' ±	247' ±	181' ±	-3.9% ±

Table Notes:

- 1) Street center line elevations determined from GIS maps provided by the City of Richmond. Datum unknown.

Source: BKF, 2012.

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Utilities

Storm Drainage

An assessment of the existing storm drain system is underway. *(Note to reviewer: Additional information has been requested from the City of Richmond.)* Field reconnaissance and record drawings indicate the presence of storm drain facilities within the project area. Although the exact size and location of these facilities is unknown, storm drain manholes were identified in the field and on record drawings on the east side of San Pablo Avenue, some of which were located outside of the roadway.



Water

The East Bay Municipal Utilities District (EBMUD) provided maps of their facilities within the project area. Review of these maps indicates the presence of an underground 24" steel water main on the west side of San Pablo Avenue throughout the project area.

Electrical

Overhead electrical lines supported by wood poles are located adjacent to the edge of the roadway for the entire project length. They are located on the west side of San Pablo Avenue except for an approximately 300-foot segment between Rivers Street and Robert Miller Drive. The poles vary in their distance from the edge of the paved roadway. Maps provided by Pacific Gas & Electric (PG&E) indicate that these are 12 kilovolt (kV) lines.

Gas

Maps provided by PG&E indicate the presence of underground gas lines within the project area. The maps show a 24-inch line through the entire project length, typically on the east side of the street. Additionally, they also show a 2" line between Rivers Street and Robert Miller Drive.

Petroleum

Site reconnaissance discovered markers identifying a Kinder Morgan petroleum pipeline within the project limits.

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KEY CONSIDERATIONS, ISSUES AND OPPORTUNITIES

The Existing Conditions analysis highlighted many key issues and opportunities for concept design alternatives.

Traffic/Vehicle Circulation

- Southbound vehicles approaching Rivers Street have limited stopping sight distance as they turn right onto Rivers Street
- Northbound vehicles turning onto Robert Miller Drive do so at a very high speed – with limited visibility and reaction time for pedestrians or bicyclists. Pedestrians crossing locations are variable across this off ramp-like configuration, and crossings must be done quickly and carefully.
- Paved medians of varying widths are present along much of the study corridor. Heights vary from 4" to 12".
- Wide paved shoulders are in place along the study corridor near La Puerta Drive.
- The San Pablo Avenue/Robert Miller Drive intersection is currently used for truck access

Pedestrian Circulation

- Pedestrian Paths of Travel
 - Along almost the entire study area, informal "goat tracks" (dirt footpaths) have been worn into the side of the road, indicating an existing demand for pedestrian travel along the corridor. For the majority of the study area, the footpath is on the east side of the road. North of the crest of the hill, however, footpaths are on both sides and, as Hilltop Drive is approached, only on the west side. In some areas the footpath is very narrow (18") and is on a steep slope that would require retaining walls or cantilevered pavement to allow space for a standard sidewalk.
 - The footpath on the east side of the road between Rivers Street and Lancaster Street is within the street right-of-way, but is lower by up to several feet than the adjacent road surface.
 - Along the Christian Academy property north of Lancaster Street, a steep slope rises up from the edge of the road. A standard sidewalk cannot be installed unless a retaining wall is built.
 - The corridor narrows around La Puerta Drive – the east side of the road is bound by a steep rip-rap armored slope; the west side of the road is bound by a culvert outfall and creek corridor.
 - From La Puerta Drive to the crest of the hill (north of Stanton Avenue) a wide, flat dirt area along the east side of the road offers sufficient space for a sidewalk.
 - Just south of Hilltop Drive, the informal footpath is on the west side of the road and is elevated on a dirt berm several feet above the surface of the road.
- Crossings
 - Rivers Street - No crosswalk is striped on the north leg of the intersection.
 - Pedestrians coming from the LeRoy Heights neighborhood (La Puerta Street) would need a safe crossing to access a sidewalk along the east side of the road and/or a future transit stop.

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- Views
 - Views to San Francisco begin near Robert Miller Drive and continue to the crest of hill.
 - Views north to San Pablo Bay begin at the crest of the hill and continue to Hilltop Drive.

Bicycle Circulation

- This section of San Pablo Avenue could serve as an important bicycle connection to Downtown San Pablo and destinations around the Hilltop Mall area. Many surrounding streets have existing or proposed facilities which, once built, would provide a comprehensive bikeway network for the area.
- San Pablo Avenue follows an uphill grade in the northbound direction, especially north of Robert Miller Drive, making this corridor challenging for many people who may be interested in traveling by bike.

Figure 11 illustrates a number of pedestrian and bicycle constraints and opportunities for improvement.



Not to Scale

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Accessibility

- In addition to the general lack of pedestrian facilities on San Pablo Avenue between Rivers Street and Hilltop Drive, many of the existing facilities at intersections are not ADA compliant for accessibility.
- Sidewalks are present on Stanton Avenue, La Puerta Drive, and Lancaster Drive where they intersect San Pablo Avenue.
- Curb ramps are not provided at any of these intersections for any crosswalk.
- Curb ramps at Hilltop Drive do not include detectable warning surfaces to aid visually impaired pedestrians.
- Existing intersections within the project area could be retrofitted to meet current accessibility requirements as defined by the ADA and the California Code of Regulations Title 24. All public paths of travel should have the following characteristics:
 - Clear path of travel should be at least 48 inches wide.
 - Cross slope along the path of travel should be equal to or less than 2.0%.
 - All curb ramps should have a grade less than 8.33% and be at least 48 inches wide. At the top of the ramp, a level landing of at least 48 inches should be provided. At the bottom of the ramp, the slope should be less than 5%.
 - Detectable warning devices, such as yellow truncated (tactile) dome tiles, should be placed at the interface between pedestrians and vehicles if ramps are present or curb edges do not provide a clear indication of the edge of pedestrian/vehicle space.
 - The maximum vertical edge along a path of travel shall be less than ¼”.



Wheelchair ramps are absent at San Pablo Avenue/Stanton Avenue intersection.

Landscaping/Topography

- Rheem Creek flows beneath San Pablo Avenue at Rivers Street.
- Along the west side of San Pablo Avenue, the topography falls steeply away from the shoulder toward Wanlass Park– this steep bank along with a guardrail and chain link fence do not allow room for pedestrian travel.
- Along the crest of the hill, the road is bound by mature trees growing on steep slopes rising up on either side of the road. Exotic species such as Eucalyptus and Acacia grow close to the existing edge of pavement.
- Just south of Hilltop Drive, a vegetated retaining wall lies along the east side of the road.

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Stormwater Quality

- In October 2009, the Regional Water Quality Control Board adopted a revised Municipal Regional Stormwater Permit (MRP). The MRP requires implementation of stormwater treatment measures for road projects adding and/or replacing 10,000 square feet of impervious surface for the following project types:
 - New roads.
 - Widening of existing roads where additional lanes are proposed. In addition, if the project alters 50% or greater area of the existing roadway, the treatment system must be designed to accommodate the entire impervious watershed.
 - The construction of impervious trails which are 10 feet or wider or are creekside.
- The MRP contains specific are exclusions for:
 - Widening existing roads with sidewalks and bicycle lanes.
 - New impervious trails directing runoff to vegetated surfaces.
- The proposed improvements may not require compliance with storm water quality requirements.

Existing Pavement Condition

- The condition of the existing pavement on San Pablo Avenue varies throughout the project limits. The proposed improvements should be coordinated with the roadway's maintenance and rehabilitation strategy.
- A pavement overlay occurring after the project may result in greater cross-slopes adjacent to new or existing curb and gutter which would likely coincide with the location of proposed bicycle lanes. To avoid pavement overlays resulting in undesirable conditions within the bicycle lane, scheduled overlays should be performed prior to the installation of the project improvements, or gutters installed with the project could be set slightly higher to accommodate a future overlay.



Example of multiple overlays – this creates a steep cross slope adjacent to curb & gutter resulting in a potentially hazardous condition for bicyclists (photo not from the project area).

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CORRIDOR IMPROVEMENTS

COMMUNITY WORKSHOP #1

On Thursday, September 27, 2012, City of San Pablo staff hosted a community workshop at the Wanlass Park Community Center. The event brought over 30 residents and stakeholders together to identify challenges and potential solutions for all users and travel modes on San Pablo Avenue between Rivers Street and Hilltop Drive. Participants walked parts of the corridor on foot and toured by van with members of the consultant team, viewed an educational presentation on tools and strategies, and worked in small groups around table maps to discuss problems and develop ideas for consideration and exploration by the City and consultant team. All activities were conducted in English and Spanish. Refreshments and childcare were provided to facilitate community engagement.

The participants had the following general observations/requests for enhancements to the corridor:

- Provide more lighting along the corridor for safety and security
- Provide sidewalks and bicycle lanes throughout the corridor
- Trim bushes/trees for clear pathways:
 - Provide paths of travel for disabled and blind pedestrians
 - Accommodate wheelchairs, double strollers, and motorized scooters, which are often observed on San Pablo Avenue
- Reduce southbound vehicle downhill speeds
- Add bus stops
- Create visible gateway signage for drivers
- Improve landscaping
- Incorporate street art
- Add trash receptacles
- Reduce the number of vehicle lanes to create more space for pedestrians and bicyclists



Photos Above, Top to Bottom. Consultant team member shares observations during walking assessment; participants work at table maps; a table representative reports results to the workshop participants.

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Additionally, the following specific observations/suggestions were noted:

- Resolve the conflict at La Puerta Drive between fast moving southbound motorists and motorists making left turns off San Pablo Avenue onto La Puerta Drive
- Add streetlights between Stanton Avenue and Robert Miller Drive
- Add inset/recessed lights or reflectors on sidewalks
- Reduce downhill motor speeds approaching Stanton Avenue
- Add shortcuts/direct paths to San Pablo Avenue from the residential neighborhood (Leroy Heights) on the west side of the corridor
- Add a pedestrian bridge/path across the creek connecting Espanola Drive and Pablo Vista Avenue
- Consider the following bus stops:
 - Flat shoulder area on the east side of San Pablo Avenue approximately 400 feet north of Robert Miller Drive
 - West side of San Pablo Avenue, several hundred feet north of Stanton Avenue
 - East side of San Pablo Avenue, opposite Stanton Avenue
- Install marked crosswalks:
 - Across San Pablo Avenue at Robert Miller Drive
 - Across Robert Miller Drive at San Pablo Avenue and across the northbound right turn lane from San Pablo Avenue onto Robert Miller Drive
 - Across San Pablo Avenue at the La Puerta Drive and Stanton Avenue intersections
 - Install pedestrian refuge island at proposed crosswalk on Stanton Avenue
 - At all legs of the San Pablo Avenue and Rivers Street intersection, with pedestrian countdown signals and signage alerting motorists to presence of pedestrians
- Construct a separated landscaped sidewalk on the west side the length of the corridor
 - Construct a retaining wall on steep side slopes north of Stanton Avenue to enable a continuous walkway on the west side
- Re-align the vehicle travel lanes on San Pablo Avenue eastward to allow a buffered pedestrian path on the west side
- Install a connection to the north side of Wanlass Park from the west side of San Pablo Avenue to improve park access and establish a pedestrian path that avoids the constraint of the steep drop-off above the park
- Install “Bott’s Dots” (raised pavement markers) on the centerline of San Pablo Avenue

BASELINE IMPROVEMENTS

Based on stakeholder feedback and an analysis of existing conditions, a number of corridor improvements were identified as necessary to address basic pedestrian and bicycle safety and mobility in the corridor. These are considered baseline corridor improvement and were considered in the development of all concept alternatives.

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Pedestrian Facilities

Basic pedestrian facilities are necessary to provide access to neighborhood streets and nearby destinations. Hilltop Mall, accessible via Robert Miller Drive, and the neighborhoods located off of La Puerta Drive and Stanton Avenue are isolated from San Pablo Avenue due to the lack of pedestrian facilities. This can be addressed with a sidewalk on both sides of San Pablo Avenue between Rivers Street and Robert Miller Drive and on the west side of San Pablo Avenue between Robert Miller Drive and Hilltop Drive. For pedestrian safety and comfort, the sidewalks should include some physical separation from the vehicle travel lanes, in the form of a landscaped buffer and/or bicycle lanes.

The recommended minimum width for each sidewalk is six to eight feet where a buffer is present (bicycle lane or landscaping), and 10 to 12 feet where no buffer is present. All sidewalks should be built to maintain the highest degree of accessibility possible, though the steep slopes on San Pablo Avenue present limitations.

Pedestrian safety and access should be emphasized at all intersections in the corridor. Intersections should be redesigned with smaller corner radii to slow turning vehicles and reduce pedestrian crossing distances. Marked crosswalks with advanced stop bars should be provided at all signalized pedestrian crossings. These changes will make crossing San Pablo Avenue safer and more convenient at the two anchor intersections, San Pablo Avenue and Rivers Street and San Pablo Avenue and Hilltop Drive, and at the main mid-corridor intersection, San Pablo Avenue and Robert Miller Drive.

Marked crosswalks with advanced stop bars should also be provided for the side street crossings along the corridor, including La Puerta Drive, Stanton Avenue and Lancaster Drive. Traffic control for San Pablo Avenue crossings and vehicular access to/from the side streets may be considered at these intersections. However, pedestrian destinations (such as transit stops) are not currently present on the east side of San Pablo Avenue between Robert Miller Drive and Hilltop Drive. As such, traffic control and pedestrian crossings at these locations are a secondary consideration.

Bicycle Facilities

Bicycle facilities are necessary on San Pablo Avenue to safely accommodate cyclists on a road that is otherwise dominated by high speed vehicle traffic. The basic bicycle facilities should provide access between Rivers Street and Robert Miller Drive, to connect to Hilltop Mall.

Due to the current highway-like vehicle conditions, especially north of Robert Miller Drive where the speed limit increases to 45 and 50 miles per hour, these bicycle facilities should be buffered. A buffered bicycle lane includes a standard width bicycle lane adjacent to the curb or edge of road, with an additional buffer between the bicycle lane and nearest vehicle lane. Depending on the specific setting, the buffer can be painted or physically separated with flexible bollards or landscaping. The recommended minimum width for buffered bicycle lanes along the San Pablo Avenue corridor is 14 to 16 feet total (seven to eight feet per buffered bicycle lane in each direction, with bicycle lanes a minimum of four to five feet, and painted buffers a minimum of three feet).

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Vehicle Facilities

The existing raised median may be realigned but should be maintained for a physical barrier between northbound and southbound traffic, as the median provides an important safety benefit. Travel lanes should be maintained at a minimum of 11 feet wide to accommodate transit vehicles.

Transit Facilities

As transit does not currently stop within the corridor between Rivers Street and Hilltop Drive, transit recommendations will be secondary. Specific details will be based on a preferred alternative and input from local transit providers.

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INITIAL CONCEPT PLANS

Four concept plans were initially developed by the project team. Concept 1 maintains the current four-lane roadway. Three specific alternatives were developed within this concept: Concepts 1A, 1B and 1C. Concept 2 reduces the roadway to two through lanes, with turn pockets at intersections. A meeting with representatives of the City of San Pablo and City of Richmond was held on October 25, 2012, to define internal constraints and priorities, and to narrow the alternatives to three concepts. Concept 1C was discarded at this meeting.

CONCEPT 1A: BASIC SIDEWALKS PLUS BICYCLE LANES TO HILLTOP MALL WITH 4 VEHICLE LANES

Concept 1A meets all the baseline criteria above and does not provide on-street bicycle lanes north of Robert Miller Drive. The west-side sidewalk between Rivers Street and Robert Miller Drive would be accommodated with a connection through Wanlass Park to existing park sidewalks to minimize sidewalk construction costs where the right-of-way is particularly constrained.

The main benefit of this design is the moderate cost associated with construction while four vehicle lanes are maintained. However, this design does not accommodate bicyclists throughout the corridor, and they may be more likely to ride on the sidewalk where on-street bicycle facilities are not provided. Additionally, the sidewalk alignment through Wanlass Park does not increase the level of street activity, and may not provide sufficient “eyes on the street” to increase pedestrian comfort through that section of the corridor. This design will require a combination of lane re-striping and narrowing, median realignment and some construction of retaining walls in spot locations.

This concept was developed in greater detail after passing an initial “fatal flaw” test from key stakeholders.

CONCEPT 1B: SIDEWALK PLUS FULL CORRIDOR BICYCLE LANES WITH 4 VEHICLE LANES

Concept 1B builds on Concept 1A, adding northbound and southbound buffered bicycle lanes between Robert Miller Drive and Hilltop Drive and a west-side sidewalk adjacent to the roadway throughout the corridor. The east-side sidewalk matches that in Concept 1A, connecting Rivers Street and Robert Miller Drive.

The main benefit of this design is the inclusion of comprehensive pedestrian and bicycle access through the entire corridor while four vehicle lanes are maintained. However, this design will require a combination of lane re-striping and narrowing, median realignment and substantial retaining walls for cut or fill to accommodate the proposed facilities. Therefore, this design is the highest cost and highest degree of difficulty to construct.

This concept was developed in greater detail after passing an initial “fatal flaw” test from key stakeholders.

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CONCEPT 1C: SHARED USE PATH WITH 4 VEHICLE LANES

Concept 1C meets all the baseline criteria via a west-side Class I shared use path with a minimum width of 10 feet, in addition to a landscaped buffer, through the full corridor. This path provides an off-street facility for both pedestrian and bicycle use.

The main benefit of this design is the inclusion of pedestrian and bicycle facilities through the entire corridor within a narrower right-of-way than is required for separate facilities. The off-street path also provides the highest degree of comfort for less confident cyclists. However, the design is problematic in this specific setting because of the steep downhill grade, where southbound cyclists will reach high speeds that are not compatible with pedestrian users. In addition, a shared use path is less likely to be used by advanced or very confident cyclists, who may prefer to ride on the street.

This concept was dismissed for a “fatal flaw” because of the potential for a high speed differential between pedestrians and cyclists.

CONCEPT 2: SIDEWALKS AND FULL CORRIDOR BICYCLE LANES WITH 2 VEHICLE LANES

Concept 2 meets all the baseline criteria within the existing right-of-way by reducing the number of vehicle lanes. This design maintains two vehicle lanes with additional right and left-turn pockets at select intersections, and adds on-street, buffered bicycle lanes in both directions throughout the corridor. Sidewalks are provided throughout the corridor. The median is widened and additional landscaping is added to the median where permitted.

The main benefit of this design is that all pedestrian and bicycle baseline accommodation criteria are met while the vehicle travel speeds are more significantly calmed. Additionally, by reducing the total number of lanes, access to and from side streets at unsignalized intersections is safer and more convenient for all users. This design is also the lowest in cost. However, occasional traffic surges related to congestion and incidents on I-80 could result in significant congestion levels on San Pablo Avenue with fewer lanes for vehicles.

This concept was developed in greater detail after passing an initial “fatal flaw” test from key stakeholders.

Table 7 presents an evaluation matrix that summarizes the key features of the three concepts carried forward, and outlines the pros and cons.

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TABLE 7: CONCEPT EVALUATION MATRIX

Plan	Design Summary	Complete Streets Amenities	Drawbacks	Traffic Impact	Cost
Concept 1A	<p>4-lane Roadway for Vehicle Travel</p> <ul style="list-style-type: none"> • Provides pedestrian facilities throughout corridor • Provides bicycle facilities for access to Hilltop Mall • Does not reduce total number of vehicle lanes • Fixes key intersection issues • Requires some expansion beyond existing paved right-of-way 	<ul style="list-style-type: none"> • Pedestrian facilities provided on both sides south of Robert Miller Drive, and on west side north of Robert Miller Drive • Bicycle lanes present in both directions south of Robert Miller Drive • Traffic calming features include narrower lanes and expanded medians where feasible 	<ul style="list-style-type: none"> • No bicycle facilities present north of Robert Miller Drive, which may invite sidewalk riding • Limited traffic calming impact; vehicles may still travel at highway speeds through much of corridor 	Little traffic impact	(\$\$) Middle cost option - road widening necessary to construct pedestrian facilities, some retaining walls
Concept 1B	<ul style="list-style-type: none"> • 4-lane Roadway for Vehicle Travel with Comprehensive Pedestrian & Bicycle Amenities • Provides pedestrian facilities throughout corridor • Provides bicycle facilities throughout corridor • Does not reduce total number of vehicle lanes • Fixes key intersection issues • Requires significant expansion beyond existing paved right of way 	<ul style="list-style-type: none"> • Pedestrian facilities provided on both sides south of Robert Miller Drive, and on west side north of Robert Miller Drive • Bicycle lanes present in both directions throughout corridor • Traffic calming features include narrower lanes and expanded medians where feasible 	<ul style="list-style-type: none"> • Limited traffic calming impact; vehicles may still travel at highway speeds through much of corridor • Requires expensive retaining walls at several locations 	• Little traffic impact	(\$\$\$) Highest cost – road widening, additional paving and retaining walls

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TABLE 7: CONCEPT EVALUATION MATRIX

Plan	Design Summary	Complete Streets Amenities	Drawbacks	Traffic Impact	Cost
Concept 2	<p>2-Lane Roadway for Vehicle Travel with Travel Lane Reduction</p> <ul style="list-style-type: none"> • Provides pedestrian facilities throughout corridor • Provides bicycle facilities throughout corridor • Requires minimal expansion beyond existing paved right of way • Fixes key intersection issues 	<ul style="list-style-type: none"> • Pedestrian facilities provided on both sides south of Robert Miller Drive, and on west side north of Robert Miller Drive • Bicycle lanes present in both directions throughout corridor • Traffic calming features include reduced number of lanes, narrower lanes and expanded medians throughout corridor • Fewer lanes will provide better and safer multimodal access in and out of neighborhood streets and at left turns 	<ul style="list-style-type: none"> • Requires reduction in vehicle travel lanes 	<ul style="list-style-type: none"> • Drivers exiting side streets and turning left will have fewer lanes to cross • Left turn lanes will remain in place for vehicles turning from San Pablo Ave to side streets • Occasional traffic surges from I-80 incidents could result in elevated congestion 	<p>(\$)</p> <p>Lowest cost – no change to road width, no construction of retaining walls to provide pedestrian and bicycle improvements</p>

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ADDITIONAL IMPROVEMENTS

Neighborhood access and landscape design improvements are critical elements for a successful multi-modal corridor. These two areas of consideration were identified in early design stages but not included in the initial concept details.

Neighborhood Access Improvements

Neighborhood connections are a key component in making San Pablo Avenue easily accessible for all users. The preferred design should emphasize access to residential neighborhoods, parks, schools and existing transit stops. Connections between residential neighborhoods and these local serving destinations will increase opportunities for daily pedestrian and bicycle trips to school and recreation.

Landscape Design Elements

Landscape design elements can create an inviting setting for pedestrians and bicyclists, and provide human-scale comfort to balance the vehicle-focused design of the corridor. These elements include seating at resting places and overlooks, pedestrian scale lighting, wayfinding signage, trees and landscaping. These elements are compatible with all initial concepts.

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PREFERRED CONCEPT PLAN

COMMUNITY WORKSHOP #2

On Thursday, November 15, 2012, City of San Pablo staff hosted a second community workshop for this project at the Wanlass Park Community Center. Three concept plans were presented and community members provided feedback about each alternative.

The event once again brought over 30 residents and stakeholders together to identify challenges and potential solutions for all users and travel modes. Representatives from First 5 Contra Costa comprised a large portion of the participants. The consultant team reintroduced the project and progress to date, and described the three Concept Alternatives for discussion. Participants were then asked to take a closer look at the concept graphics, ask questions and make comments about each alternative. The workshop ended with a summary of feedback from the group. All activities were conducted in English and Spanish. Refreshments and childcare were provided to facilitate community engagement.



The following concepts were presented:

- Concept 1A: Basic Sidewalks Plus Bicycle Lanes to Hilltop Mall with 4 Vehicle Lanes
- Concept 1B: Sidewalk Plus Full Corridor Bicycle Lanes with 4 Vehicle Lanes
- Concept 2: Sidewalks and Full Corridor Bicycle Lanes with 2 Vehicle Lanes



Photos above, top to bottom: City staff and community members discuss one of the concept plans; community members take a closer look at concept plan; meeting participants listen to presentation

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The following summarizes the key feedback from the workshop participants:

- Concept 2 provides the most comprehensive pedestrian and bicycle infrastructure, but will likely have a significant impact on vehicle access through the corridor
- The pedestrian and bicycle amenities presented in Concept 1B could improve safety through the corridor and would allow San Pablo Avenue to continue functioning as a route of regional significance
- San Pablo Avenue is a route of regional significance and regional access and operations are important considerations
- The pedestrian connection to Wanlass Park included in Concept 1A could be added to Concept 1B to expand the pedestrian infrastructure and provide a direct connection between Wanlass Park and Robert Miller Drive
- A new traffic signal at La Puerta Drive could improve safety for turning vehicles; this may also improve safety for pedestrians and bicyclists

Input from the project team, stakeholders and community was discussed in more detail at a team charrette on Monday, December 17, 2012. This meeting focused on identifying clear priorities from the second workshop in order to define a preferred alternative. The following priorities were identified at this charrette:

- The community recognizes the importance of maintaining the current vehicle capacity on San Pablo Avenue as it is a route of regional significance
- Regional funding is likely to be available for a local complete streets project, so a more expensive option, such as Concept 1B, is a possibility
- Concept 1B should be updated with a pedestrian connection between Wanlass Park and Robert Miller Drive and a traffic signal at La Puerta Drive should be analyzed.

PREFERRED CONCEPT PLAN: SIDEWALK AND FULL CORRIDOR BICYCLE LANES WITH FOUR VEHICLE LANES PLUS PARK CONNECTION

The workshop and team charrette informed the development of a preferred alternative with a detailed concept plan. This concept includes a west-side sidewalk adjacent to the roadway throughout the corridor, an east-side sidewalk connecting Rivers Street and Robert Miller Drive, northbound and southbound buffered bicycle lanes between Rivers Street and Hilltop Drive, and an additional west-side pedestrian connection path between Robert Miller Drive and Wanlass Park following existing right of way.

The possibility of a new traffic signal at either La Puerta Drive or Stanton Avenue was considered as a strategy to improve safety for turning vehicles and bicyclists. Results from the signal warrant analysis are included in **Appendix B**.

The preferred concept proposes significant enhancements to the Robert Miller Drive and San Pablo Avenue intersection. These include the closure of the northbound channelized right turn, which would be replaced with a pocket park, and a reconfiguration of all approach lanes to create a conventional three-way, signalized intersection and provide for pedestrian crossings of San Pablo Avenue. The consultant team completed an operational analysis for the proposed changes and determined multi-modal operations will not substantially degrade. More details from this analysis are provided in **Appendix B**.

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CITY of SAN PABLO
City of New Directions

Enhancements were also proposed for the Rivers Street and San Pablo Avenue intersection, with a focus on the northwest corner. The southbound right turn lane was eliminated to encourage slower speed turns, provide more room for bicycle and pedestrian infrastructure, and improve the visibility of pedestrians in the west leg of the crosswalk. The consultant team completed an operational analysis for the proposed changes and determined multi-modal operations will not substantially degrade. Details from this analysis are provided in **Appendix B**.

This preferred concept provides comprehensive pedestrian and bicycle access throughout the entire corridor, including access to Wanlass Park, while maintaining four vehicle lanes to ensure adequate vehicular traffic flow. This design will require a combination of lane re-striping and narrowing, median realignment and substantial retaining walls for cut or fill to accommodate the proposed facilities.

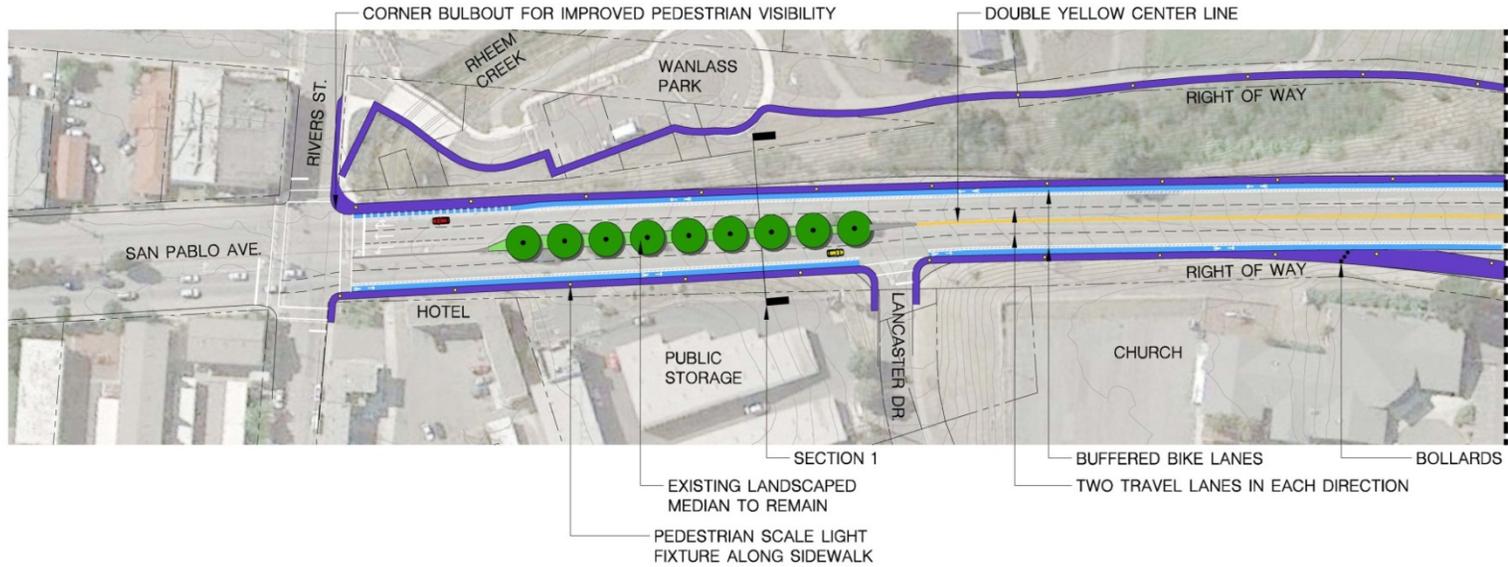
The following figures illustrate the draft preferred alternative in plan view and cross section.

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BUFFERED BIKE LANES



PEDESTRIAN REFUGES



PEDESTRIAN STREET LIGHTING



LANDSCAPED MEDIAN



RECOMMENDED CONCEPT
San Pablo Avenue Complete Streets Study
San Pablo, California



1

February 19, 2013

Sheet No. 1

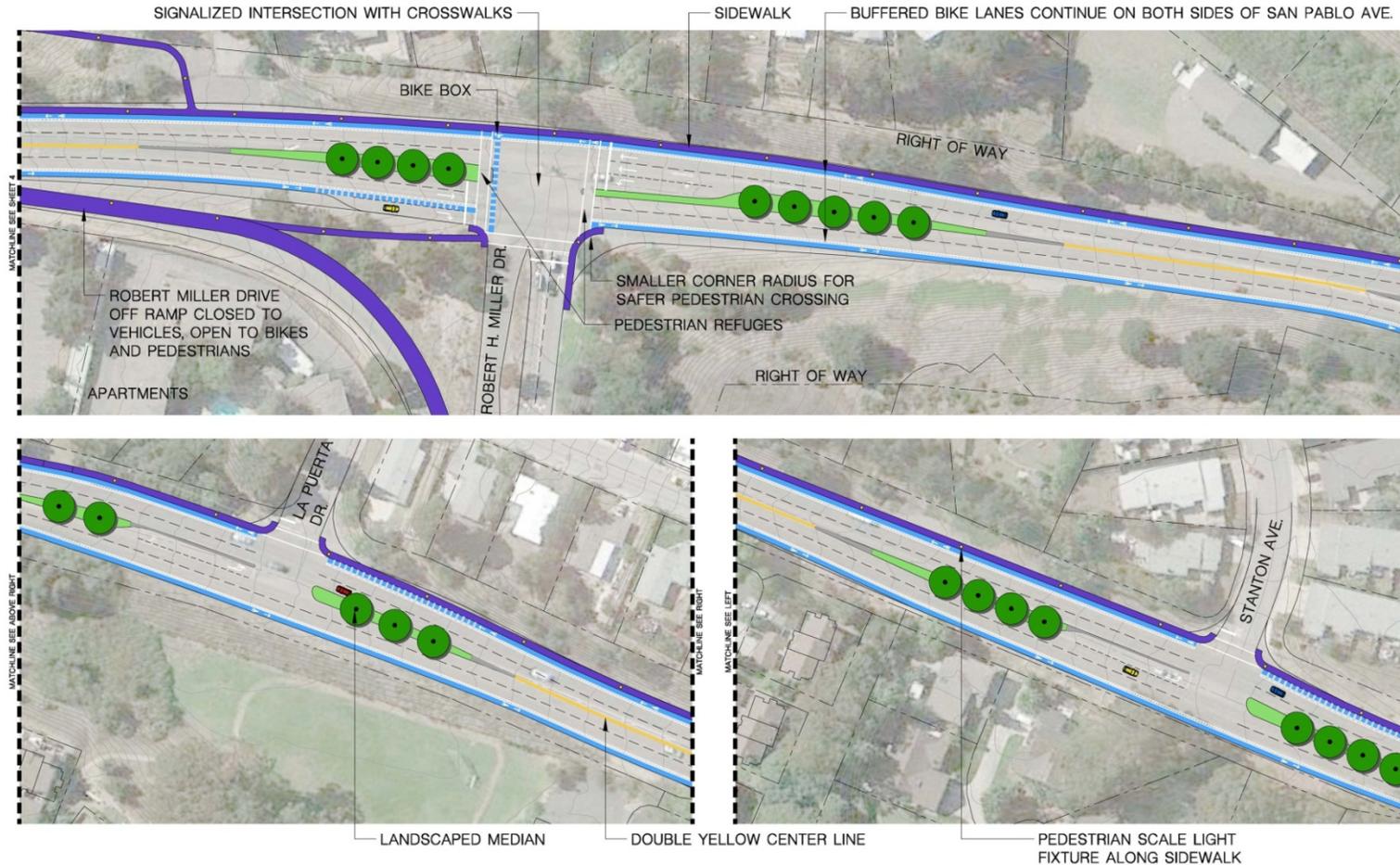
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CITY of SAN PABLO
City of New Directions



RECOMMENDED CONCEPT
San Pablo Avenue Complete Streets Study
San Pablo, California



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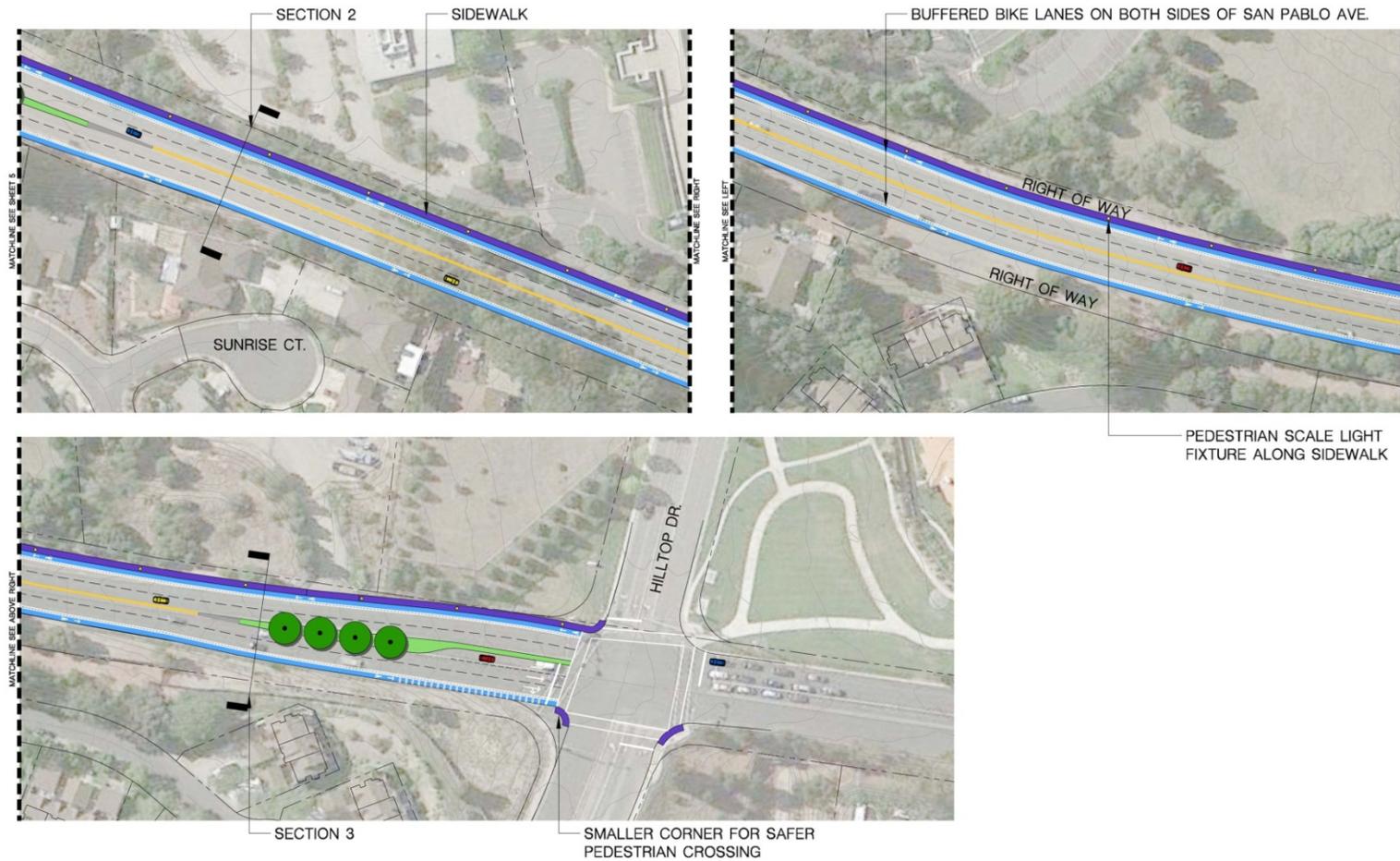


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CITY OF SAN PABLO
City of New Directions



RECOMMENDED CONCEPT
San Pablo Avenue Complete Streets Study
San Pablo, California



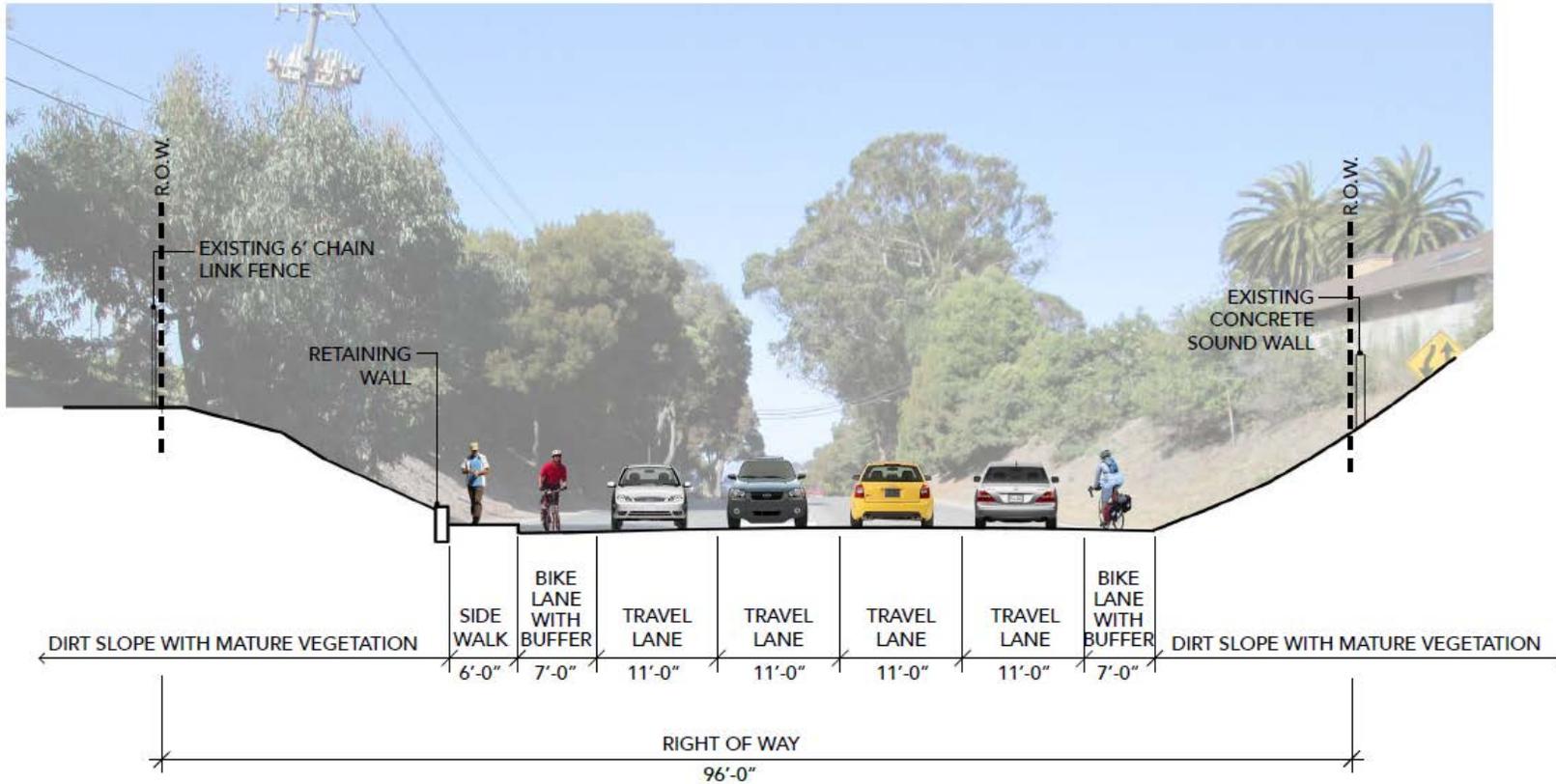
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Recommended Concept – Cross Section: Looking northbound at crest of hill, approaching Hilltop Drive

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CITY of SAN PABLO
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The preferred concept plan was presented to the West Contra Costa Transportation Advisory Committee (WCCTAC) on Thursday, January 10. The WCCTAC and other meeting participants confirmed that San Pablo Avenue's role as a route of regional significance is an important consideration for redesign. WCCTAC indicated regional support for a plan that implements pedestrian and bicycle infrastructure improvements and maintains four vehicle lanes.

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FINAL PLAN

COMMUNITY WORKSHOP #3

On Tuesday, February 19, 2013, City of San Pablo staff hosted a third community meeting for this project at the Wanlass Park Community Center. Approximately 40 residents and stakeholders gave feedback on the proposed design for San Pablo Avenue to make it easier and safer to walk and bike, improve conditions for motorists, and enhance the look of the corridor between Rivers Street and Hilltop Drive. The event was conducted in English and Spanish. Snacks, refreshments and childcare were provided to facilitate community engagement.

The participants viewed a presentation by the consultant team that started with a review of the preceding workshops, community input and evolution of design alternatives for the corridor. The team followed with presentation and discussion of the preferred concept design. Participants generally supported the concept, though questions were raised about how the project would be built (given the high cost). Staff noted that the City is pursuing a OneBayArea Grant (OBAG) to help fund implementation. Other thoughts and comments that were raised included:

1. Clear and well-placed directional signage for pedestrians will be important since the design does not include a sidewalk on the east side of San Pablo Avenue north of Robert Miller Drive.
2. Bicycle lanes should be striped through intersections for added visibility. The consultant team noted this recommendation and added skip-striping through all intersections, as is shown in the attachments to this memo.
3. Bicycle connections on either end of the study area are very important. The City should consider options to continue the bicycle lanes to formally connect to the path north



Top, consultants present details of preferred concept plan to community members; bottom, community members discuss priorities and questions about the plan.

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- of Hilltop Drive on the west side and to the commercial corridor south of Rivers Street. In particular, bicycle connections to Contra Costa College are very important.
4. Bus stops are not shown on the plan. Team members explained that transit operators have no plans to add new bus stops at this time. However, Hilltop Mall and Contra Costa College are important transit hubs close to the corridor.
 5. Drainage on the west side of the corridor and impacts to the creek outlet immediately south of La Puerta must be considered in design and construction.
 6. The effect of the proposed retaining wall on surrounding properties must be considered. The consultant team noted that considerable space exists between the paved roadway and adjacent property. The retaining walls will be located within the existing right-of-way for San Pablo Avenue.

Workshop input from stakeholders and community members informed the final design details of the preferred alternative. Additional pedestrian and bicycle crossing treatments were incorporated into the intersection design, with an emphasis on maintaining clear and continuous pedestrian and bicycle right-of-way.

CITY COUNCIL PRESENTATIONS

Based on input from the community workshop, the Cities of San Pablo and Richmond, and the project team, the preferred concept plan was revised to the Draft Final Concept. Fehr & Peers presented the Draft Final Concept to the City of San Pablo City Council on Monday, March 4, 2013, and to the City of Richmond City Council on Tuesday, April 23, 2013. These presentations focused on introducing the cities' elected officials to the complete streets plan, the public outreach process that informed the plan and the next steps and upcoming funding opportunity.

FUNDING

The City of San Pablo submitted an application for One Bay Area Grant (OBAG) funding on April 19, 2013. This grant would fund the final design, engineering, environmental review, and construction of the concept plan. The funding request was approximately \$6 million, and the Cities of San Pablo and Richmond committed to provide the local match, which must be at least 11.4% of the funding request. As of the writing of this report, the request for funding has been successful and the cities will receive full funding for implementation of the project.

DRAFT FINAL CONCEPT PLAN

The community feedback summarized above highlighted the importance of high visibility crossing treatments for both bicyclists and pedestrians. The details of the preferred concept plan have been updated with continuous bicycle lanes through intersections and enhanced crosswalks to address this.

The bicycle lanes are continuous across all minor street crossings, with green skip striping through the intersections, adjacent to the striped crosswalks.



San Pablo Avenue Complete Streets Study

Final Report – September 2013

At Robert Miller Drive, the northbound bicycle lane continues through the intersection with green skip striping, as at minor street crossings. The southbound bicycle lane continues as a solid green lane across the west edge of the intersection. Through southbound bicycle traffic maintains a continuous line, and left-turning southbound bicycle traffic is directed to a jug-handle turning queue area to the right of the through bicycle lane. This directs left turning bicyclists to the skip striping across the intersection, connecting to the eastbound bicycle lane on Robert Miller Drive. The mixing zone where the westbound bicycle lane on Robert Miller Drive meets the proposed right and left turn lanes is marked with 50 feet of skip striping across the entire width of the right lane, followed by 50 feet of solid green bicycle left- and right-turning lanes at the approach to the intersection. The skip striping marks the bicycle/vehicle crossing zone and the bicycle turning lanes position bicycles for safer and more comfortable turning with a high visibility reminder of the potential presence of bicycles.



Example of shared pedestrian and bicycle crosswalk in Berkeley, crossing University Avenue to connect to off-street West Street Path.

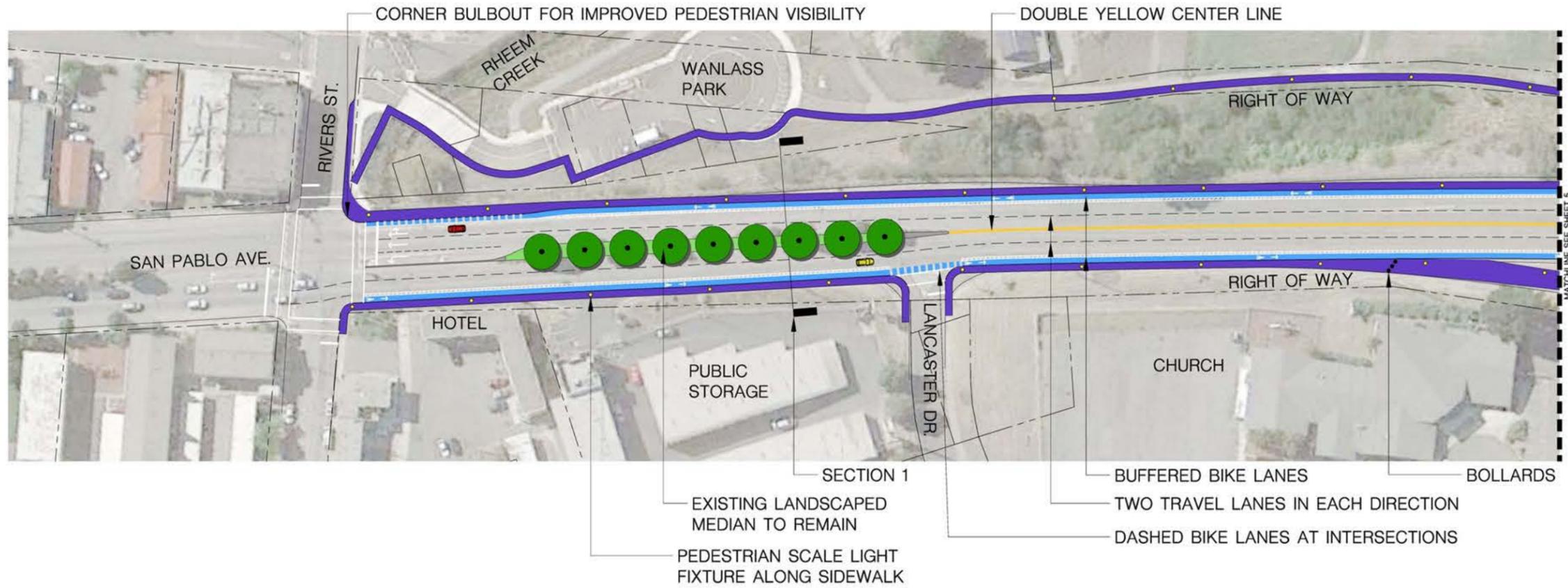
At Hilltop Drive the northbound bicycle lane continues through the intersection with green skip striping, as at minor street crossings. On-street bicycle lanes are not present north of Hilltop Drive. Therefore, northbound bicyclists are directed across the north leg of the intersection via the shared pedestrian and bicycle crosswalk, which is marked with wide white stripes, similar to the “triple-four” crosswalk style, and includes sharrow markings through the center. An example of this crossing treatment is pictured above.

A speed feedback sign is recommended in the southbound direction between Robert Miller Drive and Rivers Street. This will alert drivers to their speeds and increase awareness of the decreasing speed limit south of Robert Miller Drive.

All of the Draft Final Plan updates are included in the following figures, and are detailed in the attached 35% design drawings in **Appendix C** (Demolition Plan, Street Improvement Plan and Planting and Irrigation Plan).

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Final Report – September 2013



BUFFERED BIKE LANES



PEDESTRIAN REFUGES



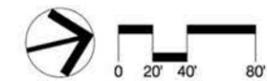
PEDESTRIAN STREET LIGHTING



LANDSCAPED MEDIAN



RECOMMENDED CONCEPT San Pablo Avenue Complete Streets Study San Pablo, California

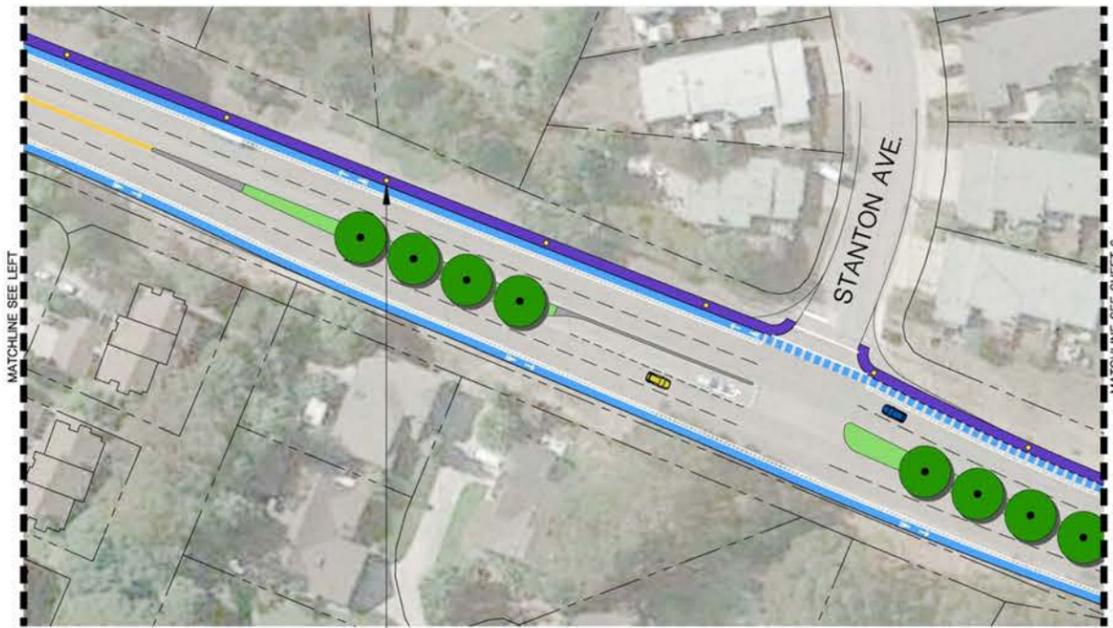
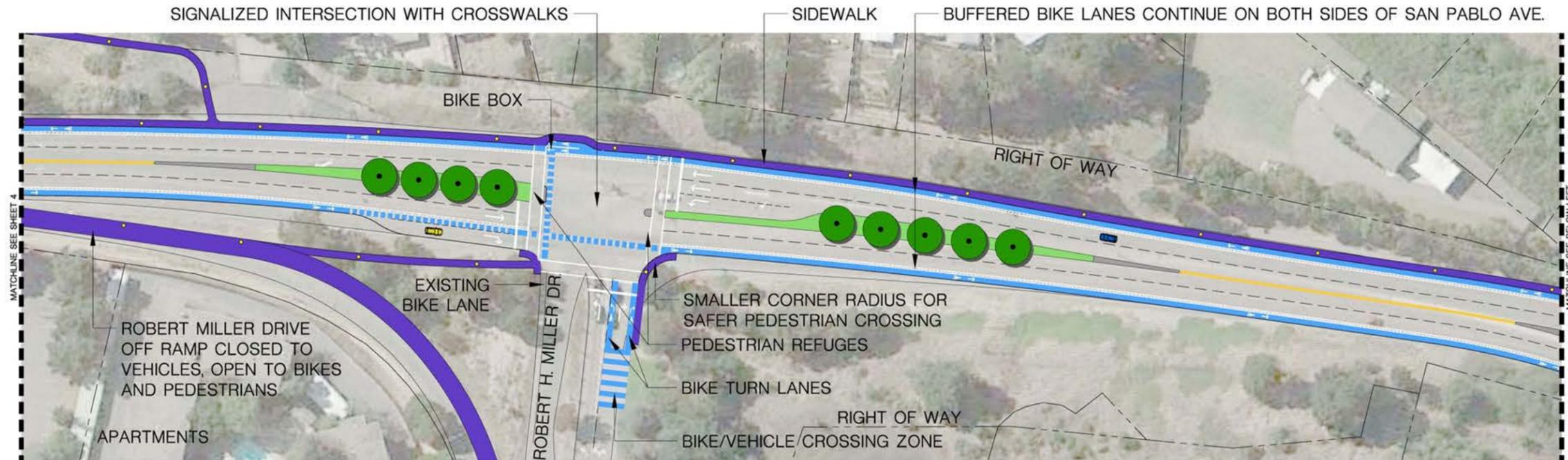


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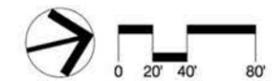
March 18, 2013

San Pablo Avenue Complete Streets Study

Final Report – September 2013



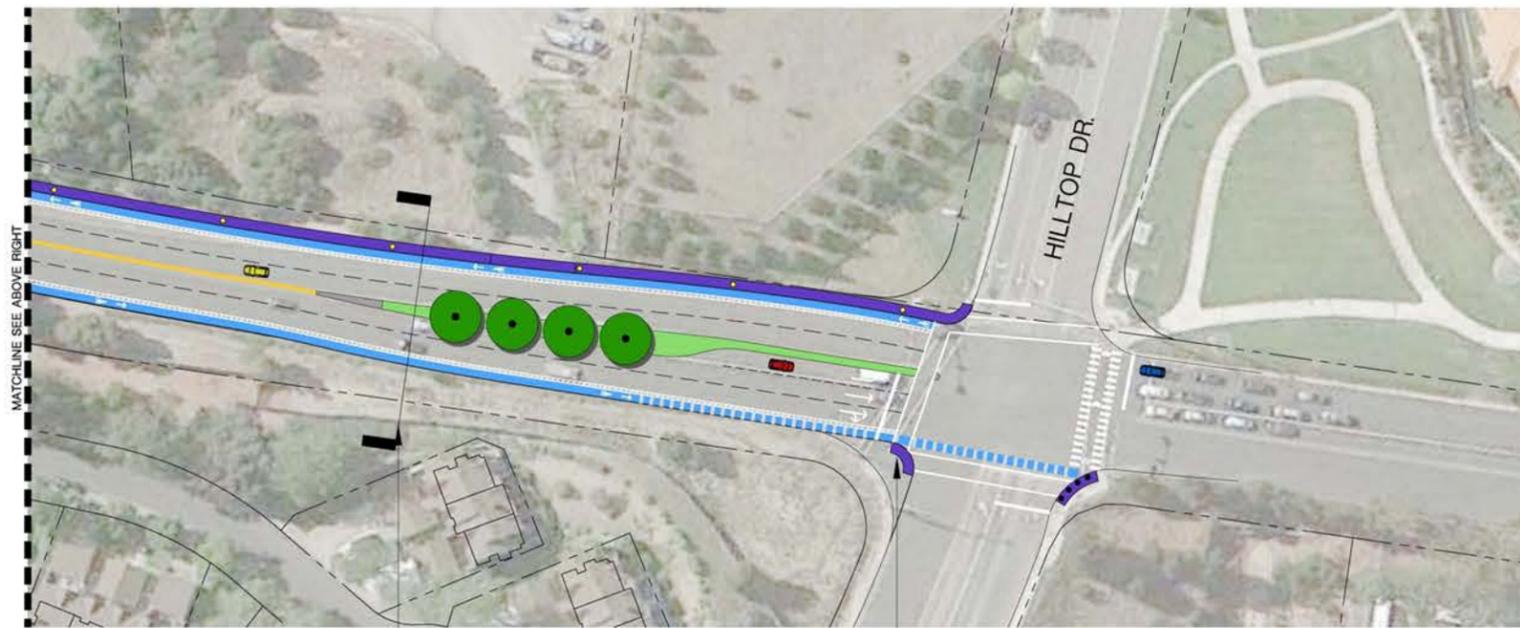
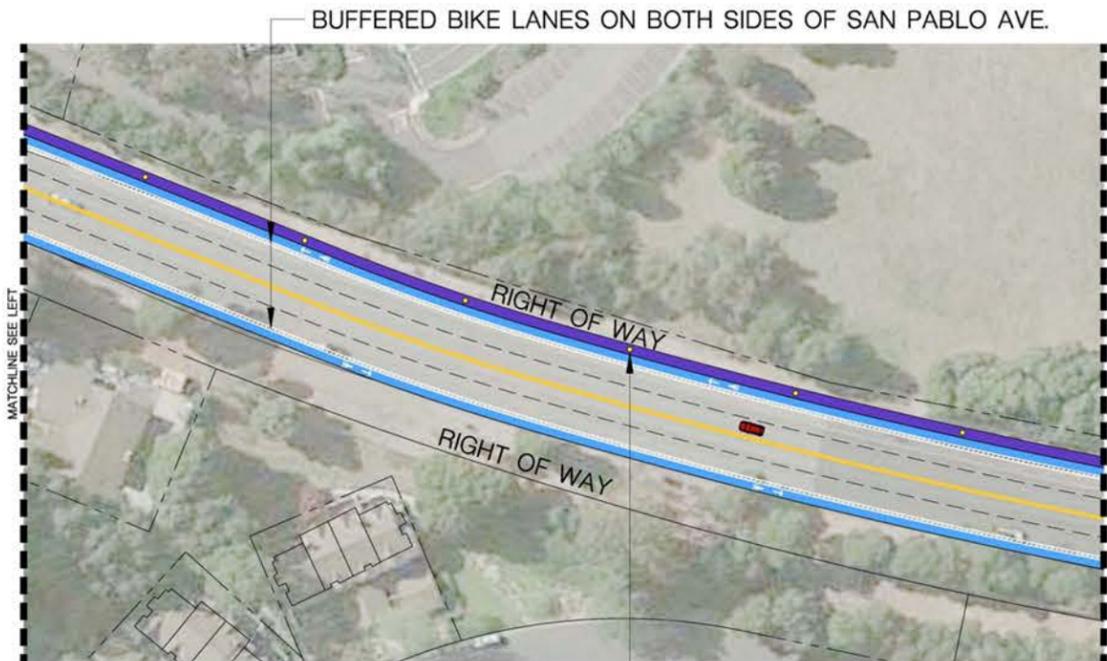
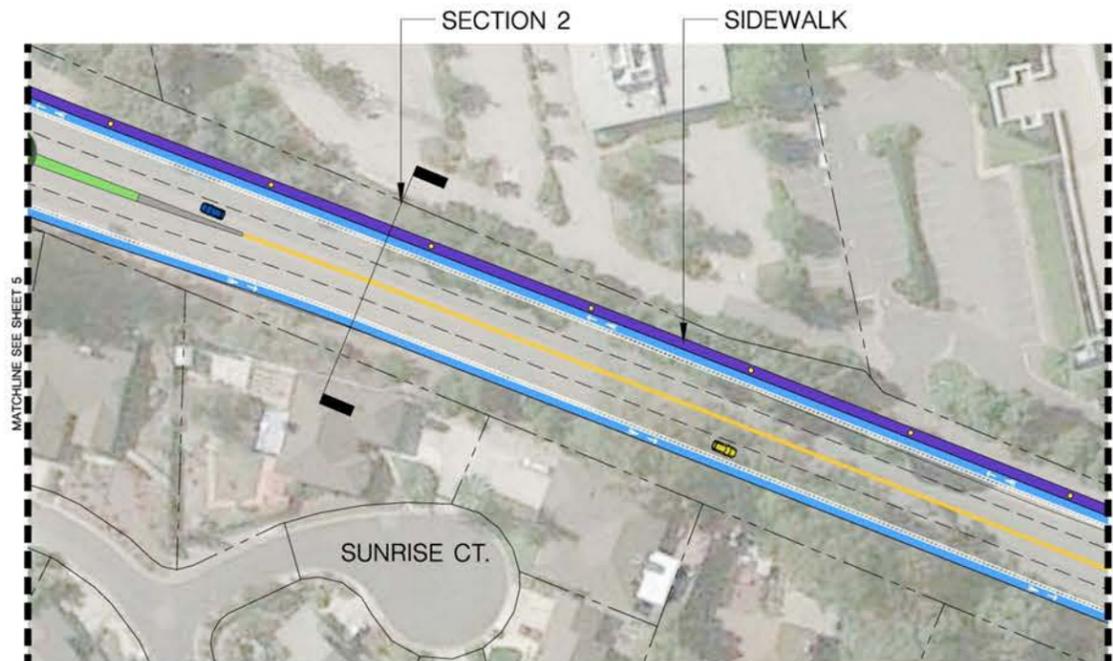
RECOMMENDED CONCEPT San Pablo Avenue Complete Streets Study San Pablo, California



2
March 18, 2013

San Pablo Avenue Complete Streets Study

Final Report – September 2013



PEDESTRIAN SCALE LIGHT FIXTURE ALONG SIDEWALK

SMALLER CORNER FOR SAFER PEDESTRIAN CROSSING

RECOMMENDED CONCEPT San Pablo Avenue Complete Streets Study San Pablo, California



3
March 18, 2013
Drawn by: JF
Checked by: TS
13041

San Pablo Avenue Complete Streets Study

Final Report – September 2013



TRUCK TURNING ANALYSIS AND TRUCK ROUTES

BKF analyzed potential conflicts between large trucks and the proposed improvements to San Pablo Avenue as illustrated in the 35% construction drawings. Analysis focused on San Pablo Avenue and Robert H. Miller Drive, as the City of Richmond has designated these roadways as truck routes.

BKF performed the simulation using AutoTURN software developed by Transoftsolutions. The analysis used the largest tractor-trailer legally allowed on California streets, which has an overall maximum length of 65 feet and kingpin to rear axle of 40 feet. The intersections were not analyzed using the Surface Transportation Assistance Act (STAA) standard tractor-trailer, as the State of California does not identify these streets as part of the STAA network. The analysis identified conflicts with the following turning movements at the San Pablo Avenue/Robert H. Miller Drive intersection:

- Eastbound right turn from San Pablo Avenue to Robert H. Miller Drive
- Southbound left turn from Robert H. Miller Drive to San Pablo Avenue
- North bound right turn from Robert H. Miller Drive to San Pablo Avenue

These conflicts are not significant within the context of the surrounding road network, as Richmond Parkway is the preferred truck route from Highway 80 to San Pablo Avenue. As demonstrated by truck traffic counts collected by the City of Richmond, truck traffic on Robert H. Miller Drive is relatively low. The uses along Robert H. Miller Drive between Hilltop Drive and San Pablo Avenue are primarily residential. The use of this road segment as a truck route is inconsistent with the character of the neighborhood. Therefore, it is recommended that the City of Richmond amend the map to remove this segment Robert H Miller Drive as a designated truck route. The preferred alternative intersection design accommodates bus and fire truck turning movements.

Encouraging trucks to use the Richmond Parkway will have the added benefit of reducing City of Richmond maintenance costs for pavement repair and replacement on Robert H. Miller Drive.

DETAILED COST ESTIMATE

BKF prepared a detailed Engineer's Opinion of Cost for implementing the Draft Final Plan. Unit costs are consistent with those used for recently constructed similar projects. Construction costs are based on best engineering judgment about required hardscape improvements. The attached cost estimate is based on conservative assumptions.

Retaining walls present the greatest unknown, as assumptions about location and dimensions are based on limited data. An existing conditions survey will be required to gather topographic details and finalize plans and cost estimate for retaining walls.

Callander Associates provided details for the landscape and lighting elements. The concept plan illustrates pedestrian-scale lights spaced at 100 feet intervals on all the new sidewalks, which is typical for similar recent streetscape and pathway projects. That spacing leads to an estimate of approximately 82 light fixtures, which are usually about 14 feet tall. The final determination of spacing and pedestrian lighting location is determined by an electrical engineer who can develop photogrammatic light distribution exhibits to ensure even, adequate coverage. The cost estimate for the pedestrian lighting is based on an installed unit cost per light (which includes the 14' pedestrian-scale LED light, fixture, pole, foundation, and pull box), and an estimate trenching, conduit, service pedestals and controllers price per linear foot.

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The City of Richmond has recently proposed pedestrian lighting standards, which are likely to be adopted before construction begins. The selected lighting, unit cost and installation costs will be based on these standards.

The detailed cost estimate is included in **Appendix D**.

San Pablo Avenue Complete Streets Study

Final Report – September 2013



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IMPLEMENTATION

With OBAG funding secured, the City of San Pablo and the City of Richmond will now collaborate to determine the sources of local matching funds and move forward with engineering design and construction plans.

Construction will require compliance with the regulatory review process, which includes environmental review. Based on the current plan, this project should not trigger an Environmental Impact Review. The simplest environmental review process that may apply is a Categorical Exemption, but a Mitigated Negative Declaration may be necessary. A mitigation plan may be necessary for construction impact as significant temporary impacts will occur during construction, and some small permanent impacts will occur due to tree removal, road widening, and work near the creek.

All final design details will be informed by applicable specifications and requirements defined by City of San Pablo and City of Richmond Engineering, Public Works, Recreation and other involved departments. For example, City of Richmond Public Works Parks and Landscaping Division has outlined the following design considerations and requirements for San Pablo Avenue:

- Final grading and retaining wall design should allow for maintenance access to the edge of the right of way and landscaping will be designed to fit into the current maintenance schedule.
- In locations where landscaping plans call for removal of existing vegetation, especially large trees, new landscaping design should replace vegetation where possible and mitigate potential weed growth and maintenance needs.
- Low flow irrigation should be used on the project following guidelines under AB 1881 (pop-up irrigation spray heads shall not be used).
- Orientation of existing gateway signs should be considered for visibility in locations such as Robert Miller Drive, where traffic is redirected.
- New concrete walking paths should be laid out to avoid existing trees and design will be verified with City Parks Division before construction.

Other design details, including aesthetics, will be addressed in final plans. Community members have discussed their support for public art and aesthetic identity along the corridor throughout the public involvement process. This is most seamlessly included when it is incorporated into the implementation and construction plans. The City of San Pablo may wish to connect directly with the community about public art, as specific ideas and sculpture models have been developed.

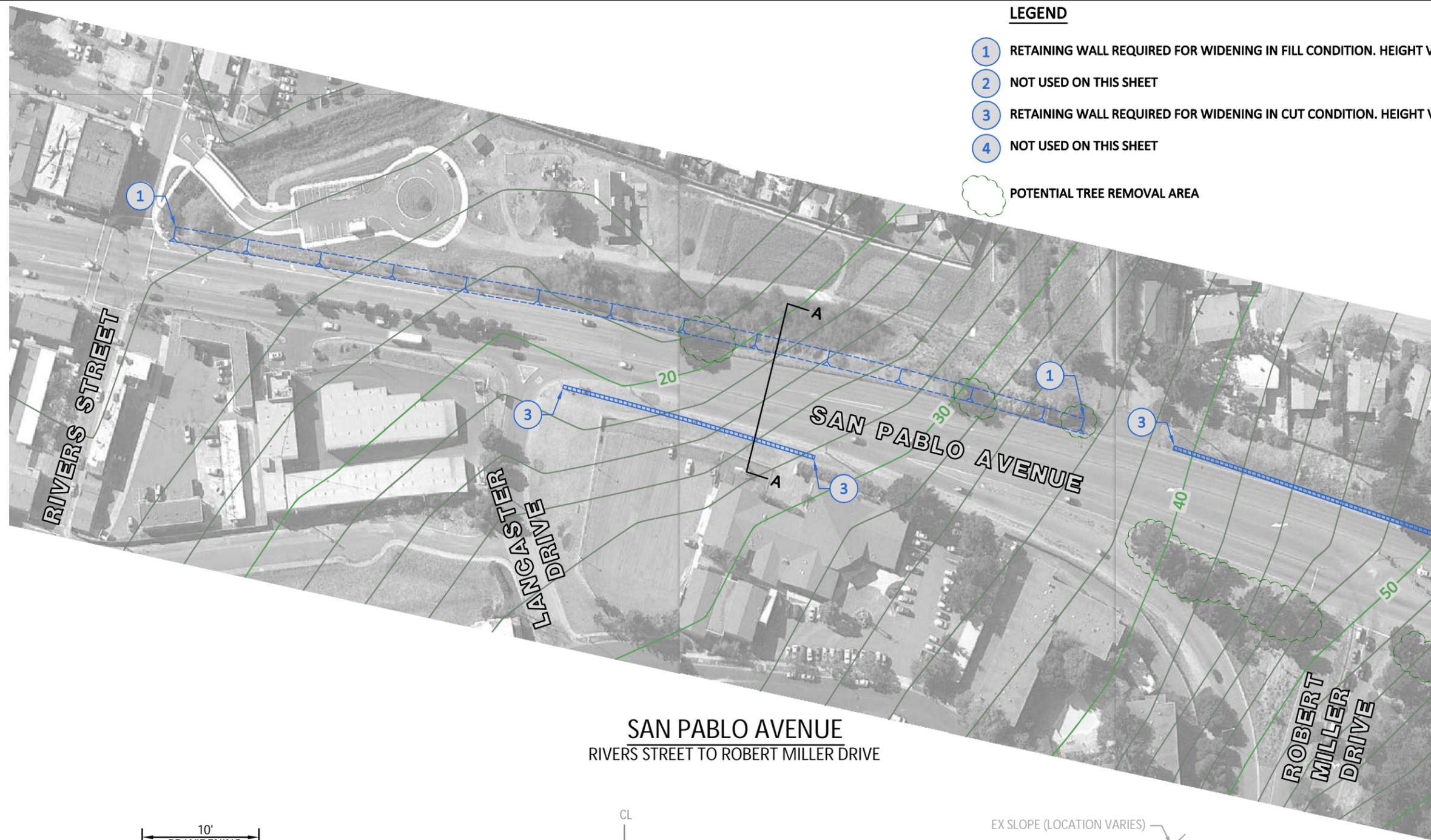
San Pablo Avenue Complete Streets Study



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Appendix A: Existing Conditions Assessment Figures

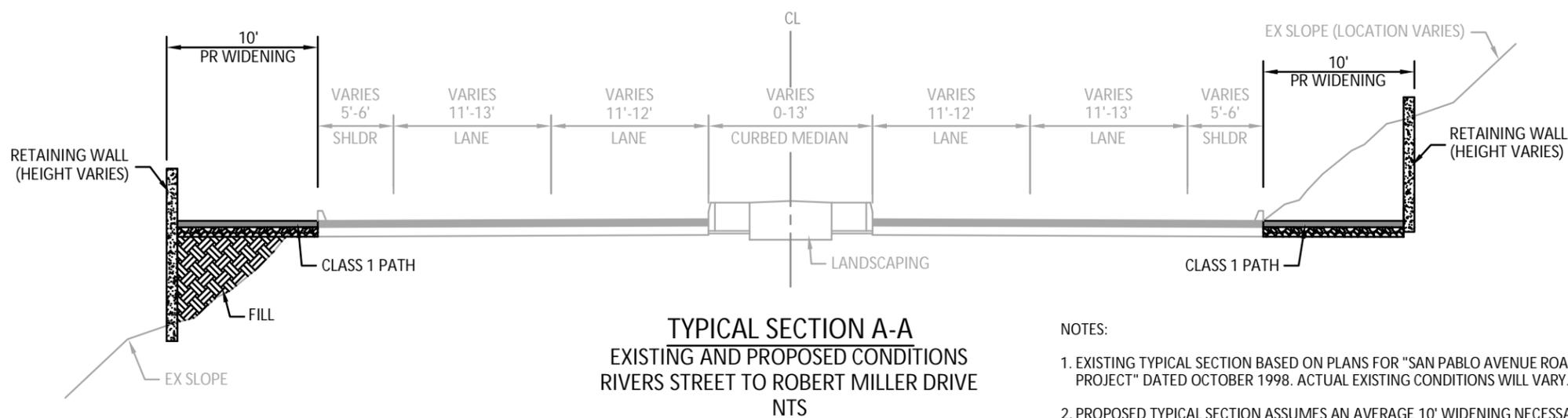
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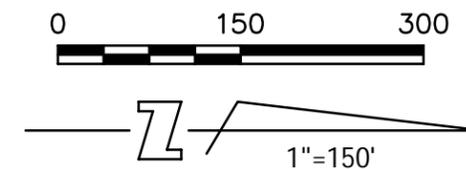
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- 2 NOT USED ON THIS SHEET
- 3 RETAINING WALL REQUIRED FOR WIDENING IN CUT CONDITION. HEIGHT VARIES - APPROX. 15' ± MAX
- 4 NOT USED ON THIS SHEET
- POTENTIAL TREE REMOVAL AREA

SAN PABLO AVENUE
 RIVERS STREET TO ROBERT MILLER DRIVE



NOTES:

1. EXISTING TYPICAL SECTION BASED ON PLANS FOR "SAN PABLO AVENUE ROADWAY RECONSTRUCTION PROJECT" DATED OCTOBER 1998. ACTUAL EXISTING CONDITIONS WILL VARY.
2. PROPOSED TYPICAL SECTION ASSUMES AN AVERAGE 10' WIDENING NECESSARY TO PROVIDE A 5' BIKE LANE AND A 5' SIDEWALK. ACTUAL WIDTH OF WIDENING WILL VARY BASED ON EXISTING CONDITIONS.



MATCHLINE - SEE SHEET 2

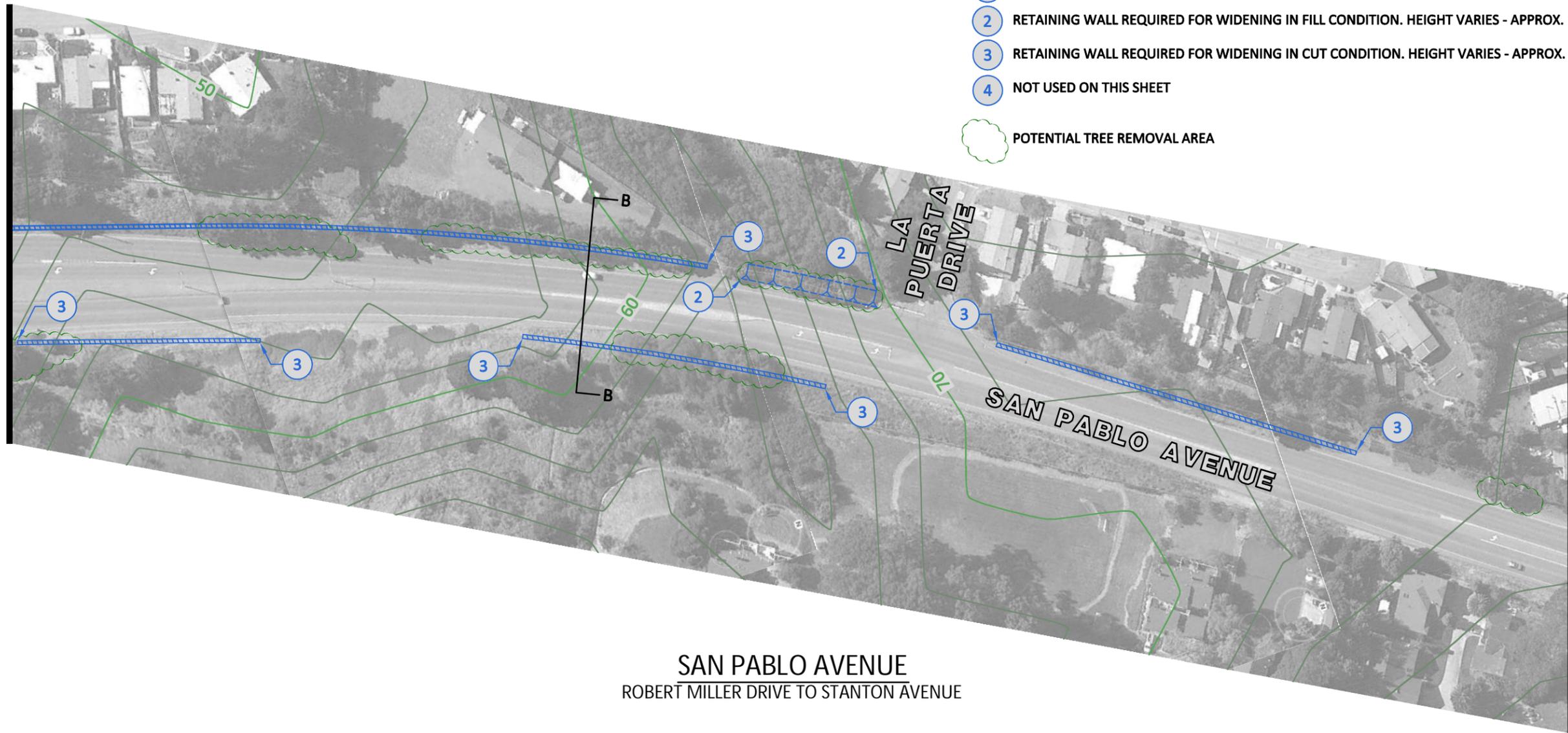
**SAN PABLO AVENUE COMPLETE STREETS
 EXISTING CONDITIONS ASSESSMENT**
 PHYSICAL CONSTRAINTS

DATE	SCALE
08/28/12	VARIES
BKF PROJECT NO.	20125090-10
CLIENT	CITY OF SAN PABLO
SHEET NO.	01 OF 04
DRAWING NO.	

BKF
 ENGINEERS / SURVEYORS / PLANNERS
 322 HARBOUR WAY
 SUITE 23
 RICHMOND, CA 94801
 510-529-0336 (TEL)
 510-529-0336 (FAX)

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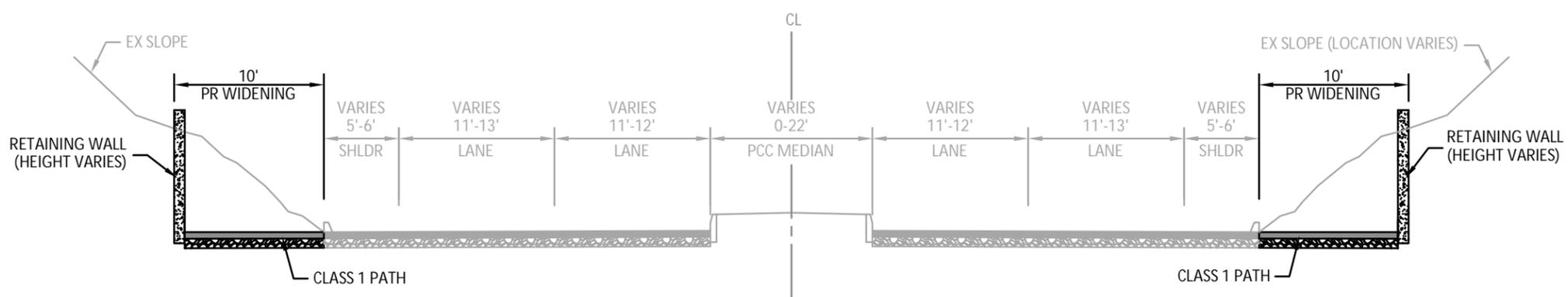
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 - 4 NOT USED ON THIS SHEET
 - POTENTIAL TREE REMOVAL AREA

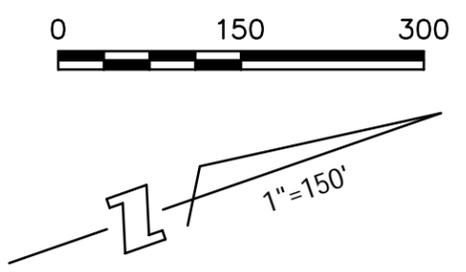
MATCHLINE - SEE SHEET 3

SAN PABLO AVENUE
 ROBERT MILLER DRIVE TO STANTON AVENUE



TYPICAL SECTION B-B
 EXISTING AND PROPOSED CONDITIONS
 ROBERT MILLER DRIVE TO HILLTOP DRIVE
 NTS

- NOTES:
1. EXISTING TYPICAL SECTION BASED ON PLANS FOR "SAN PABLO AVENUE ROADWAY RECONSTRUCTION PROJECT" DATED OCTOBER 1998. ACTUAL EXISTING CONDITIONS WILL VARY.
 2. PROPOSED TYPICAL SECTION ASSUMES AN AVERAGE 10' WIDENING NECESSARY TO PROVIDE A 5' BIKE LANE AND A 5' SIDEWALK. ACTUAL WIDTH OF WIDENING WILL VARY BASED ON EXISTING CONDITIONS.



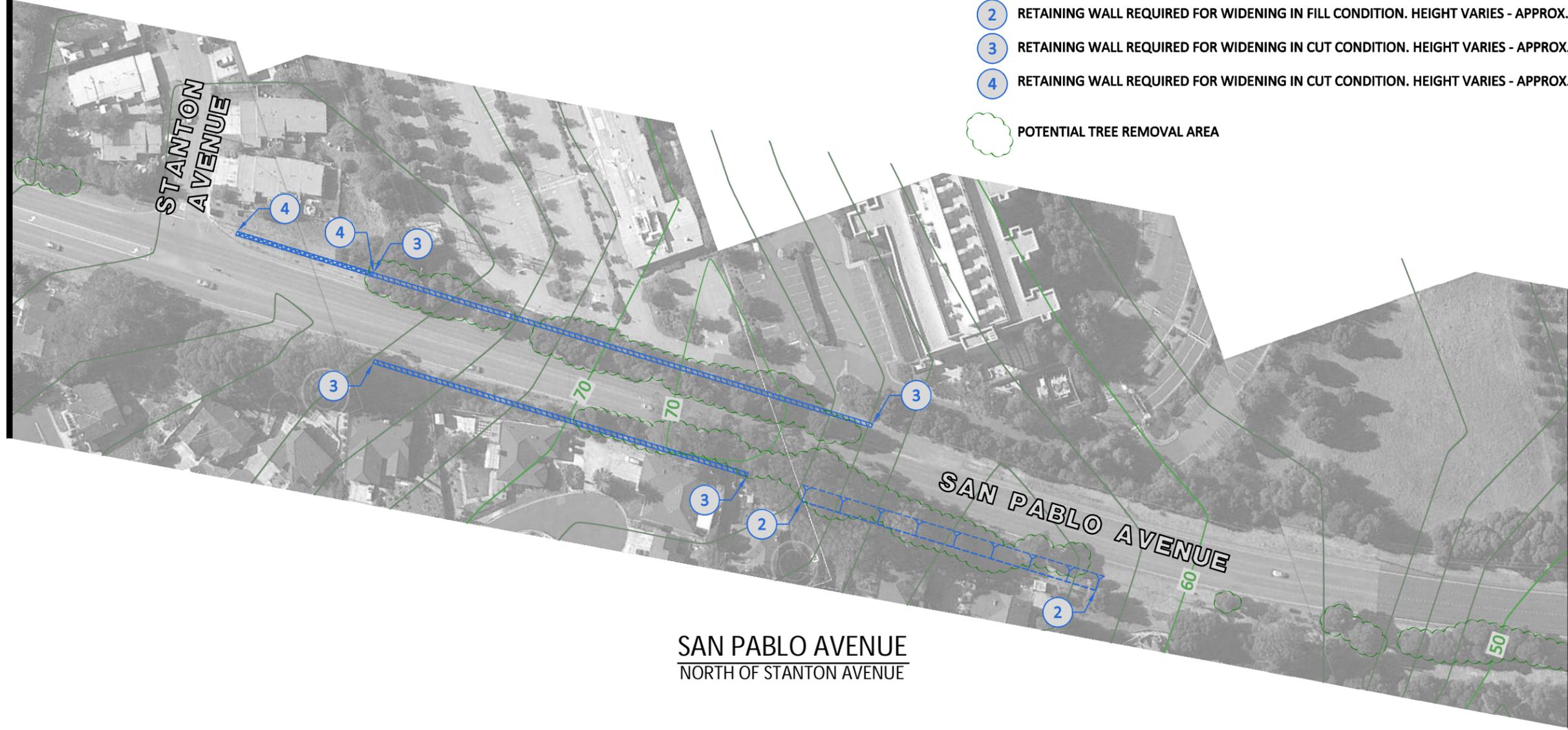
**SAN PABLO AVENUE COMPLETE STREETS
 EXISTING CONDITIONS ASSESSMENT**
 PHYSICAL CONSTRAINTS

DATE	SCALE
08/28/12	VARIES
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CLIENT CITY OF SAN PABLO	
SHEET NO. 02 OF 04	
DRAWING NO.	

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MATCHLINE - SEE SHEET 2

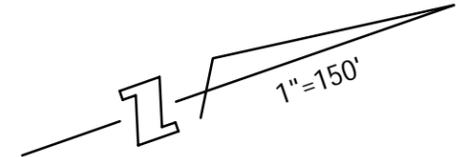


SAN PABLO AVENUE
 NORTH OF STANTON AVENUE

MATCHLINE - SEE SHEET 4

LEGEND

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- 4 RETAINING WALL REQUIRED FOR WIDENING IN CUT CONDITION. HEIGHT VARIES - APPROX. 5' ± MAX
- POTENTIAL TREE REMOVAL AREA



**SAN PABLO AVENUE COMPLETE STREETS
 EXISTING CONDITIONS ASSESSMENT**
 PHYSICAL CONSTRAINTS

DATE	SCALE
08/28/12	VARIES
BKF PROJECT NO.	
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CITY OF SAN PABLO	
SHEET NO.	03 OF 04
DRAWING NO.	



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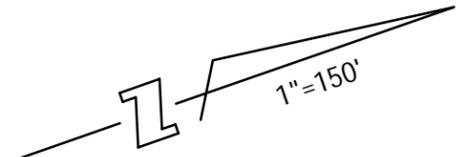
MATCHLINE - SEE SHEET 3



SAN PABLO AVENUE
 SOUTH OF HILLTOP DRIVE

LEGEND

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- ③ RETAINING WALL REQUIRED FOR WIDENING IN CUT CONDITION. HEIGHT VARIES - APPROX. 15' ± MAX
- ④ NOT USED ON THIS SHEET
-  POTENTIAL TREE REMOVAL AREA



**SAN PABLO AVENUE COMPLETE STREETS
 EXISTING CONDITIONS ASSESSMENT**
 PHYSICAL CONSTRAINTS

DATE	SCALE
08/28/12	VARIES
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San Pablo Avenue Complete Streets Study



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Appendix B: Intersection Analysis

San Pablo Avenue Complete Streets Study



Signal Warrant Analysis

The possibility of a new traffic signal at either La Puerta or Stanton was initially raised because community members pointed out the dangerous conditions for pedestrians, bicyclists and turning vehicles at these intersections. (Safe pedestrian crossing of San Pablo Avenue was also part of the early discussion, but that is no longer an issue because there are no pedestrian facilities on the east side of San Pablo Avenue between Robert Miller Drive and Hilltop Ave.)

The signal warrant evaluation was based on warrant criteria as defined in the California Manual on Uniform Traffic Control Devices (CA MUTCD) section 4C, which contains eight warrant criteria. Meeting one or more of the warrants could justify signalization of the intersection. For the analysis results discussed below, San Pablo Avenue is considered the Major Street, and La Puerta Drive is considered the Minor Street.

Peak Hour traffic data was collected for these intersections, so the Peak Hour Delay and Volume warrant was used to analyze this intersection. This warrant examines peak hour conditions at the intersection to determine if the minor street traffic suffers undue delay when entering or crossing the major street for a minimum of one hour of an average day. Warrant 3 is met if one of two conditions is met: Warrant 3A examines minor street approach volume, stopped time delay, and total intersection volume, and Warrant 3B examines the interaction of the major street volume and the higher volume minor street approach.

Fehr & Peers conducted a Signal Warrant analysis based on traffic volumes at La Puerta Drive and Stanton Avenue. The "rural" setting applies if the major-street speed exceeds 40 mph or it is located in an isolated community with a population of less than 10,000. Because the speed limit on this section of San Pablo Avenue exceeds 40 mph, the "rural" setting was used for analysis with the following results. The signal warrant is met for rural conditions at La Puerta; the warrant is not met at La Puerta for urban conditions, and is not met at Stanton for either condition.

SUMMARY OF RESULTS						
Major Street:	San Pablo Ave					
Minor Street:	La Puerta Ave					
Scenario:	Current					
Warrant	MUTCD Warrant Number	Caltrans Warrant Number	Requested for Analysis?	Volumes Satisfy Warrant?	Applicable Time Period	
Peak Hour Volume	3	11	YES	YES	Peak Hour	

Note that this section of San Pablo Avenue is very close to an "urban" setting; the volumes do not satisfy the warrant for the "urban" setting.

This evaluation is intended to examine the general correlation between the existing conditions and the need to install new traffic signals. It compares existing and available data provided by traffic volume and turning movement counts collected in December 2012 against a sub-set of the standard traffic signal

San Pablo Avenue Complete Streets Study



warrants recommended in the Federal Highway Administration *Manual on Uniform Traffic Control Devices* and the CA MUTCD.

This evaluation should not serve as the only basis for deciding whether and when to install a signal. To reach such a decision, the full set of warrants should be investigated based on field-measured, as well as forecast, traffic data and a thorough study of traffic and roadway conditions by an experienced engineer. Furthermore, the decision to install a signal should not be based solely upon the warrants, since the installation of signals can lead to certain types of collisions. Furthermore, the Caltrans *Traffic Manual* states, "delay, congestion, approach conditions, driver confusion, future land use or other evidence of the need for right of way assignment beyond that which could be provided by stop signs must be demonstrated" prior to the installation of a signal. The City of San Pablo and the City of Richmond make the ultimate determination whether or not a signal is warranted and should undertake regular monitoring of traffic conditions and accident data, and timely re-evaluation of the full set of warrants, before prioritizing and programming intersections for signalization.

With this understanding of the preliminary signal warrant analysis, there are a variety of options to consider. Community input and is an important factor, as a new signal will have an impact on local traffic flow.

Because sight distance at Stanton Ave is also an issue, regardless of whether a signal is installed, Fehr & Peers also considered closing left turns at either La Puerta or Stanton, and directing all left turning vehicles to the one intersection with a signal. If turning volumes at La Puerta and Stanton are consolidated, the volumes satisfy the signal warrant at both locations. In this case, a signal could be installed at Stanton (along with a "signal ahead" warning before the southbound approach) and La Puerta would be right-in/right-out only; or a signal could be installed at La Puerta and Stanton would be right-in/right-out only.

Each option is summarized below:

Alternative	Pros	Cons
Existing - No signal	-No change in traffic patterns and neighborhood access	-Does not address safety concerns for turning vehicles, pedestrians crossing minor streets, and bicycles
1: Assume rural context for signal warrant and install signal at La Puerta (no change at Stanton)	-Provides protected phase for turning vehicles at La Puerta (which also provides neighborhood access to Stanton)	-Rural context may not be appropriate for this location -Does not address Stanton sight distance concerns
2: Consolidate left-turns at La Puerta, right-in/right-out only at Stanton	-Meets both urban and rural signal warrant -La Puerta offers best access to neighborhood streets	-Closes left-turn access at Stanton -Does not address Stanton sight distance concerns
3: Consolidate left-turns at Stanton, right-in/right-out only at La Puerta	-Meets both urban and rural signal warrant -Addresses Stanton sight distance concerns for all turning vehicles	-Closes left-turn access options to neighborhood -Stanton may not be as convenient an access point as La Puerta -Requires advance signage in southbound direction for Stanton

San Pablo Avenue Complete Streets Study

The following figures illustrate the three alternatives:

1: Assume rural context for signal warrant and install signal at La Puerta (no change at Stanton)



Add signal with protected left-turn phase at La Puerta

Per emails exchanged with City of San Pablo, *Signal Alternative 1: Assume rural context for signal warrant and install signal at La Puerta (no change at Stanton)* will be discussed with the community at the public workshop on February 19, 2013.

2: Consolidate left-turns at La Puerta, right-in/right-out only at Stanton



Close left turns at Stanton - right-in and right-out only

Add signal with protected left-turn phase at La Puerta

3: Consolidate left-turns at Stanton, right-in/right-out only at La Puerta



Add "Signal Ahead" warning at southbound approach to Stanton

Add signal with protected left-turn phase at Stanton

Close left turns at La Puerta - right-in and right-out only

San Pablo Avenue Complete Streets Study



Highway Capacity Manual Level of Service and Delay Analysis

The operation of study intersections is also analyzed using the concept of intersection level of service (LOS). The method to conduct LOS analysis is documented by the Transportation Research Board (TRB) in the 2000 *Highway Capacity Manual* (HCM). LOS is considered a qualitative description of traffic operations; however, most studies quantify intersection LOS using “control delay” at intersections.

Intersection LOS is based on control delay, which is defined as the delay directly associated with the traffic control device (i.e., a stop sign or signal), including initial deceleration delay, queue move-up time, stopped delay and final acceleration delay. These delay estimates are considered meaningful indicators of driver discomfort and frustration, fuel consumption and lost travel time.

The LOS analysis for signalized intersections accounts for factors that affect delay at signalized intersections, including the turning movement volumes, lane geometries, and signal timing plan (e.g., cycle length, coordination and phasing). Signal timing plans also include information about transit operations at intersections with special timing requirements when transit vehicles pass through the intersections.

LOS analysis for unsignalized intersections accounts for delay experienced on each approach and is typically reported for the approach experiencing the highest level of delay. These intersections have a different threshold for LOS because drivers expect different levels of performance from distinct types of facilities. Typically, signalized intersections have higher traffic volumes and a higher level of delay is acceptable to drivers compared to unsignalized intersections.

San Pablo Avenue Complete Streets Study



The table below presents the relationship between LOS and delay for signalized and unsignalized intersections.

INTERSECTION LOS DEFINITIONS			
LOS	Average Delay (Seconds / Vehicle)		Description
	Signalized Intersection	Unsignalized Intersection	
A	< 10.1	<10	Insignificant delay: No approach is fully used and no vehicle waits longer than one red indication (at signals).
B	10.1 – 20.0	10.1 – 15.0	Minimal Delay: An occasional approach is fully used and drivers begin to feel restricted.
C	20.1 – 35.0	15.1 – 25.0	Average/moderate, but acceptable delay. Most drivers feel restricted.
D	35.1 – 55.0	25.1 – 35.0	Tolerable delay. Some queuing may occur, but usually dissipates quickly.
E	55.1 – 80.0	35.1 – 50.0	Significant delay. Volume approaches capacity and vehicles wait through several signal cycles. Drivers at unsignalized intersections may wait in long queues.
F	>80.0	>50	Excessive delay and congestion. Conditions are at capacity with long delay and queuing.

Source: Chapters 16 and 17, Highway Capacity Manual, Transportation Research Board, 2000.

Intersection operations for existing and proposed scenarios at all study area intersections are summarized in the table below as delay and intersection level of service (LOS).

INTERSECTION LOS COMPARISON					
Intersection	Control	Existing Conditions		Preferred Alternative Project Conditions	
		PM		PM	
		Delay ¹	LOS ²	Delay ¹	LOS ²
1. San Pablo Ave. / Rivers St.	Signal	11	B	11	B
2. San Pablo Ave. / Robert Miller Dr.	Signal	10	B	15	B
3. San Pablo Ave. / La Puerta Dr.	SSS	12	B	12	B
4. San Pablo Ave. / Stanton Ave.	SSS	15	B	15	B
5. San Pablo Ave. / Hilltop Dr.	Signal	36	D	36	D

Notes: SSS = Side-Street Stop

1. For signalized and all-way stop controlled intersections, the delay shown is the weighted average for all movements in seconds

San Pablo Avenue Complete Streets Study



per vehicle. For side-street stop controlled intersection, the delay shown is the worse approach delay.

2. LOS based on average delay/vehicle per HCM 2000 methodology

Source: Fehr & Peers, January 2013.

The weighted average delay for all movements at Robert Miller Drive increases from 10 seconds per vehicle under existing conditions to 15 seconds per vehicle under the preferred alternative project conditions. This reflects a slight increase in delay for left-turning vehicles in the eastbound direction. This does increase queues for this movement, but does not degrade the LOS of the entire intersection, and queues will still clear with each signal cycle.

San Pablo Avenue Complete Streets Study



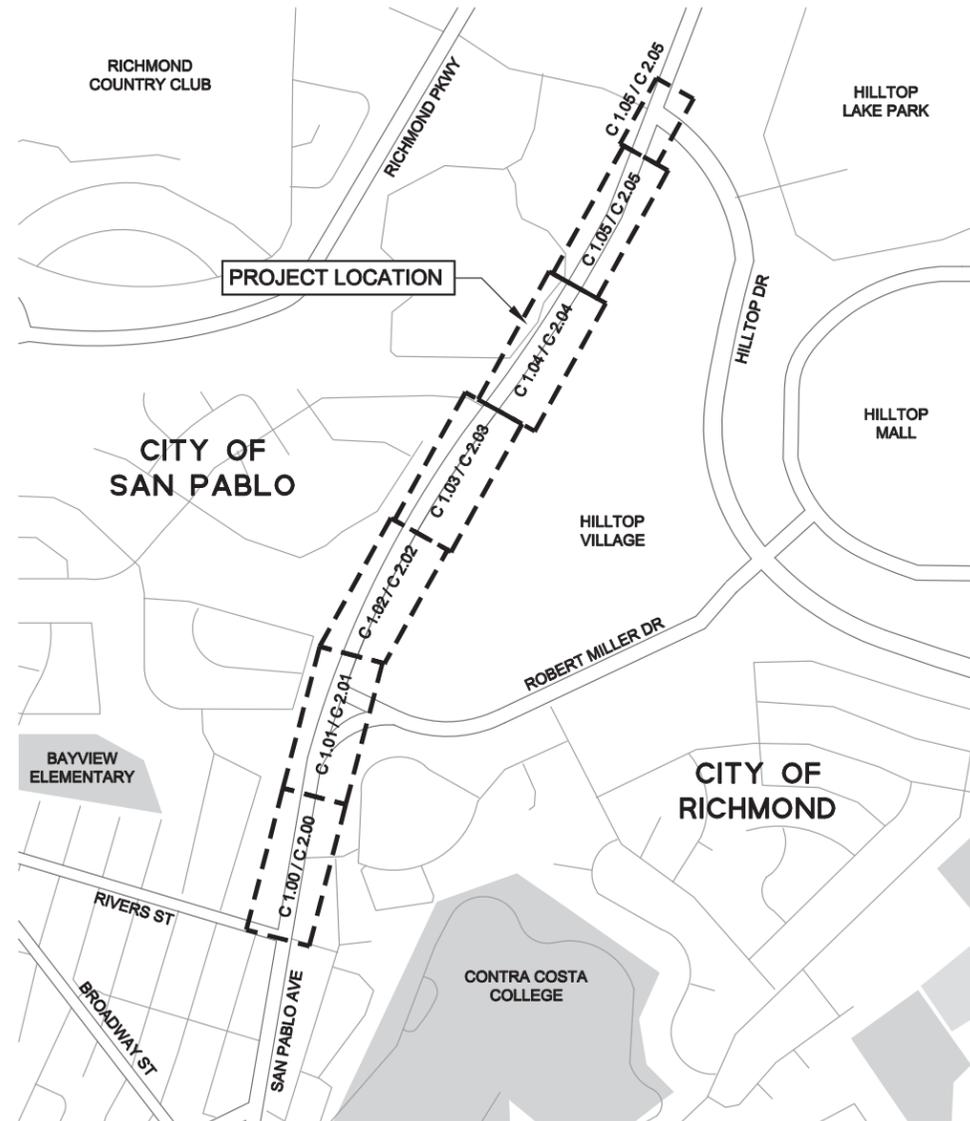
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Appendix C: 35% Design Drawings

SAN PABLO AVENUE COMPLETE STREETS

FROM RIVERS STREET TO HILLTOP DRIVE

JULY 2013



SHT NO	SHT REF	DESCRIPTION
01	C 0.00	TITLE SHEET
02	C 1.00	DEMOLITION PLAN
03	C 1.01	DEMOLITION PLAN
04	C 1.02	DEMOLITION PLAN
05	C 1.03	DEMOLITION PLAN
06	C 1.04	DEMOLITION PLAN
07	C 1.05	DEMOLITION PLAN
08	C 2.00	STREET IMPROVEMENT PLAN
09	C 2.01	STREET IMPROVEMENT PLAN
10	C 2.02	STREET IMPROVEMENT PLAN
11	C 2.03	STREET IMPROVEMENT PLAN
12	C 2.04	STREET IMPROVEMENT PLAN
13	C 2.05	STREET IMPROVEMENT PLAN
14	C 3.00	CONSTRUCTION DETAILS
L1	12041 PL & IR	PLANTING AND IRRIGATION PLAN
L2	12041 PL & IR	PLANTING AND IRRIGATION PLAN
L3	12041 PL & IR	PLANTING AND IRRIGATION PLAN
L4	12041 PL & IR	PLANTING AND IRRIGATION PLAN
L5	12041 PL & IR	PLANTING AND IRRIGATION PLAN
L6	12041 DT	CONSTRUCTION DETAILS

ABBREVIATIONS

AVE	AVENUE
DR	DRIVE
EX	EXISTING
LF	LINEAR FEET
PR	PROPOSED
ST	STREET
STND	STANDARD
TYP	TYPICAL

REVISIONS

NO.	DESCRIPTION	BY	DATE	APPVD



BKF
 ENGINEERS / SURVEYORS / PLANNERS
 1546 N CALIFORNIA BLVD
 SUITE 400, RICHMOND, CA 94807
 925-940-2200 (FAX)
 925-940-2200 (TEL)

REGISTERED PROFESSIONAL ENGINEER
 ROBERT C. STEVENS
 No. C 058660
 CIVIL
 STATE OF CALIFORNIA
 07/16/2013

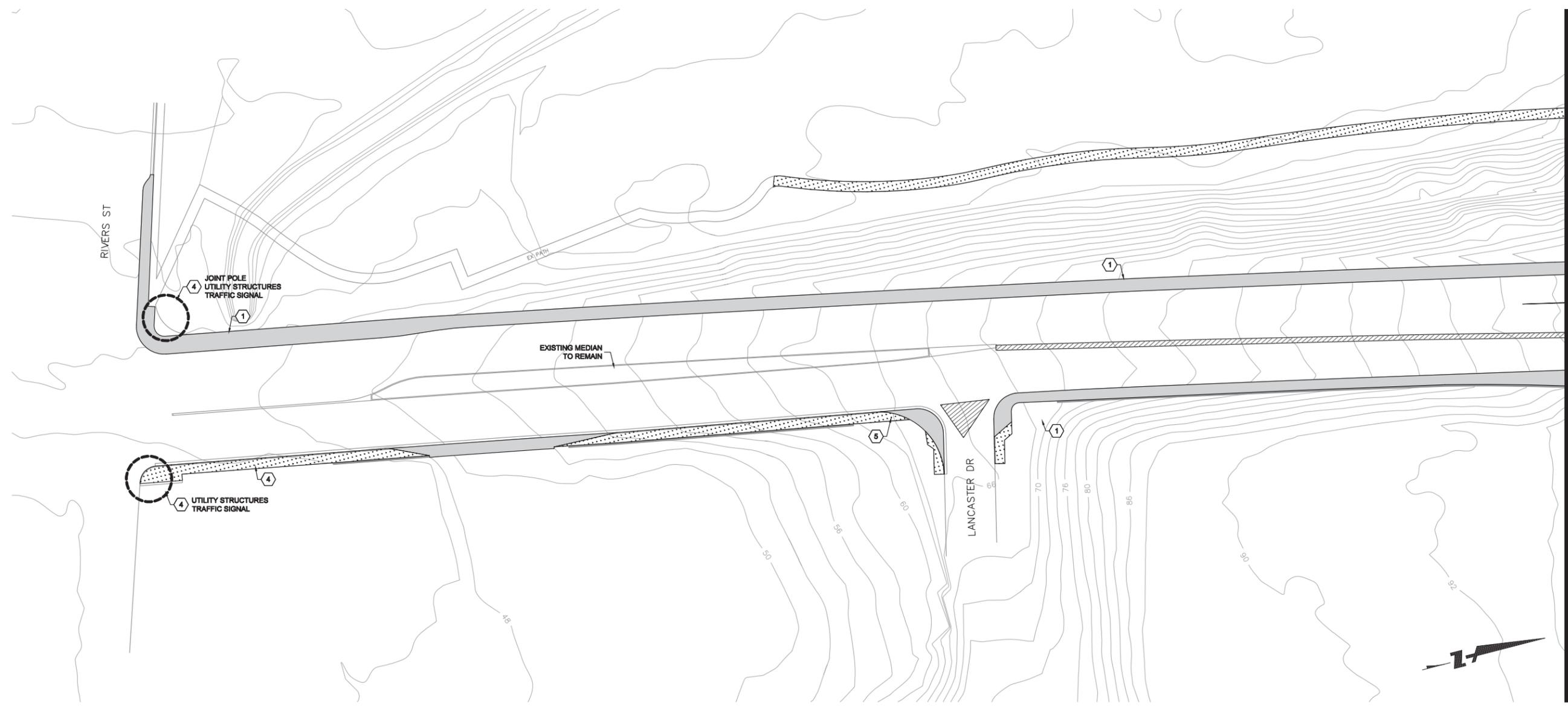
OWNER: CITY OF RICHMOND
 CONTRACT NO.: 20125082
 PROJECT: SAN PABLO AVENUE COMPLETE STREETS FROM RIVERS ST TO HILLTOP DR

SAN PABLO AVENUE COMPLETE STREETS
 FROM RIVERS ST TO HILLTOP DR
 TITLE SHEET

CITY OF RICHMOND
 CALIFORNIA

DATE	07/16/13	SCALE	AS SHOWN
REF. JOB NO.	20125082		
COUNTY NO.			
SHEET NO.	01	OF	14
FILE NO.	C 0.00		

NOT FOR CONSTRUCTION



MATCH LINE SEE SHEET C 1.01

LEGEND

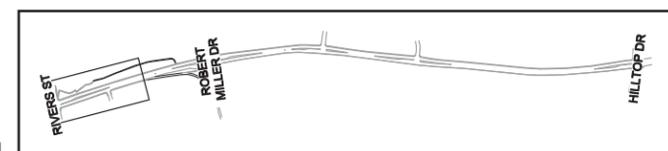
- ASPHALT CONCRETE REMOVAL
- CONCRETE REMOVAL
- CLEAR AND GRUB

KEYNOTES

- REMOVE AND SALVAGE SIGN
- REMOVE TRAFFIC SIGNAL
- RELOCATE EXISTING UTILITY
- PROTECT EXISTING UTILITY
- REMOVE EXISTING UTILITY

DEMOLITION NOTES

1. PROTECT ALL EXISTING UNDERGROUND UTILITIES (STORM DRAIN, SANITARY SEWER, WATER, GAS AND ELECTRICAL) UNLESS OTHERWISE NOTED ON THE PLANS.
2. ALL EXISTING UTILITY BOXES, STRUCTURES, MANHOLES AND VALVES WITHIN THE LIMIT OF WORK SHALL BE ADJUSTED TO FINAL GRADE UNLESS OTHERWISE NOTED.
3. AT ALL SIDEWALK REPLACEMENT SAWCUTS, CUT AT NEAREST SCOREMARK.
4. CONTRACTOR IS RESPONSIBLE TO LEGALLY DISPOSE OF ALL REMOVED MATERIAL.
5. ORDER OF WORK WITHIN THE PUBLIC RIGHT OF WAY SHALL BE PHASED SUCH THAT CLOSURE OF PUBLIC FACILITIES ARE MINIMIZED.
6. EXISTING SIGNAL TO REMAIN UNTIL NEW TRAFFIC SIGNAL IS INSTALLED AND OPERATIONAL.
7. LIMITS OF DEMOLITION AND UTILITY RELOCATION ARE APPROXIMATE. EXACT LIMITS OF DEMOLITION AND UTILITY RELOCATION TO BE VERIFIED WITH ADDITIONAL FIELD TOPOGRAPHIC AND COMPLETION OF 100% CONSTRUCTION DOCUMENTS.
8. CONTRACTOR TO REMOVE STREET LIGHT POLES AND FOUNDATION. PROTECT AND REUSE NEW LED LIGHT FIXTURES.



NOT FOR CONSTRUCTION

NO.	DESCRIPTION	BY	DATE	APPVD



1546 N CALIFORNIA BLVD
SUITE 400
RICHMOND, CA 94807
925-940-2200 (TEL)
925-940-2200 (FAX)

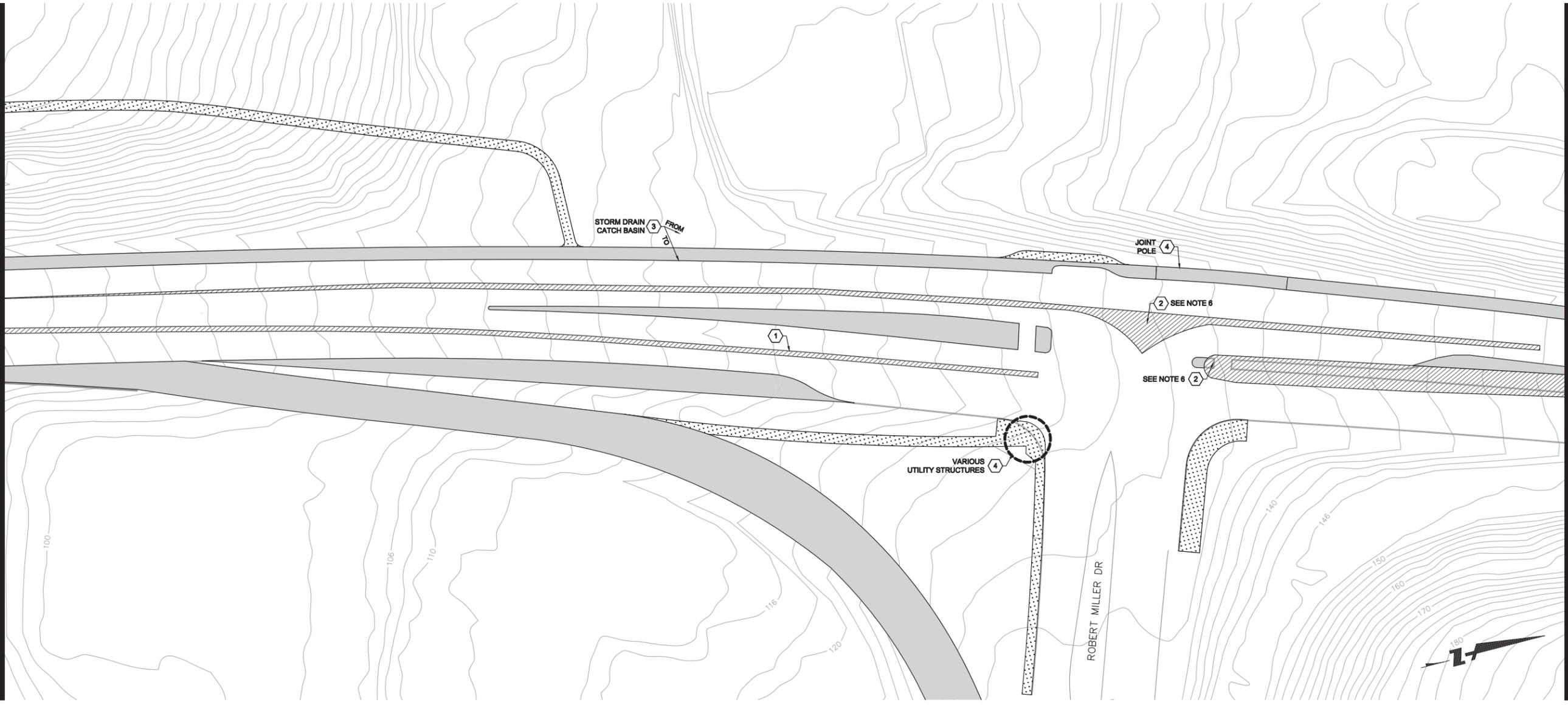
BKF
ENGINEERS / SURVEYORS / PLANNERS

PROJECT: BKF WC
DRAWN: BKF WC
CHECKED: BKF WC
DATE: 07/16/2013

SAN PABLO AVENUE COMPLETE STREETS
FROM RIVERS ST TO HILLTOP DR
DEMOLITION PLAN

DATE:	07/16/13	SCALE:	AS SHOWN
REF. JOB NO.:	20125082	COUNTY NO.:	
SHEET NO.:	02 OF 14	FILE NO.:	C 1.00

MATCH LINE SEE SHEET C 1.00



MATCH LINE SEE SHEET C 1.02

LEGEND

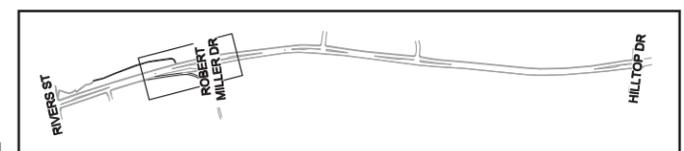
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-  CONCRETE REMOVAL
-  CLEAR AND GRUB

KEYNOTES

-  REMOVE AND SALVAGE SIGN
-  REMOVE TRAFFIC SIGNAL
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8. CONTRACTOR TO REMOVE STREET LIGHT POLES AND FOUNDATION. PROTECT AND REUSE NEW LED LIGHT FIXTURES.



NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

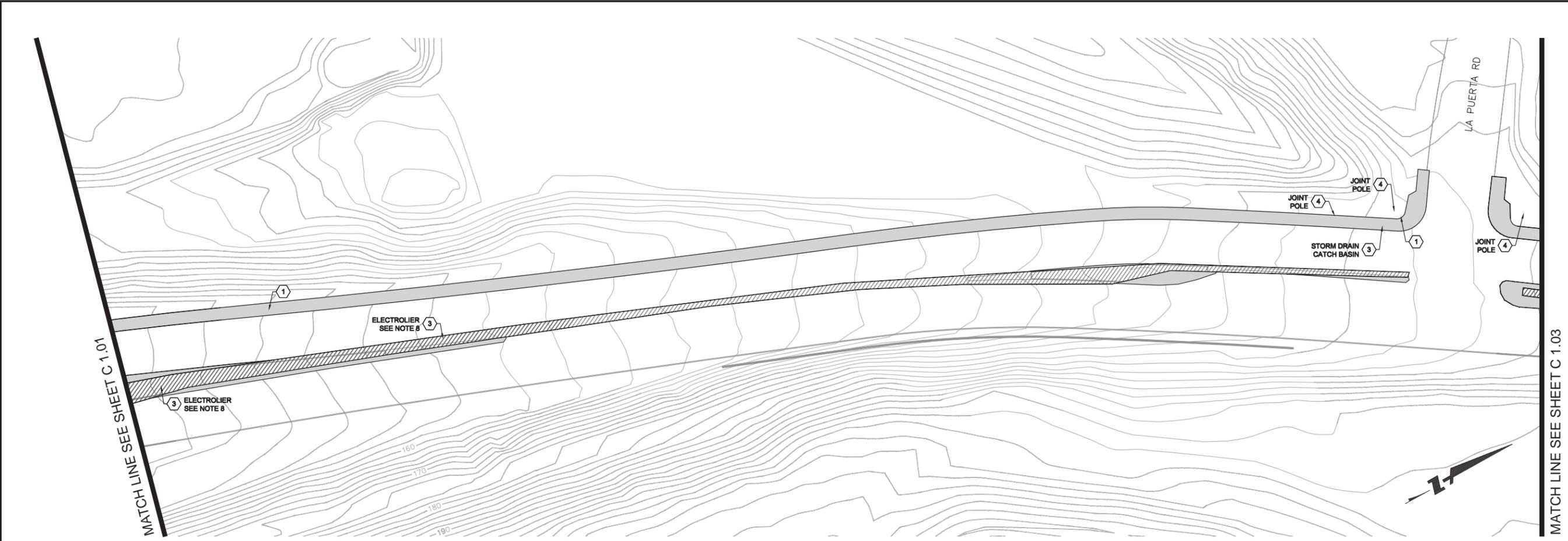


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 ENGINEERS / SURVEYORS / PLANNERS
 1546 N CALIFORNIA BLVD
 SUITE 400, RICHMOND, CA 94807
 925-940-2200 (TEL) 925-940-2200 (FAX)

CALIFORNIA
 REGISTERED PROFESSIONAL ENGINEER
 NO. C 058660
 EXPIRES 07/16/2013

**SAN PABLO AVENUE COMPLETE STREETS
 FROM RIVERS ST TO HILLTOP DR
 DEMOLITION PLAN**

DATE	07/16/13	SCALE	AS SHOWN
PROJ. NO.	20125082	COUNTY NO.	
SHEET NO.	03 OF 14	FILE NO.	C 1.01



LEGEND

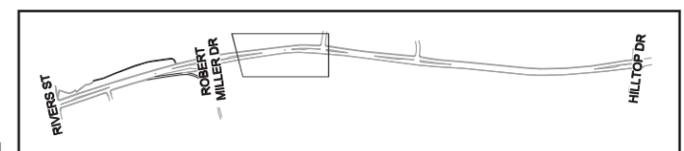
-  ASPHALT CONCRETE REMOVAL
-  CONCRETE REMOVAL
-  CLEAR AND GRUB

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-  REMOVE AND SALVAGE SIGN
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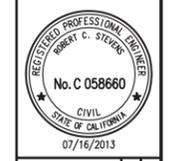
DEMOLITION NOTES

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8. CONTRACTOR TO REMOVE STREET LIGHT POLES AND FOUNDATION. PROTECT AND REUSE NEW LED LIGHT FIXTURES.



NOT FOR CONSTRUCTION

REVISIONS	
NO.	DESCRIPTION



1546 N CALIFORNIA BLVD
SUITE 400
RICHMOND, CA 94807
925-940-2200 (TEL)
925-940-2200 (FAX)

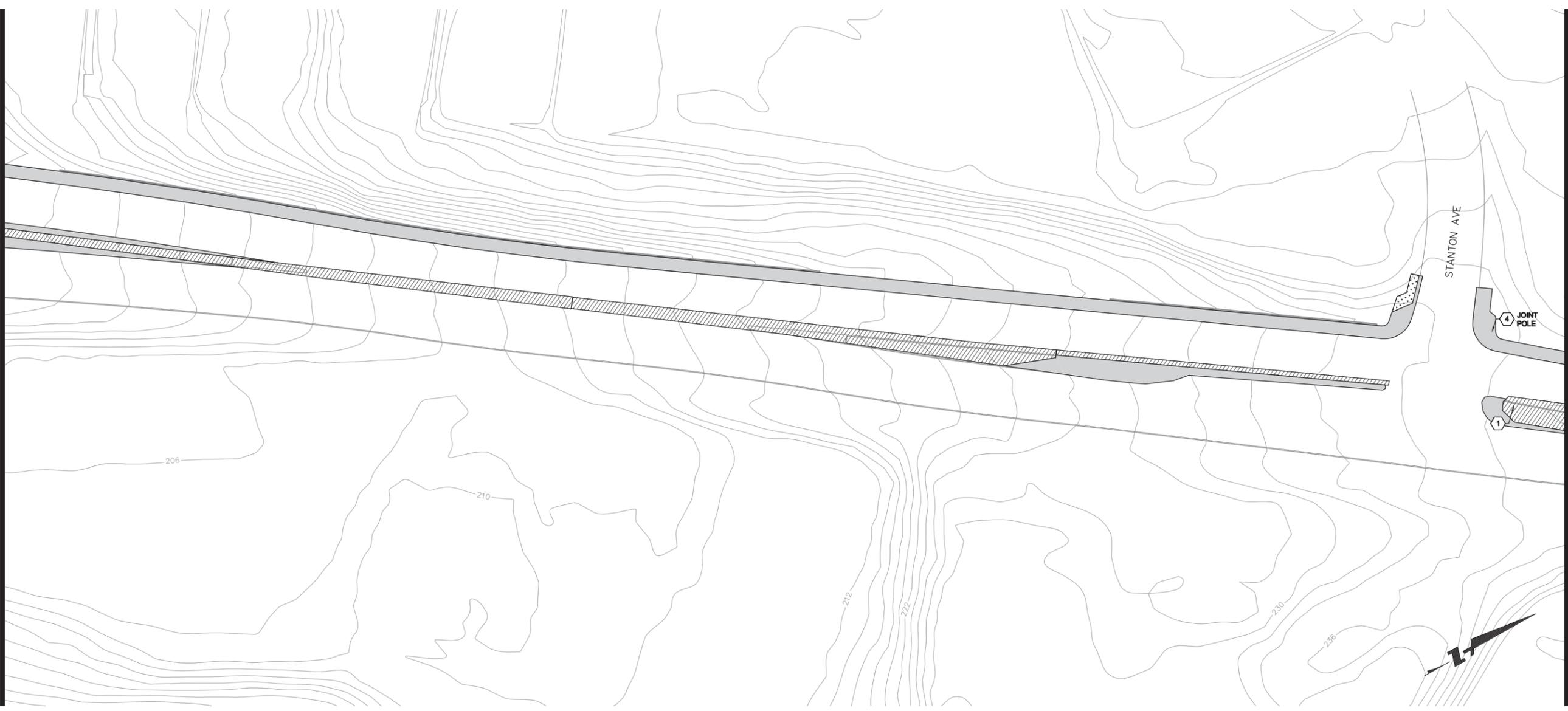
BKF
ENGINEERS / SURVEYORS / PLANNERS

PROJECT: BKF WC
DRAWN: BKF WC
CHECKED: BKF WC
DATE: 07/16/2013

**SAN PABLO AVENUE COMPLETE STREETS
FROM RIVERS ST TO HILLTOP DR
DEMOLITION PLAN**

DATE:	07/16/13	SCALE:	AS SHOWN
REF. JOB NO.:	20125082	COUNTY NO.:	
SHEET NO.:	04	OF	14
FILE NO.:	C 1.02		

MATCH LINE SEE SHEET C 1.02



MATCH LINE SEE SHEET C 1.04

LEGEND

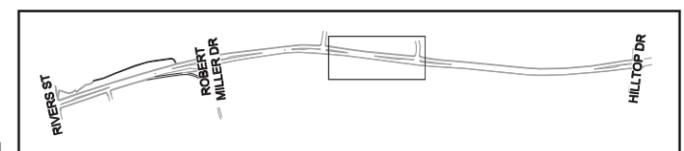
-  ASPHALT CONCRETE REMOVAL
-  CONCRETE REMOVAL
-  CLEAR AND GRUB

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NOT FOR CONSTRUCTION

NO.	DESCRIPTION	BY	DATE	APPVD



1546 N CALIFORNIA BLVD
SUITE 400
RICHMOND, CA 94807
925-940-2200 (TEL)
925-940-2200 (FAX)

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ENGINEERS / SURVEYORS / PLANNERS

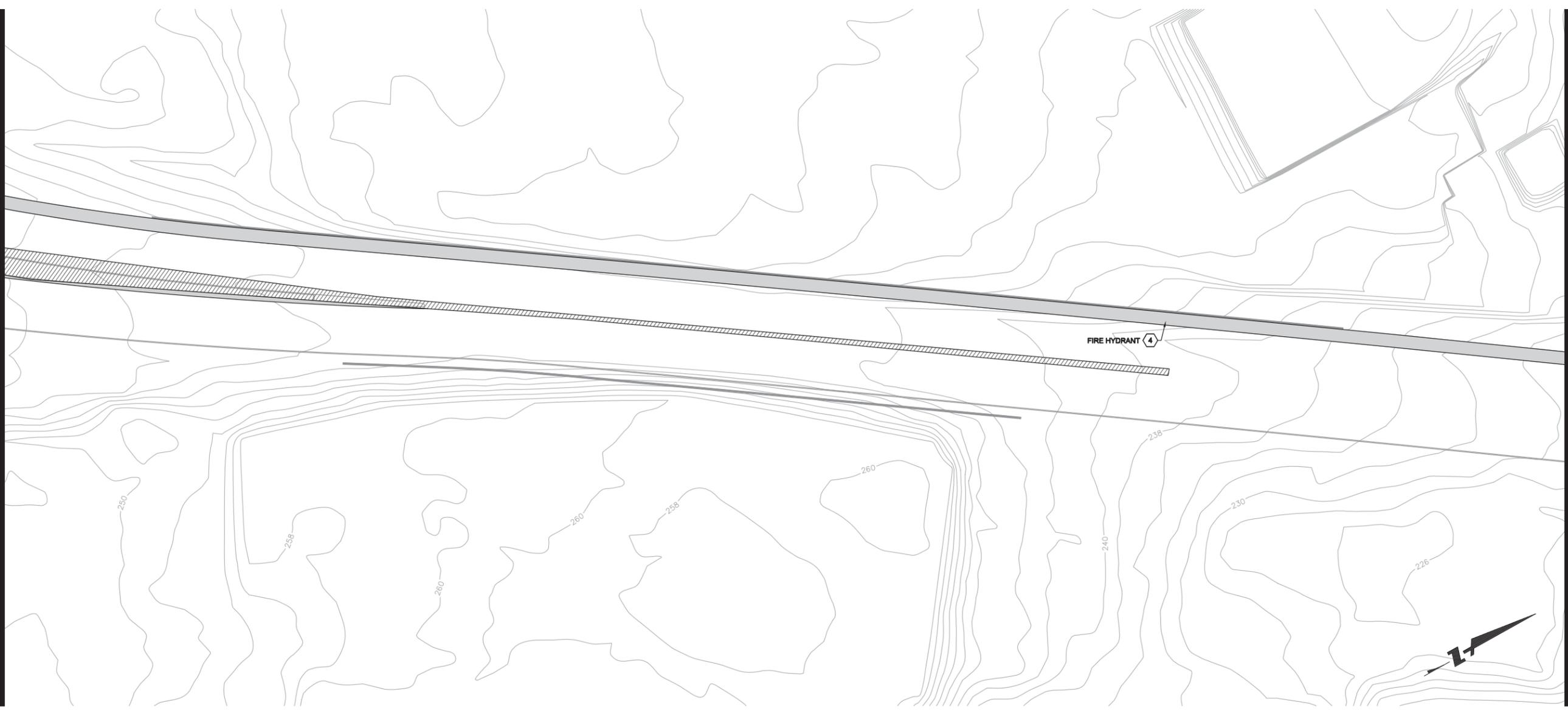
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DRAWN: BKF WC
CHECKED: BKF WC
APPROVED: RCS

CALIFORNIA

**SAN PABLO AVENUE COMPLETE STREETS
FROM RIVERS ST TO HILLTOP DR
DEMOLITION PLAN**

DATE:	07/16/13	SCALE:	AS SHOWN
REF. JOB NO.:	20125082	COUNTY NO.:	
SHEET NO.:	05 OF 14	FILE NO.:	C 1.03

MATCH LINE SEE SHEET C 1.03



MATCH LINE SEE SHEET C 1.05

LEGEND

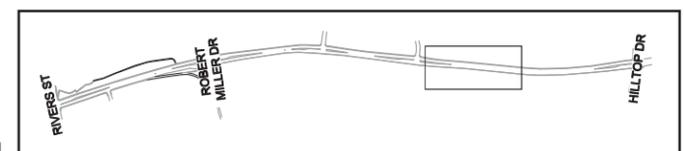
-  ASPHALT CONCRETE REMOVAL
-  CONCRETE REMOVAL
-  CLEAR AND GRUB

KEYNOTES

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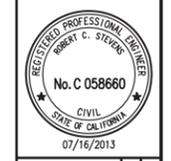
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8. CONTRACTOR TO REMOVE STREET LIGHT POLES AND FOUNDATION. PROTECT AND REUSE NEW LED LIGHT FIXTURES.



NOT FOR CONSTRUCTION

NO.	DESCRIPTION	BY	DATE	APPVD



1546 N CALIFORNIA BLVD
SUITE 400
RICHMOND, CA 94807
925-940-2200 (TEL)
925-940-2200 (FAX)

BKF
ENGINEERS / SURVEYORS / PLANNERS

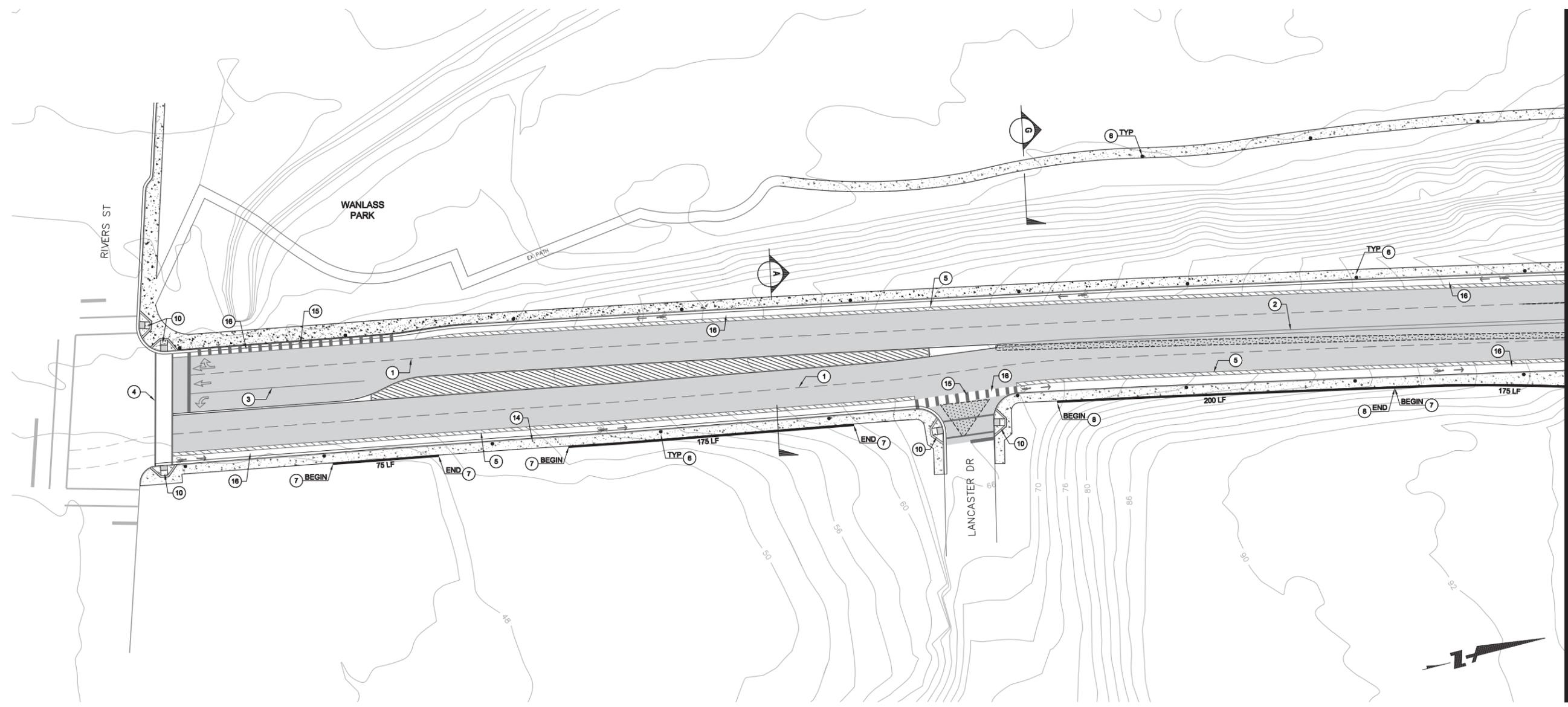
PROJECT: BKF WC
DRAWN: BKF WC
CHECKED: BKF WC
APPROVED: RCS

CALIFORNIA

SAN PABLO AVENUE COMPLETE STREETS
FROM RIVERS ST TO HILLTOP DR
DEMOLITION PLAN

CITY OF RICHMOND

DATE	07/16/13	SCALE	AS SHOWN
REF. JOB NO.	20125082	COUNTY NO.	
SHEET NO.	06 OF 14	FILE NO.	C 1.04



MATCH LINE SEE SHEET C 2.01

LEGEND

- 1.5" GRIND AND OVERLAY RIGHT LANE IN NORTH AND SOUTH DIRECTION. SLURRY SEAL ENTIRE ROADWAY.
- CONCRETE SIDEWALK
- NEW ASPHALT CONCRETE
- MEDIAN LANDSCAPING REFER TO LANDSCAPE PLAN FOR DETAIL
- GREEN PAINTED BIKE LANE
- BIKE LANE SYMBOL AND ARROW PER CALTRANS STND PLAN A24A/C
- 13 FT TYPE VII THRU AND TURN ARROW (LEFT AND RIGHT) PER CALTRANS STND PLAN A24A
- 10 FT TYPE I THRU ARROW PER CALTRANS STND PLAN A24A
- 8 FT TYPE IV TURN ARROW (LEFT AND RIGHT) PER CALTRANS STND PLAN A24B

KEY NOTES

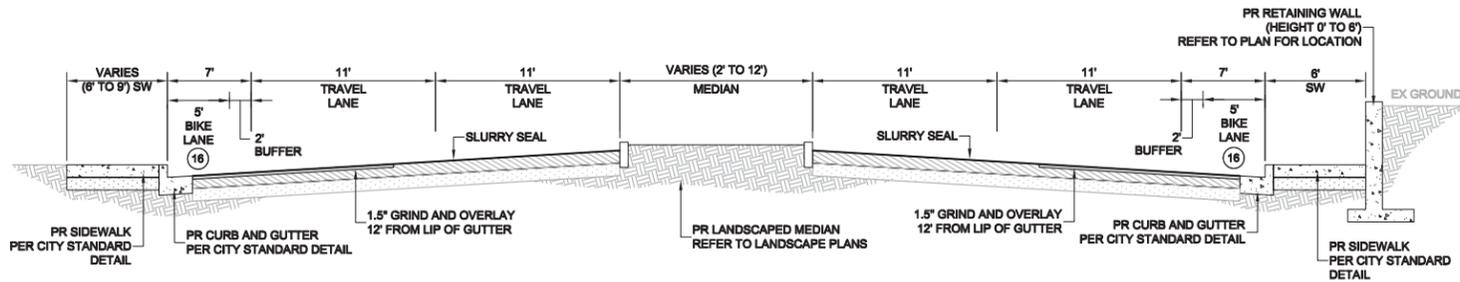
- ① DETAIL 8 - DASHED LANE LINE PER CALTRANS STND PLAN A20A
- ② DETAIL 21 - NO PASSING ZONE PER CALTRANS STND PLAN A20D
- ③ DETAIL 38A - CHANNELIZING LINE PER CALTRANS STND PLAN A20D
- ④ 12" WIDE WHITE STRIPE (TYP)
- ⑤ BIKE LANE BUFFER $\frac{2}{C3.0}$
- ⑥ PEDESTRIAN STREET LIGHT REFER TO LANDSCAPE PLANS
- ⑦ RETAINING WALL (HEIGHT: 0' - 3')
- ⑧ RETAINING WALL (HEIGHT: 3' - 8')

NOTES

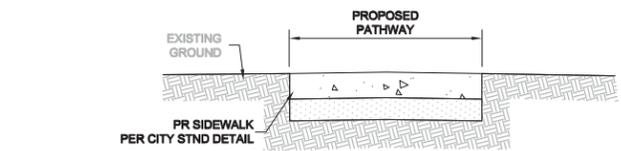
1. WITHIN PROJECT LIMITS REMOVE AND SALVAGE ALL EXISTING SIGNAGE THAT ARE IN CONFLICT WITH THE PROPOSED PLAN (REUSE SIGNS WHEN POSSIBLE)
2. EXISTING SIGNAGE AND STRIPING BEYOND PROJECT LIMITS ARE TO REMAIN. IF DAMAGED, CONTRACTOR SHALL RESTORE AT THEIR OWN EXPENSE.
3. ALL PAVEMENT WITHIN BIKE LANE AND SKIP STRIPING LIMITS SHALL BE PAINTED GREEN.
4. ASPHALT CONCRETE PLUG REQUIRED IN LOCATIONS OF NEW MEDIAN CURB, CURB AND GUTTER, DRIVEWAY AND CURB RAMPS.
5. SIGNAL AT ROBERT MILLER DR TO BE MODIFIED. CONTRACTOR TO COORDINATE TIMING OF REMOVAL TO MAINTAIN SIGNAL OPERATION.
6. CITY OF SAN PABLO DETAILS TO BE USED WITHIN CITY OF SAN PABLO RIGHT-OF-WAY. CITY OF RICHMOND DETAILS TO BE USED WITHIN CITY OF RICHMOND RIGHT-OF-WAY.

ABBREVIATIONS

- EX EXISTING
- PR PROPOSED
- STND STANDARD
- TYP TYPICAL
- ⑨ RETAINING WALL (HEIGHT: 6' - 10')
- ⑩ ACCESSIBLE CURB RAMP - CASE A PER CALTRANS STND PLAN A88A
- ⑪ ACCESSIBLE CURB RAMP - CASE C PER CALTRANS STND PLAN A20D
- ⑫ PROPOSED STAIRS TO BE CONFIRMED BY THE CITY
- ⑬ NEW MEDIAN CURB PER CITY STANDARD DETAIL
- ⑭ NEW DRIVEWAY PER CITY OF RICHMOND STND DETAIL
- ⑮ 12" WHITE SKIP STRIPING
- ⑯ GREEN PAINTED BIKE LANE



SECTION A
NOT TO SCALE



SECTION G
NOT TO SCALE



REVISIONS			
NO.	DESCRIPTION	BY	DATE



1546 N CALIFORNIA BLVD
SUITE 400
SAN PABLO, CA 94597
925-940-2200 (FAX)
925-940-2200 (TEL)

BKF
ENGINEERS / SURVEYORS / PLANNERS

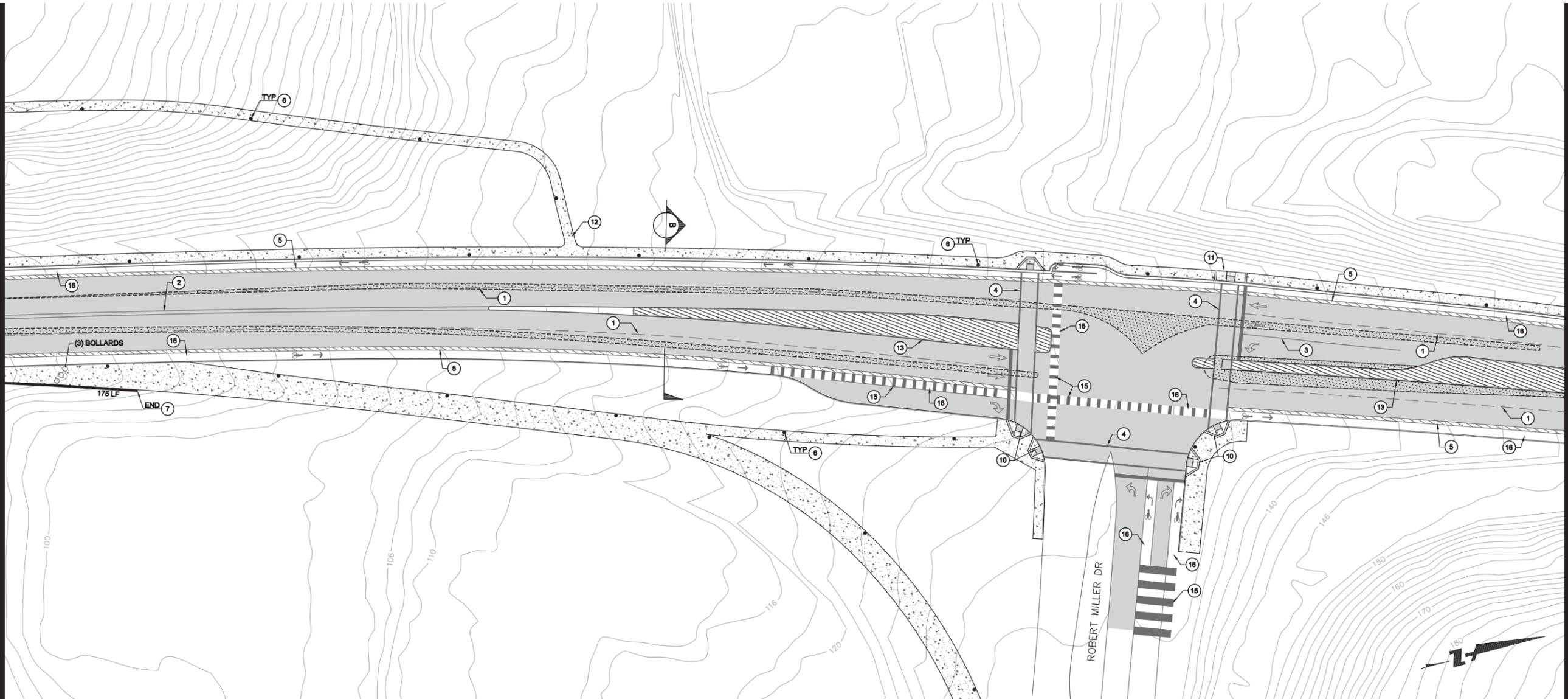
PROJECT: SAN PABLO AVENUE COMPLETE STREETS FROM RIVERS ST TO HILLTOP DR
DRAWN: BKF/WC
CHECKED: BKF/WC
DATE: 07/16/2013

SAN PABLO AVENUE COMPLETE STREETS
FROM RIVERS ST TO HILLTOP DR
STREET IMPROVEMENT PLAN

DATE: 07/16/13	SCALE: AS SHOWN
REF. JOB NO.: 20125082	
COUNTY NO.:	
SHEET NO.: 08 OF 14	
FILE NO.: C 2.00	

NOT FOR CONSTRUCTION

MATCH LINE SEE SHEET C 2.00



MATCH LINE SEE SHEET C 2.02

LEGEND

- 1.5" GRIND AND OVERLAY RIGHT LANE IN NORTH AND SOUTH DIRECTION. SLURRY SEAL ENTIRE ROADWAY.
- CONCRETE SIDEWALK
- NEW ASPHALT CONCRETE
- MEDIAN LANDSCAPING REFER TO LANDSCAPE PLAN FOR DETAIL
- GREEN PAINTED BIKE LANE
- BIKE LANE SYMBOL AND ARROW PER CALTRANS STND PLAN A24A/C
- 13 FT TYPE VII THRU AND TURN ARROW (LEFT AND RIGHT) PER CALTRANS STND PLAN A24A
- 10 FT TYPE I THRU ARROW PER CALTRANS STND PLAN A24A
- 8 FT TYPE IV TURN ARROW (LEFT AND RIGHT) PER CALTRANS STND PLAN A24B

KEY NOTES

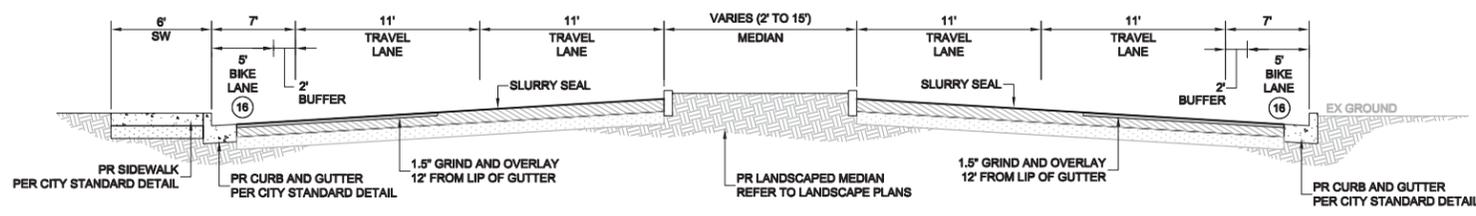
- ① DETAIL 8 - DASHED LANE LINE PER CALTRANS STND PLAN A20A
- ② DETAIL 21 - NO PASSING ZONE PER CALTRANS STND PLAN A20D
- ③ DETAIL 38A - CHANNELIZING LINE PER CALTRANS STND PLAN A20D
- ④ 12" WIDE WHITE STRIPE (TYP)
- ⑤ BIKE LANE BUFFER $\frac{2}{C3.0}$
- ⑥ PEDESTRIAN STREET LIGHT REFER TO LANDSCAPE PLANS
- ⑦ RETAINING WALL (HEIGHT: 0' - 3')
- ⑧ RETAINING WALL (HEIGHT: 3' - 8')

NOTES

1. WITHIN PROJECT LIMITS REMOVE AND SALVAGE ALL EXISTING SIGNAGE THAT ARE IN CONFLICT WITH THE PROPOSED PLAN (REUSE SIGNS WHEN POSSIBLE)
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- ⑫ PROPOSED STAIRS TO BE CONFIRMED BY THE CITY
- ⑬ NEW MEDIAN CURB PER CITY STANDARD DETAIL
- ⑭ NEW DRIVEWAY PER CITY OF RICHMOND STND DETAIL
- ⑮ 12" WHITE SKIP STRIPING
- ⑯ GREEN PAINTED BIKE LANE



SECTION B
NOT TO SCALE



NOT FOR CONSTRUCTION

NO.	DESCRIPTION	BY	DATE	APPVD



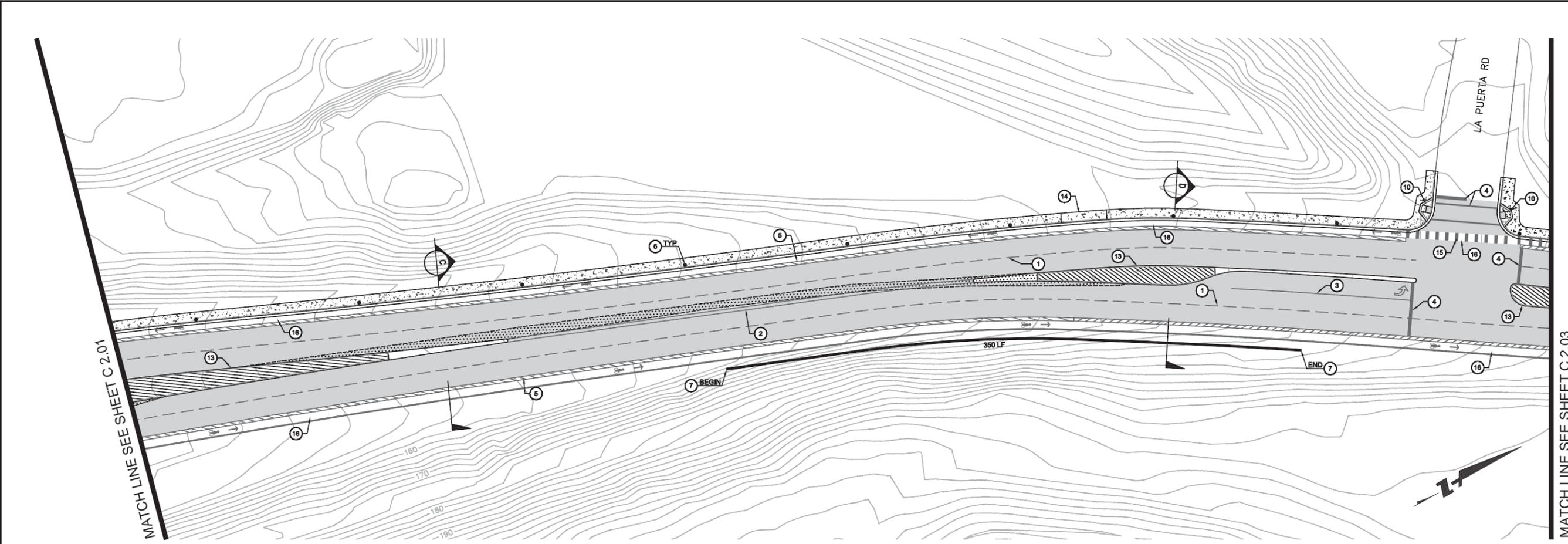
1548 N CALIFORNIA BLVD
SUITE 400
SAN PABLO, CA 94597
925-940-2200 (FAX)
925-940-2200 (TEL)

BKF
ENGINEERS / SURVEYORS / PLANNERS

PROJECT: BKF WC
DRAWN: BKF WC
CHECKED: BKF WC
APPROVED: RCS
CALIFORNIA

SAN PABLO AVENUE COMPLETE STREETS
FROM RIVERS ST TO HILLTOP DR
STREET IMPROVEMENT PLAN

DATE: 07/16/13	SCALE: AS SHOWN
PROJECT NO: 20125082	
COUNTY NO:	
SHEET NO: 09 OF 14	
FILE NO: C 2.01	



LEGEND

- 1.5" GRIND AND OVERLAY RIGHT LANE IN NORTH AND SOUTH DIRECTION. SLURRY SEAL ENTIRE ROADWAY.
- CONCRETE SIDEWALK
- NEW ASPHALT CONCRETE
- MEDIAN LANDSCAPING REFER TO LANDSCAPE PLAN FOR DETAIL
- GREEN PAINTED BIKE LANE

- BIKE LANE SYMBOL AND ARROW PER CALTRANS STND PLAN A24AC
- 13 FT TYPE VII THRU AND TURN ARROW (LEFT AND RIGHT) PER CALTRANS STND PLAN A24A
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KEY NOTES

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- ② DETAIL 21 - NO PASSING ZONE PER CALTRANS STND PLAN A20D
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- ⑤ BIKE LANE BUFFER $\frac{2}{C3.0}$
- ⑥ PEDESTRIAN STREET LIGHT REFER TO LANDSCAPE PLANS
- ⑦ RETAINING WALL (HEIGHT: 0' - 3')
- ⑧ RETAINING WALL (HEIGHT: 3' - 6')

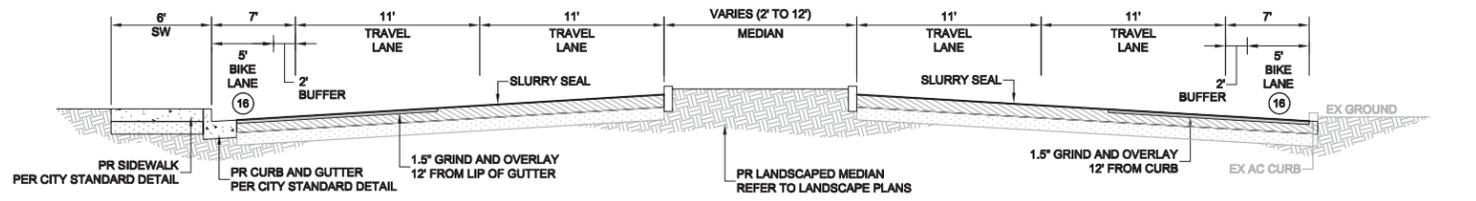
NOTES

1. WITHIN PROJECT LIMITS REMOVE AND SALVAGE ALL EXISTING SIGNAGE THAT ARE IN CONFLICT WITH THE PROPOSED PLAN (REUSE SIGNS WHEN POSSIBLE)
2. EXISTING SIGNAGE AND STRIPING BEYOND PROJECT LIMITS ARE TO REMAIN. IF DAMAGED, CONTRACTOR SHALL RESTORE AT THEIR OWN EXPENSE.
3. ALL PAVEMENT WITHIN BIKE LANE AND SKIP STRIPING LIMITS SHALL BE PAINTED GREEN.
4. ASPHALT CONCRETE PLUG REQUIRED IN LOCATIONS OF NEW MEDIAN CURB, CURB AND GUTTER, DRIVEWAY AND CURB RAMPS.
5. SIGNAL AT ROBERT MILLER DR TO BE MODIFIED. CONTRACTOR TO COORDINATE TIMING OF REMOVAL TO MAINTAIN SIGNAL OPERATION.
6. CITY OF SAN PABLO DETAILS TO BE USED WITHIN CITY OF SAN PABLO RIGHT-OF-WAY. CITY OF RICHMOND DETAILS TO BE USED WITHIN CITY OF RICHMOND RIGHT-OF-WAY.

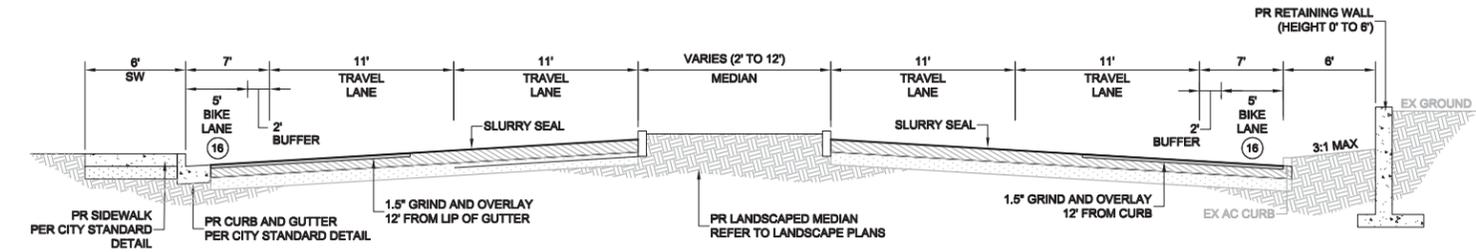
ABBREVIATIONS

- EX EXISTING
- PR PROPOSED
- STND STANDARD
- TYP TYPICAL

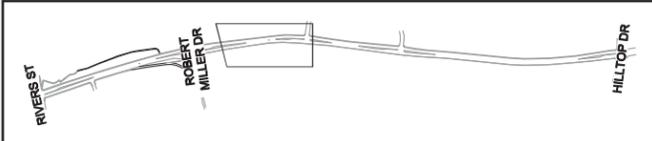
- ⑨ RETAINING WALL (HEIGHT: 6' - 10')
- ⑩ ACCESSIBLE CURB RAMP - CASE A PER CALTRANS STND PLAN A88A
- ⑪ ACCESSIBLE CURB RAMP - CASE C PER CALTRANS STND PLAN A20D
- ⑫ PROPOSED STAIRS TO BE CONFIRMED BY THE CITY
- ⑬ NEW MEDIAN CURB PER CITY STANDARD DETAIL
- ⑭ NEW DRIVEWAY PER CITY OF RICHMOND STND DETAIL
- ⑮ 12" WHITE SKIP STRIPING
- ⑯ GREEN PAINTED BIKE LANE



SECTION C
NOT TO SCALE



SECTION D
NOT TO SCALE



NOT FOR CONSTRUCTION

NO.	DESCRIPTION	BY	DATE	APPVD



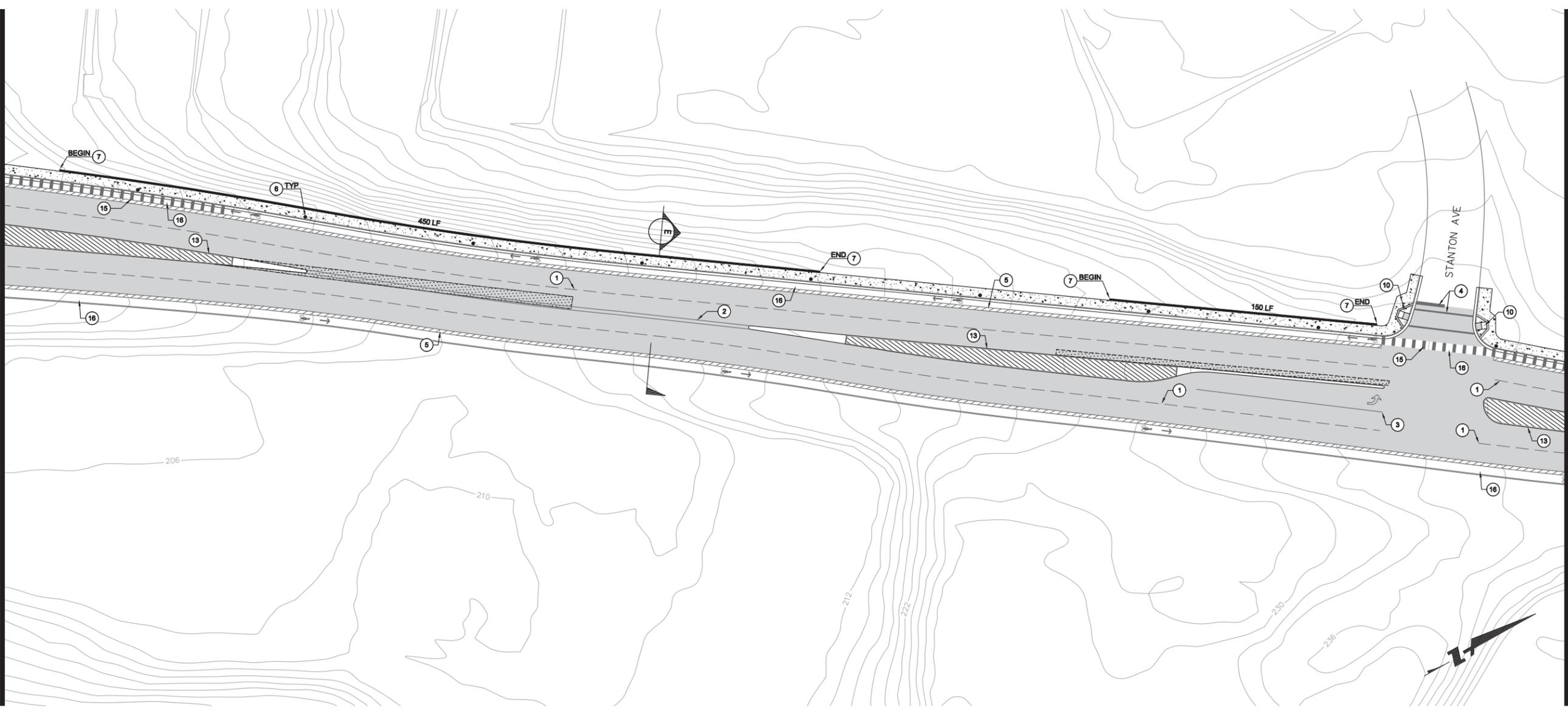
BKF
ENGINEERS / SURVEYORS / PLANNERS
1546 N CALIFORNIA BLVD
SUITE 400
SAN PABLO, CA 94577
925-940-2200 (TEL)
925-940-2200 (TEL)

PROJECT: BKF WC
DRAWN: BKF WC
CHECKED: BKF WC
RCS

SAN PABLO AVENUE COMPLETE STREETS
FROM RIVERS ST TO HILLTOP DR
STREET IMPROVEMENT PLAN

DATE	07/16/13	SCALE	AS SHOWN
REF. JOB NO.	20125082	COUNTY NO.	
SHEET NO.	10 OF 14	FILE NO.	C 2.02

MATCH LINE SEE SHEET C 2.02



MATCH LINE SEE SHEET C 2.04

LEGEND

- 1.5" GRIND AND OVERLAY RIGHT LANE IN NORTH AND SOUTH DIRECTION. SLURRY SEAL ENTIRE ROADWAY.
- CONCRETE SIDEWALK
- NEW ASPHALT CONCRETE
- MEDIAN LANDSCAPING REFER TO LANDSCAPE PLAN FOR DETAIL
- GREEN PAINTED BIKE LANE
- BIKE LANE SYMBOL AND ARROW PER CALTRANS STND PLAN A24A/C
- 13 FT TYPE VII THRU AND TURN ARROW (LEFT AND RIGHT) PER CALTRANS STND PLAN A24A
- 10 FT TYPE I THRU ARROW PER CALTRANS STND PLAN A24A
- 8 FT TYPE IV TURN ARROW (LEFT AND RIGHT) PER CALTRANS STND PLAN A24B

KEY NOTES

- ① DETAIL 8 - DASHED LANE LINE PER CALTRANS STND PLAN A20A
- ② DETAIL 21 - NO PASSING ZONE PER CALTRANS STND PLAN A20D
- ③ DETAIL 38A - CHANNELIZING LINE PER CALTRANS STND PLAN A20D
- ④ 12" WIDE WHITE STRIPE (TYP)
- ⑤ BIKE LANE BUFFER $\frac{2}{C3.0}$
- ⑥ PEDESTRIAN STREET LIGHT REFER TO LANDSCAPE PLANS
- ⑦ RETAINING WALL (HEIGHT: 0' - 3')
- ⑧ RETAINING WALL (HEIGHT: 3' - 8')

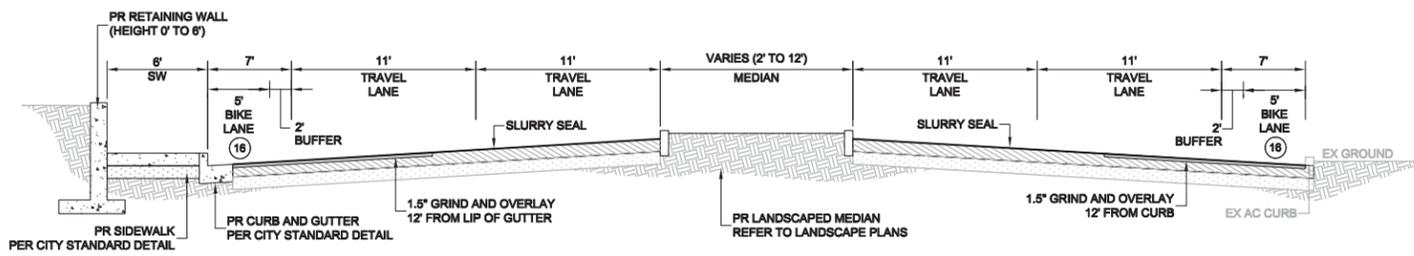
NOTES

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2. EXISTING SIGNAGE AND STRIPING BEYOND PROJECT LIMITS ARE TO REMAIN. IF DAMAGED, CONTRACTOR SHALL RESTORE AT THEIR OWN EXPENSE.
3. ALL PAVEMENT WITHIN BIKE LANE AND SKIP STRIPING LIMITS SHALL BE PAINTED GREEN.
4. ASPHALT CONCRETE PLUG REQUIRED IN LOCATIONS OF NEW MEDIAN CURB, CURB AND GUTTER, DRIVEWAY AND CURB RAMP.
5. SIGNAL AT ROBERT MILLER DR TO BE MODIFIED. CONTRACTOR TO COORDINATE TIMING OF REMOVAL TO MAINTAIN SIGNAL OPERATION.
6. CITY OF SAN PABLO DETAILS TO BE USED WITHIN CITY OF SAN PABLO RIGHT-OF-WAY. CITY OF RICHMOND DETAILS TO BE USED WITHIN CITY OF RICHMOND RIGHT-OF-WAY.

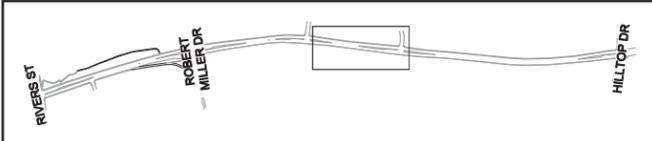
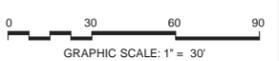
ABBREVIATIONS

- EX EXISTING
- PR PROPOSED
- STND STANDARD
- TYP TYPICAL

- ⑨ RETAINING WALL (HEIGHT: 6' - 10')
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- ⑪ ACCESSIBLE CURB RAMP - CASE C PER CALTRANS STND PLAN A20D
- ⑫ PROPOSED STAIRS TO BE CONFIRMED BY THE CITY
- ⑬ NEW MEDIAN CURB PER CITY STANDARD DETAIL
- ⑭ NEW DRIVEWAY PER CITY OF RICHMOND STND DETAIL
- ⑮ 12" WHITE SKIP STRIPING
- ⑯ GREEN PAINTED BIKE LANE



SECTION E
NOT TO SCALE



NOT FOR CONSTRUCTION

DRAWING NAME: K:\Eng12\125082\DWG\SHEETS\03_SPHL.dwg
PLOT DATE: 07-16-13 PLOTTED BY: megn

NO.	DESCRIPTION	BY	DATE	APPROV



1546 N CALIFORNIA BLVD
SUITE 400
SAN PABLO, CA 94597
925-940-2200 (FAX)
925-940-2200 (TEL)

BKF
ENGINEERS / SURVEYORS / PLANNERS

PROJECT: BKF WC
DRAWN: BKF WC
CHECKED: BKF WC
DATE: 07/16/2013

CALIFORNIA

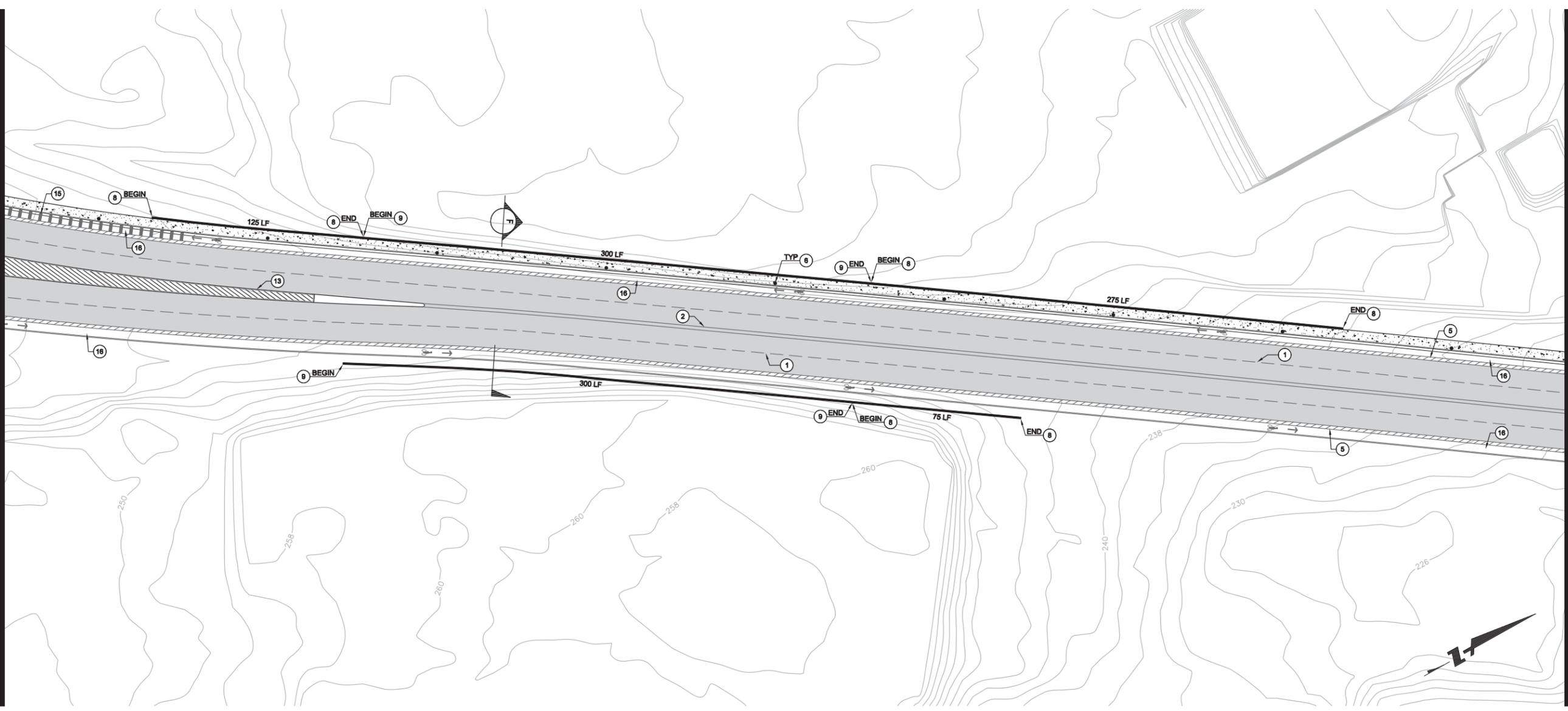
SAN PABLO AVENUE COMPLETE STREETS
FROM RIVERS ST TO HILLTOP DR
STREET IMPROVEMENT PLAN

DATE: 07/16/13	SCALE: AS SHOWN
PROJECT NO: 20125082	
COUNTY NO:	
SHEET NO: 11 OF 14	
FILE NO: C 2.03	

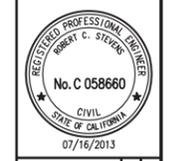
35% CONSTRUCTION DOCUMENTS 07/16/2013

MATCH LINE SEE SHEET C 2.03

MATCH LINE SEE SHEET C 2.05



NO.	DESCRIPTION	BY	DATE	APPVD



1546 N CALIFORNIA BLVD
SUITE 400, SAN PABLO, CA 94577
925-940-2200 (FAX)
925-940-2200 (TEL)

BKF
ENGINEERS / SURVEYORS / PLANNERS

PROJECT: BKF WC
DRAWN: BKF WC
CHECKED: BKF WC
DATE: 07/16/2013

CALIFORNIA

SAN PABLO AVENUE COMPLETE STREETS
FROM RIVERS ST TO HILLTOP DR
STREET IMPROVEMENT PLAN

DATE	07/16/13	SCALE	AS SHOWN
REF. JOB NO.	20125082		
COUNTY NO.			
SHEET NO.	12 OF 14		
FILE NO.	C 2.04		

CITY OF RICHMOND
35% CONSTRUCTION DOCUMENTS 07/16/2013

LEGEND

- 1.5" GRIND AND OVERLAY RIGHT LANE IN NORTH AND SOUTH DIRECTION. SLURRY SEAL ENTIRE ROADWAY.
- CONCRETE SIDEWALK
- NEW ASPHALT CONCRETE
- MEDIAN LANDSCAPING REFER TO LANDSCAPE PLAN FOR DETAIL
- GREEN PAINTED BIKE LANE
- BIKE LANE SYMBOL AND ARROW PER CALTRANS STND PLAN A24A/C
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KEY NOTES

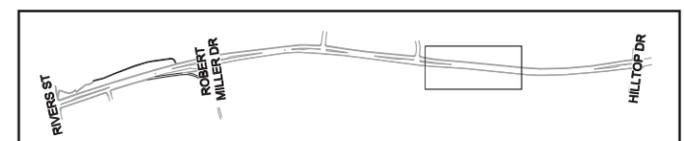
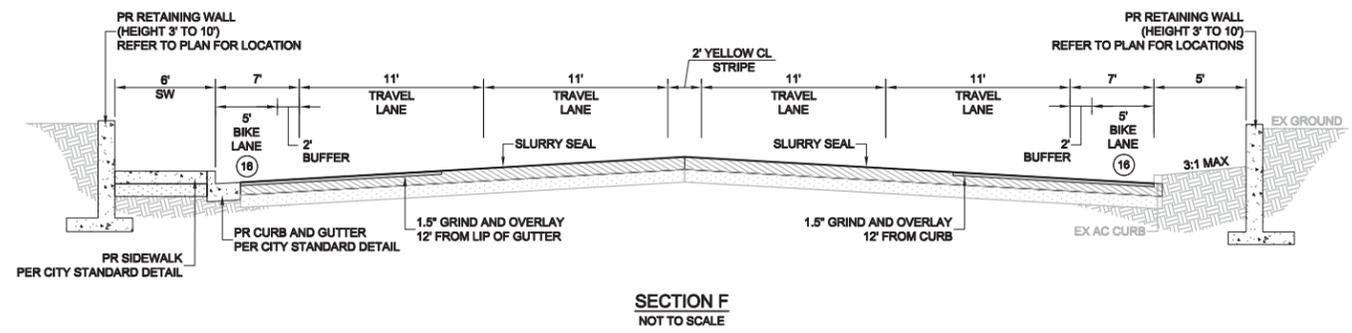
- ① DETAIL 8 - DASHED LANE LINE PER CALTRANS STND PLAN A20A
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- ⑤ BIKE LANE BUFFER $\frac{2}{C3.0}$
- ⑥ PEDESTRIAN STREET LIGHT REFER TO LANDSCAPE PLANS
- ⑦ RETAINING WALL (HEIGHT: 0' - 3')
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- ⑪ ACCESSIBLE CURB RAMP - CASE C PER CALTRANS STND PLAN A20D
- ⑫ PROPOSED STAIRS TO BE CONFIRMED BY THE CITY
- ⑬ NEW MEDIAN CURB PER CITY STANDARD DETAIL
- ⑭ NEW DRIVEWAY PER CITY OF RICHMOND STND DETAIL
- ⑮ 12" WHITE SKIP STRIPING
- ⑯ GREEN PAINTED BIKE LANE

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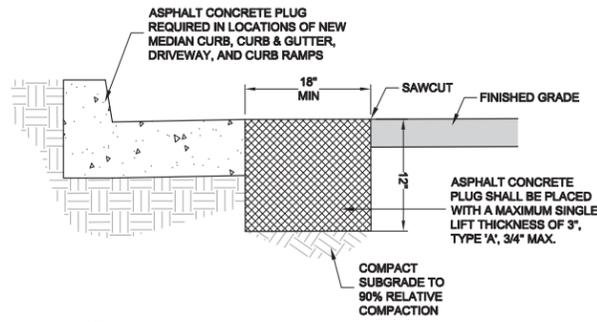
ABBREVIATIONS

- EX EXISTING
- PR PROPOSED
- STND STANDARD
- TYP TYPICAL



NOT FOR CONSTRUCTION

DRAWING NAME: K:\Eng12\125082\DWG\SHEETS\03_SPHL.dwg
PLOT DATE: 07-16-13 PLOTTED BY: megn

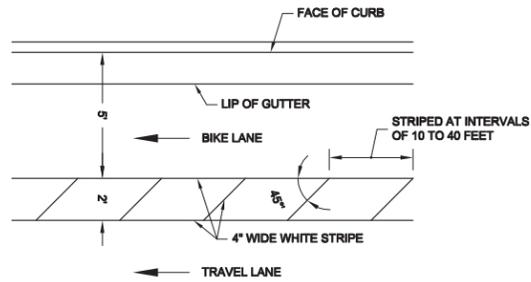


NOTES:

- 1. ASPHALT PLUG PAID FOR AS PART OF UNIT COST OF NEW ADJACENT CONCRETE WORK.

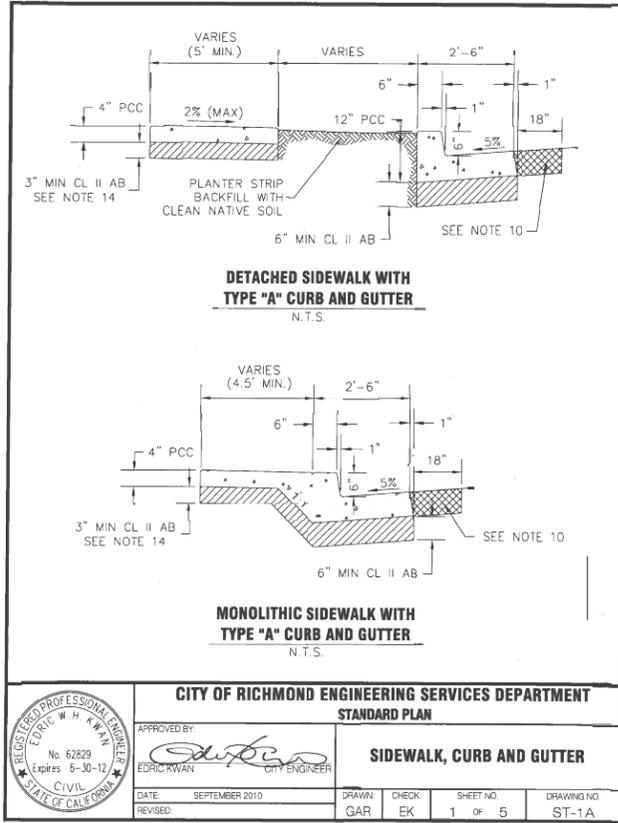
ASPHALT PLUG
NOT TO SCALE

1



BIKE LANE BUFFER STRIPE
NOT TO SCALE

2



CITY OF RICHMOND ENGINEERING SERVICES DEPARTMENT
STANDARD PLAN

SIDEWALK, CURB AND GUTTER

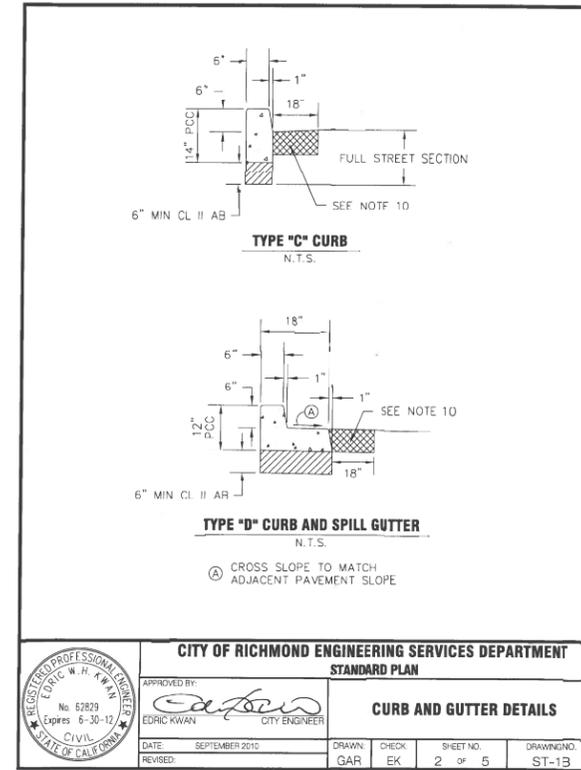


APPROVED BY:
EDRIC KWAN
CITY ENGINEER

DATE: SEPTEMBER 2010
DRAWN: GAR
CHECK: EK
SHEET NO. 1 OF 5
DRAWING NO. ST-1A

CITY OF RICHMOND STANDARD DETAIL 1A
NOT TO SCALE

3



CITY OF RICHMOND ENGINEERING SERVICES DEPARTMENT
STANDARD PLAN

CURB AND GUTTER DETAILS

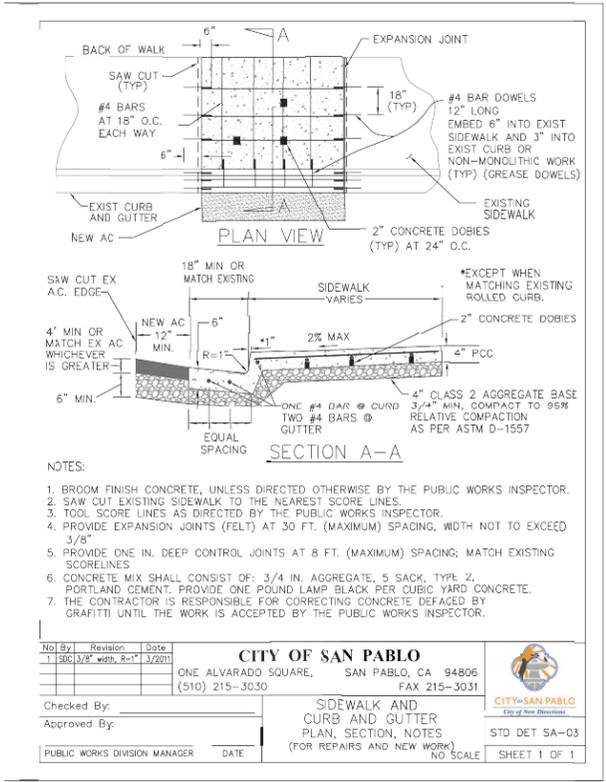


APPROVED BY:
EDRIC KWAN
CITY ENGINEER

DATE: SEPTEMBER 2010
DRAWN: GAR
CHECK: EK
SHEET NO. 2 OF 5
DRAWING NO. ST-1B

CITY OF RICHMOND STANDARD DETAIL 1B
NOT TO SCALE

4



CITY OF SAN PABLO

SIDEWALK AND CURB AND GUTTER PLAN, SECTION, NOTES

- NOTES:
1. BROOM FINISH CONCRETE, UNLESS DIRECTED OTHERWISE BY THE PUBLIC WORKS INSPECTOR.
 2. SAW CUT EXISTING SIDEWALK TO THE NEAREST SCORE LINES.
 3. TOOL SCORE LINES AS DIRECTED BY THE PUBLIC WORKS INSPECTOR.
 4. PROVIDE EXPANSION JOINTS (FELT) AT 30 FT. (MAXIMUM) SPACING, WIDTH NOT TO EXCEED 3/8"
 5. PROVIDE ONE IN. DEEP CONTROL JOINTS AT 8 FT. (MAXIMUM) SPACING; MATCH EXISTING SCORE LINES.
 6. CONCRETE MIX SHALL CONSIST OF: 3/4 IN. AGGREGATE, 5 SACK, TYPE 2, PORTLAND CEMENT, PROVIDE ONE POUND LAMP BLACK PER CUBIC YARD CONCRETE.
 7. THE CONTRACTOR IS RESPONSIBLE FOR CORRECTING CONCRETE DEFACED BY GRAFFITI UNTIL THE WORK IS ACCEPTED BY THE PUBLIC WORKS INSPECTOR.

Checked By: _____
Approved By: _____
PUBLIC WORKS DIVISION MANAGER DATE

ONE ALVARADO SQUARE, SAN PABLO, CA 94806
(510) 215-3030 FAX 215-3031

NO SCALE SHEET 1 OF 1

CITY OF SAN PABLO STANDARD DETAIL SA-03
NOT TO SCALE

5

REVISIONS	DATE	BY	DESCRIPTION



BKF
ENGINEERS / SURVEYORS / PLANNERS

1546 N. CALIFORNIA BLVD.
SUITE 400, RICHMOND, CA 94807
(510) 940-2200 (FAX)
(510) 940-2200 (TEL)

CITY OF SAN PABLO
City of New Residents

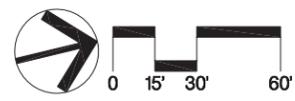
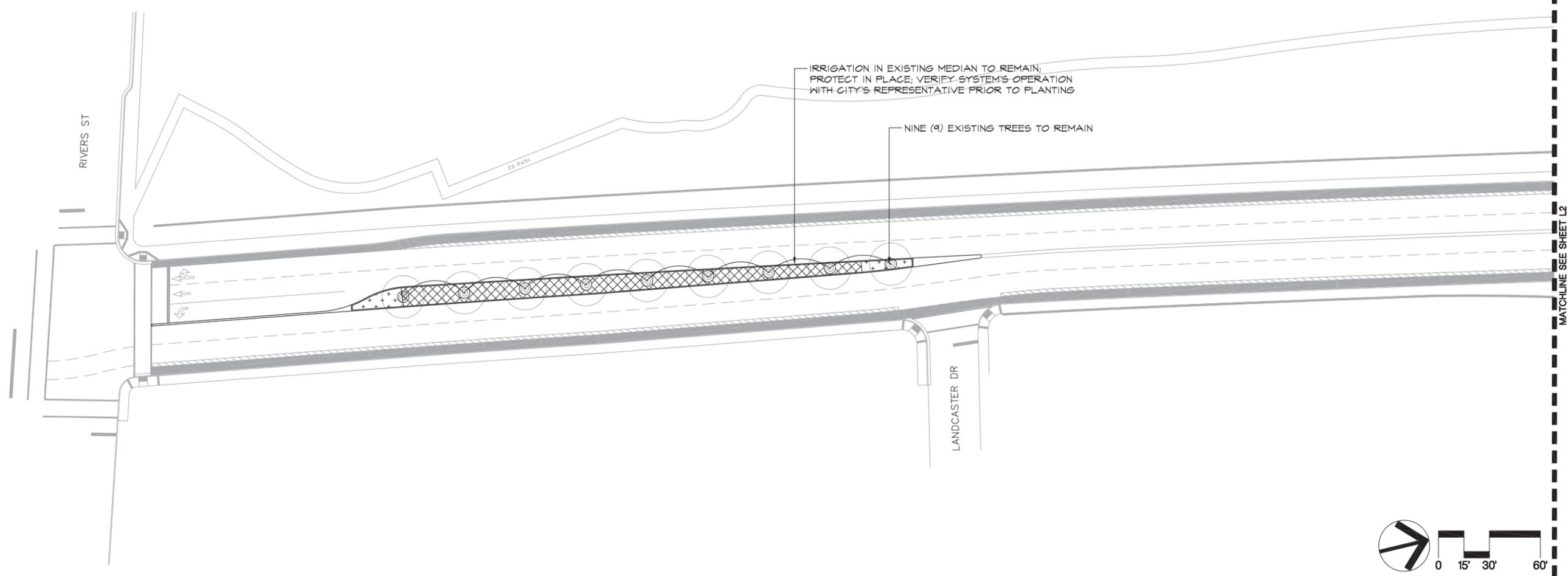
APPROVED BY: _____
DATE: _____

SAN PABLO AVENUE COMPLETE STREETS
FROM RIVERS ST TO HILLTOP DR

CONSTRUCTION DETAILS

CITY OF RICHMOND

DATE	07/16/13	SCALE	AS SHOWN
REF. JOB NO.	20125082		
COUNTY NO.			
SHEET NO.	13 OF 14		
FILE NO.	C 3.00		



PLANT LIST

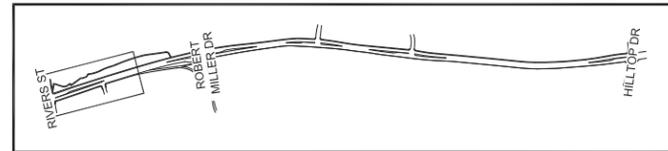
ABBREVIATION	BOTANICAL NAME	COMMON NAME	SIZE	SPACING
TREES				
CER OCC	CERCIS OCCIDENTALIS-STANDARD	EASTERN REDBUD	24" BOX	AS SHOWN
QUE AGR	QUERCUS AGRIFOLIA-STANDARD	COAST LIVE OAK	36" BOX	AS SHOWN
SHRUBS				
BER THU	BERBERIS THUNBERGII 'ATROPURPUREA'	BARBERRY	5 GALLON	4'-0" O.C.
CUP HYS	CUPHEA HYSSOPIFOLIA	MEXICAN FALSE HEATHER	5 GALLON	2'-0" O.C.
MUH RIG	MUHLENBERGIA RIGENS	DEER GRASS	5 GALLON	4'-0" O.C.
GROUNDCOVERS				
CEA GRI	CEANOETHUS GRISEUS HORIZONTALIS	WILD LILAC	1 GALLON	6'-0" O.C.
FES AME	FESTUCA AMETHYSTINE	TUFTED FESCUE	1 GALLON	1'-0" O.C.
FES GLA	FESTUCA GLAUCA 'ELIJAH BLUE'	BLUE FESCUE	1 GALLON	1'-0" O.C.
HEM MON	HEMEROCALLIS X 'MONOLD'	DOUBLE GOLD EVERGREEN DAYLILY	1 GALLON	3'-0" O.C.

PLANTING NOTES

- MULCH:** INSTALL A UNIFORM THREE INCH COVERING OF WALK-ON MULCH, 1-1/2" MAX PARTICLE SIZE, IN ALL AREAS TO BE PLANTED, EXTENDING TO INSIDE FACE OF CURB IN ALL MEDIANS. MATERIAL AVAILABLE FROM REDI-GRO, (800) 654-4358, OR EQUAL.
- EXISTING PLANT MATERIAL:** PROTECT ALL EXISTING PLANT MATERIAL TO REMAIN. REPAIR ANY DAMAGES INCURRED AS A DIRECT RESULT OF THIS CONTRACT TO THE CITY'S SATISFACTION AT NO ADDITIONAL COST.
- GROUNDCOVER:** PROVIDE GROUNDCOVER AT INDICATED ON-CENTER SPACING THROUGHOUT ALL AREAS TO BE PLANTED. GROUNDCOVER SHALL BE PROVIDED UP TO THE WATERING BASIN OF ALL TREES AND SHRUBS.
- QUANTITIES:** THE QUANTITIES SHOWN ON THE LABELS ARE NOT TO BE CONSTRUED AS THE COMPLETE AND ACCURATE LIMITS OF THE CONTRACT. FURNISH AND INSTALL ALL PLANTS SHOWN SCHEMATICALLY ON THE DRAWINGS.
- TOPSOIL:** ALL PLANTING AREAS TO RECEIVE A TWELVE INCH LAYER OF IMPORT TOPSOIL PER SPECIFICATIONS.
- SOILS TESTING:** SEE SPECIFICATIONS FOR TESTING OF TOPSOIL AND AMENDMENTS. IN ADDITION, CONTRACTOR SHALL SUBMIT A FIVE GALLON SAMPLE OF NATIVE TOPSOIL FROM ANY AREAS PREVIOUSLY COVERED BY PAVING, TO SOIL AND PLANT LABORATORY, INC. OF SANTA CLARA, (408) 727-0330, FOR CONTAMINATION TESTING. TESTING REQUIRES FOUR TO FIVE WEEKS. CONTRACTOR SHALL ALLOW SUFFICIENT TIME FOR TESTING PRIOR TO CONSTRUCTION.
- ROOT BARRIER:** INSTALL 24" ROOT BARRIER, DEEP ROOT CORP. #SB24 OR APPROVED EQUAL, FLUSH WITH INSIDE FACE OF CURB IN ALL NEW MEDIANS.
- WATER EFFICIENT LANDSCAPE ORDINANCE:** ALL PROPOSED PLANT MATERIAL IS DESIGNATED TO BE "LOW" WATER NEEDS PER WUCOLS. NO SUBSTITUTIONS OF HIGHER WATER USING PLANTS WILL BE APPROVED.

PLANT LEGEND

- EXISTING TREE TO REMAIN
- TREE, 36" BOX SIZE
- TREE, 24" BOX SIZE
- SHRUB PLANTING AREA, SEE PLANT LIST FOR POTENTIAL SPECIES CHOICES
- GROUNDCOVER PLANTING AREA, SEE PLANT LIST FOR POTENTIAL SPECIES CHOICES



NO.	DESCRIPTION	BY	DATE	APPVD



Candler Associates
Landscape Architecture
311 Seventh Ave
San Mateo, CA 94401
T 650.375.1313

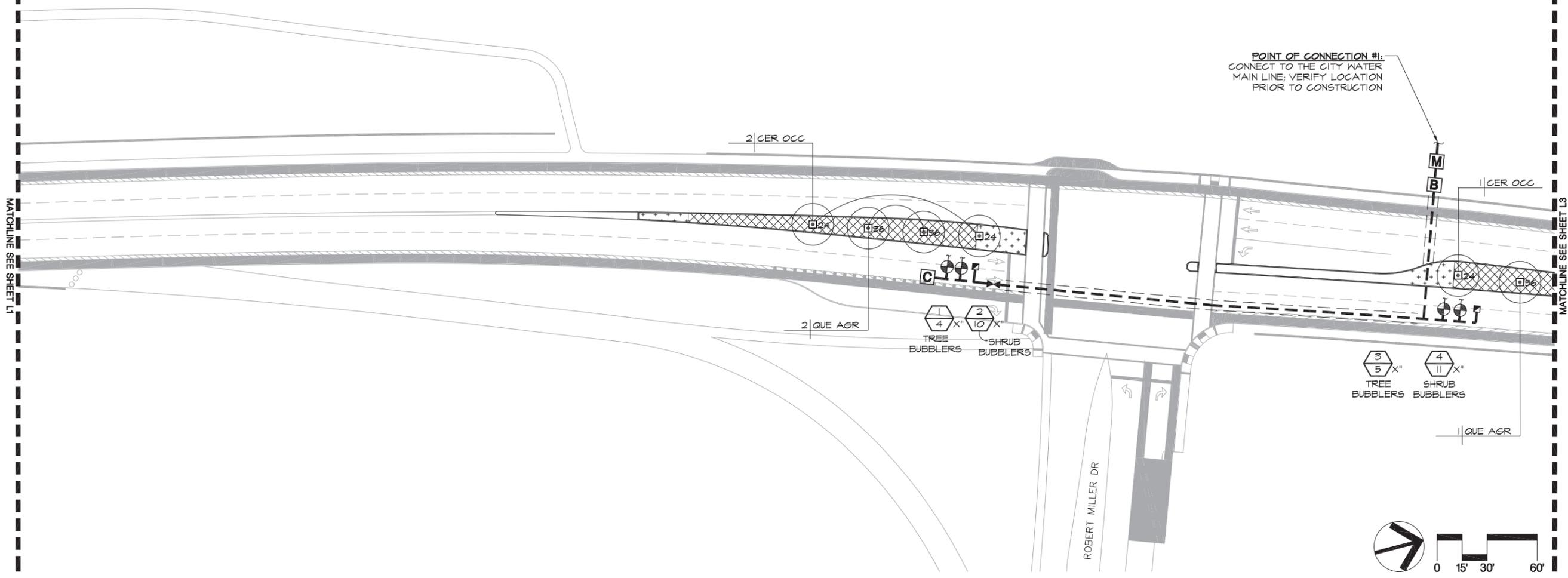


CITY OF RICHMOND
CALIFORNIA

SAN PABLO AVENUE COMPLETE STREET
FROM RIVERS ST TO HILLTOP DR
PLANTING AND IRRIGATION PLAN

DATE	7/18/2013	SCALE	PER PLAN
SHEET NO.	L1	OF	6
FILE NO.	12041 PL & IR		

DRAWING NAME: \\44FCALLSMA\cadd\Cadproj\12041\12041 PL AND IR.dwg
PLOT DATE: 07-18-13 PLOTTED BY: zkatz

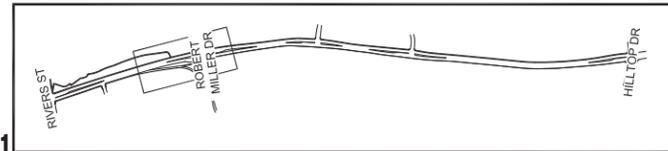


IRRIGATION LEGEND

- REMOTE CONTROL VALVE, IRRITROL, 100 SERIES, SIZE PER PLAN, WITH DC LATCHING SOLENOID
- CONTROLLER, BATTERY POWERED; TORO, DDC-WP-4-9V
- BACKFLOW PREVENTER, 1", FEBCO B25Y
- 3/4" WATER METER, SEE IRRIGATION NOTE 7
- LATERAL LINE, CLASS 200 PVC, SIZE PER PLAN, 12" MIN. BURIAL
- MAINLINE, 1-1/4", CLASS AS REQUIRED PER SPECS., 24" MIN. BURIAL
- SLEEVE, SCH 40 PVC, SIZE AS REQUIRED
- QUICK COUPLING VALVE, RB, 44LRC
- GATE VALVE, NIBCO, CLASS 125, LINE SIZE, INSTALL IN VALVE BOX
- VALVE # APPROXIMATE GPM THROUGH VALVE VALVE SIZE
- SHRUB BUBBLERS IN NEW PLANTING AREAS, TORO 5705-LF40-PL, INSTALL ONE BUBBLER PER SHRUB, 30 PSI REQUIRED, 4 GPH PER BUBBLER
- TREE BUBBLER, PRESSURE COMPENSATING, TORO 5705-FB-50-PC, INSTALL TWO BUBBLERS PER TREE (ONE DEEP ROOT AND ONE SURFACE), 30 PSI REQUIRED, 0.5 GPM PER BUBBLER

IRRIGATION NOTES

1. **SPECIFICATIONS:** SEE IRRIGATION SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. **VERIFICATION:** SYSTEM DESIGN IS BASED ON A MINIMUM OF 50 P.S.I. AND 11 G.P.M. AVAILABLE AT DISCHARGE OUTLET OF METER OR OTHER POINT OF CONNECTION. VERIFY SAME AND NOTIFY OWNER'S REPRESENTATIVE IF LOWER FIGURES ARE RECORDED DURING VERIFICATION. SUCH NOTICE SHALL BE MADE IN WRITING AND PRIOR TO COMMENCING ANY IRRIGATION WORK.
3. **UTILITIES:** VERIFY LOCATION OF ALL ON-SITE UTILITIES. RESTORATION OF DAMAGED UTILITIES SHALL BE MADE AT THE CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
4. **SCHEMATIC:** SYSTEM FEATURES ARE SHOWN SCHEMATICALLY FOR GRAPHIC CLARITY. INSTALL ALL PIPING AND VALVES IN COMMON TRENCHES WHERE FEASIBLE AND INSIDE PLANTING AREAS WHENEVER POSSIBLE. ALL VALVES SHALL BE LOCATED IN GROUND COVER OR SHRUB AREAS WHENEVER POSSIBLE.
5. **CODES:** IRRIGATION SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH ALL LOCAL CODES AND MANUFACTURER'S SPECIFICATIONS. NOTIFY OWNER'S REPRESENTATIVE BY TELEPHONE AND IN WRITING OF ANY CONFLICTS PRIOR TO INSTALLATION.
6. **SERVICE LINE:** WATER AGENCY SHALL TAP CITY MAIN WATER LINE AND PROVIDE COPPER TYPE K SERVICE LINE TO WATER METER LOCATION AS SHOWN ON PLANS. INSTALLER SHALL REPAIR ALL DAMAGES INCURRED DURING INSTALLATION AND SHALL BE RESPONSIBLE FOR ALL ASSOCIATED FEES AND CHARGES. DEPTH OF PIPE, TRENCHING AND BACKFILLING, AS REQUIRED BY GOVERNING AGENCY.
7. **WATER METER:** CITY SHALL PURCHASE AND WATER AGENCY SHALL INSTALL WATER METER AS SHOWN PLANS, INCLUDING ALL ASSOCIATED CONNECTIONS, VAULTS, ETC. INSTALLING PARTY SHALL INCUR ALL FEES ASSOCIATED WITH PURCHASE AND INSTALLATION.
8. **BACKFLOW ASSEMBLY:** CONTRACTOR SHALL CONNECT THE BACKFLOW ASSEMBLY TO THE WATER METER USING 1" COPPER TYPE K LINE BURIED A MINIMUM OF 18 INCHES.
9. **POINT OF CONNECTION #1:** CONNECT TO THE CITY WATER MAIN LINE; VERIFY LOCATION PRIOR TO CONSTRUCTION
10. **SLEEVING:** ADEQUATELY SIZE ALL SLEEVES SHOWN ON PLAN. SLEEVES SHALL BE INSTALLED AT THE NECESSARY DEPTHS PRIOR TO PAVEMENT CONSTRUCTION. SLEEVING SHALL EXTEND 1'-0" FROM EDGE OF PAVING INTO LAWN OR PLANTING AREA, AND SHALL HAVE ENDS CLEARLY MARKED ABOVE GRADE.
11. **QUICK COUPLING VALVES:** INSTALL ON TRIPLE SWING JOINT. LOCATE 12 INCHES AWAY FROM EDGE OF WALKS, WALLS, CURBS, AND HEADERBOARDS WITHIN PLANTING AREAS. PROVIDE OWNER WITH ONE OPERATING KEY, TWO SETS OF LOCKING COVER KEYS, AND ONE SWIVEL HOSE ELL.
12. **HEAD ALLOWANCE:** ALLOW IN BID PRICE AN AMOUNT SUFFICIENT TO PROVIDE AND INSTALL AN ADDITIONAL 4 SPRINKLER HEADS OF EACH TYPE SPECIFIED ON PLAN TO ACCOMMODATE FIELD CHANGES. THESE HEADS SHALL BE LOCATED AS DIRECTED BY THE OWNER'S REPRESENTATIVE. DELIVER TO THE OWNER ANY UN-USED ADDITIONAL HEADS AT THE END OF THE MAINTENANCE PERIOD.
13. **CONTROLLER:** INSTALL CONTROLLER IN VALVE BOX WITH REMOTE CONTROLS VALVE
14. **CHECK VALVES:** INSTALL PLASTIC CHECK VALVE AT BASE OF HEADS ON LOW ENDS OF SYSTEMS AS REQUIRED TO MINIMIZE LINE DRAINAGE. ALLOW IN BID PRICE AN AMOUNT SUFFICIENT TO PROVIDE AND INSTALL AN ADDITIONAL 10 CHECK VALVES TO ACCOMMODATE ANY NECESSARY FIELD CHANGES.
15. **WATER EFFICIENT LANDSCAPE ORDINANCE:** TREES SHALL BE IRRIGATED ON SEPARATE STATIONS FROM UNDERSTORY SHRUBS. NO PLANTING AREA LESS THAN 8' WIDE SHALL BE IRRIGATED WITH OVERHEAD SPRAY.



FOR PLANTING LIST, LEGEND AND NOTES SEE SHEET L1

DRAWING NAME: \\44FCALLSM\cadd\caddproj\1\Prj\12\12041\12041 PL AND IR.dwg PLOT DATE: 07-18-13 PLOTTED BY: zkatz

NO.	DESCRIPTION	BY	DATE	APPVD



Callander Associates
Landscape Architecture
311 Seventh Ave
San Mateo, CA 94401
T 650.375.1313



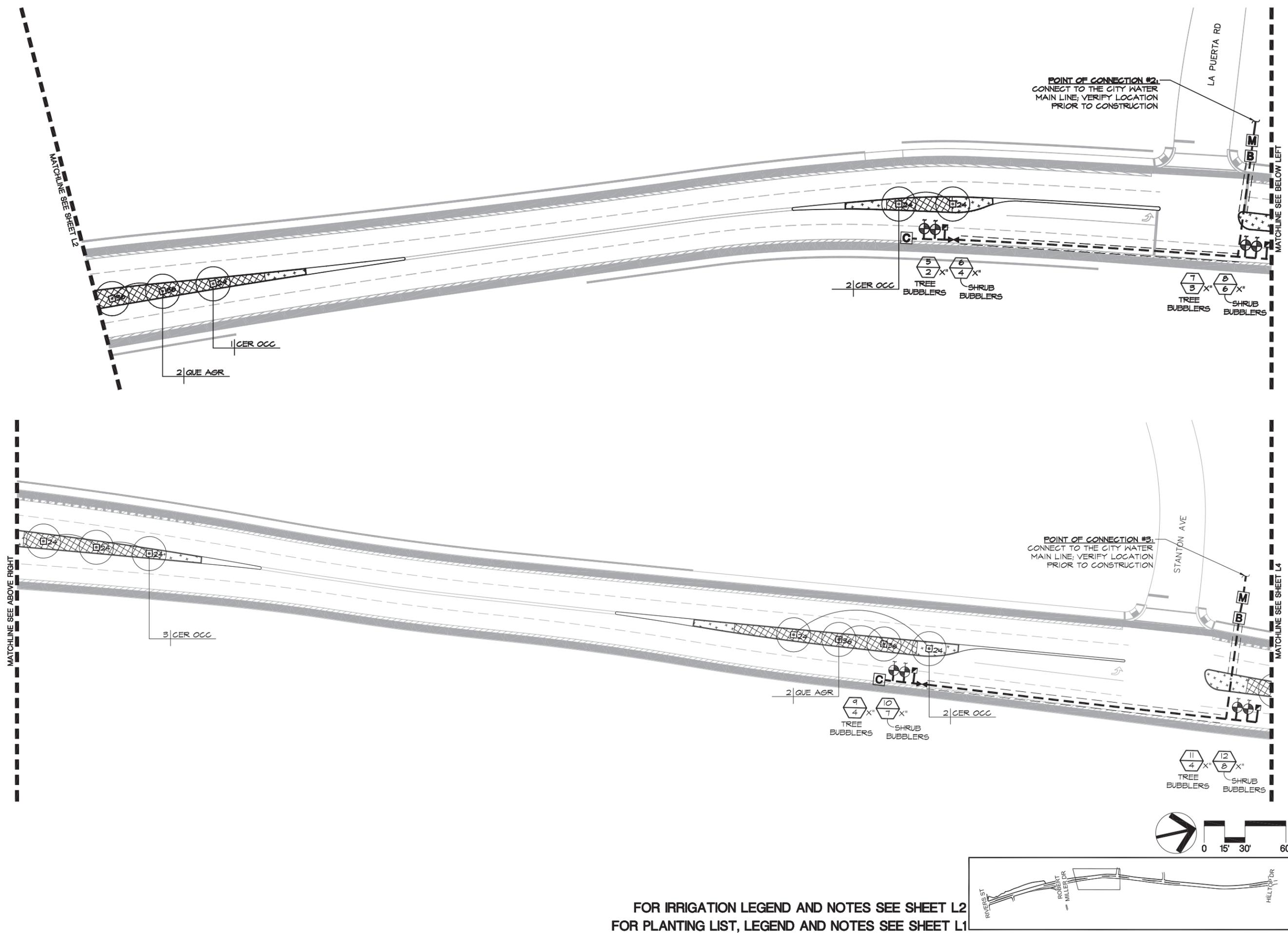
CALIFORNIA

SAN PABLO AVENUE COMPLETE STREET
FROM RIVERS ST TO HILLTOP DR
PLANTING AND IRRIGATION PLAN

DATE	7/18/2013	SCALE	PER PLAN
SHEET NO.	L2	OF	6
COUNTY NO.	20125082	FILE NO.	12041 PL & IR

35% CONSTRUCTION DOCUMENTS

DRAWING NAME: \\A4FCALLSM\cad\Cadproj\12041\12041 PL AND IR.dwg
 PLOT DATE: 07-18-13 PLOTTED BY: zkatz



FOR IRRIGATION LEGEND AND NOTES SEE SHEET L2
 FOR PLANTING LIST, LEGEND AND NOTES SEE SHEET L1

NO.	DESCRIPTION	BY	DATE	APPVD



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 Landscape Architecture
 311 Seventh Ave.
 San Mateo, CA 94401
 T 650.375.1313

CALIFORNIA
 REGISTERED ARCHITECT

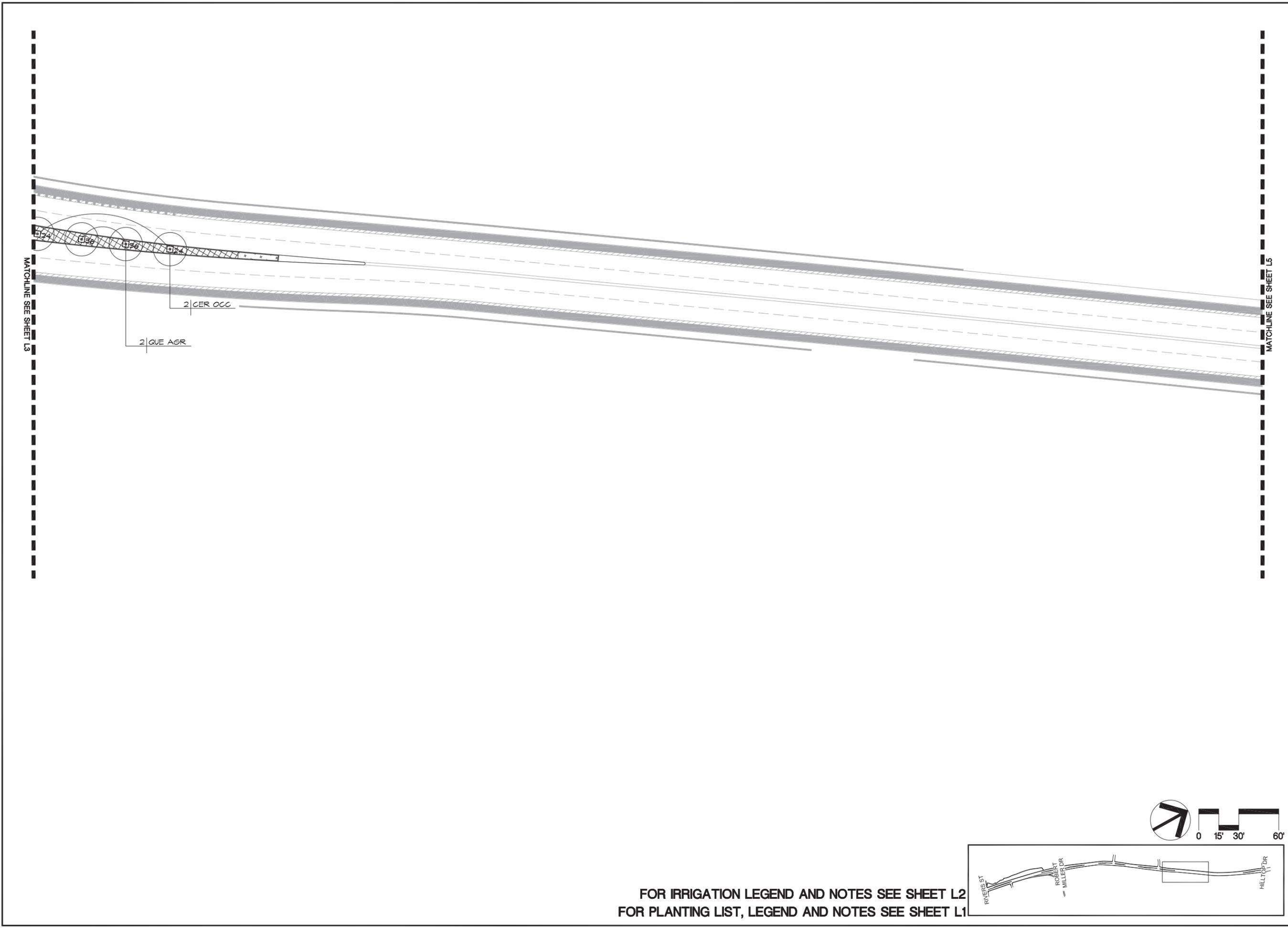
SAN PABLO AVENUE COMPLETE STREET
 FROM RIVERS ST TO HILLTOP DR
 PLANTING AND IRRIGATION PLAN

CITY OF RICHMOND

DATE: 7/18/2013 SCALE: PER PLAN
 SHEET NO.: 20125082
 COUNTY: L3 OF 6
 FILE NO.: 12041 PL & IR

35% CONSTRUCTION DOCUMENTS

DRAWING NAME : \\A4FCALLSM\ood\Cadpro\Proj12\12041\12041 PL AND IR.dwg
 PLOT DATE : 07-18-13 PLOTTED BY: zkatz



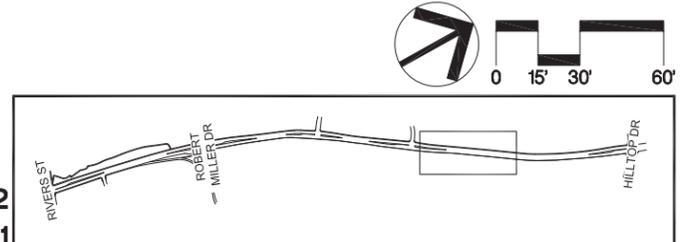
MATCHLINE SEE SHEET L3

MATCHLINE SEE SHEET L5

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2 CER OCC

FOR IRRIGATION LEGEND AND NOTES SEE SHEET L2
 FOR PLANTING LIST, LEGEND AND NOTES SEE SHEET L1



NO.	DESCRIPTION	BY	DATE	APPVYD



Callander Associates
 Landscape Architecture
 311 Seventh Ave.
 San Mateo, CA 94401
 T 650.375.1313

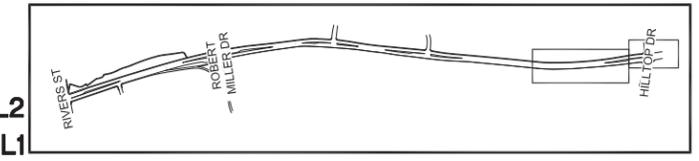
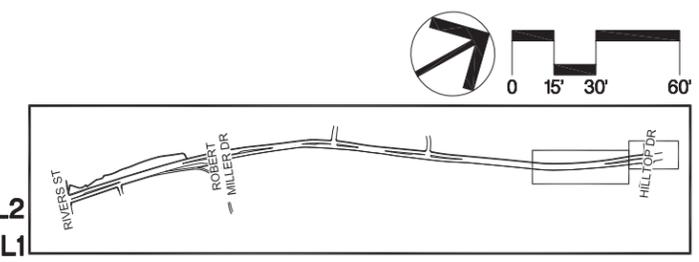
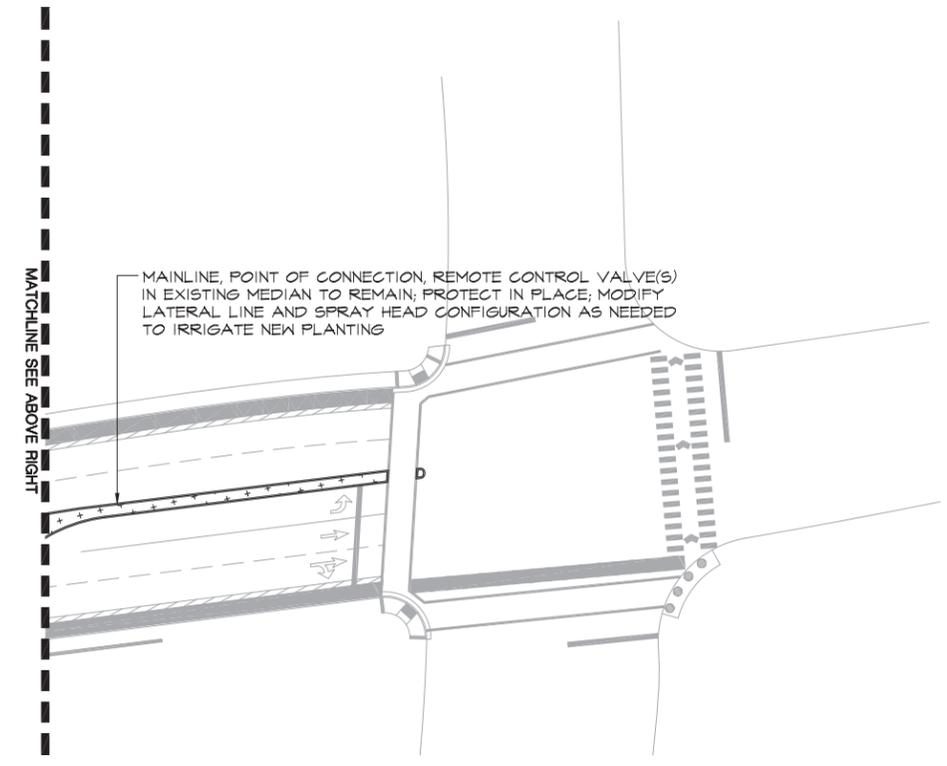
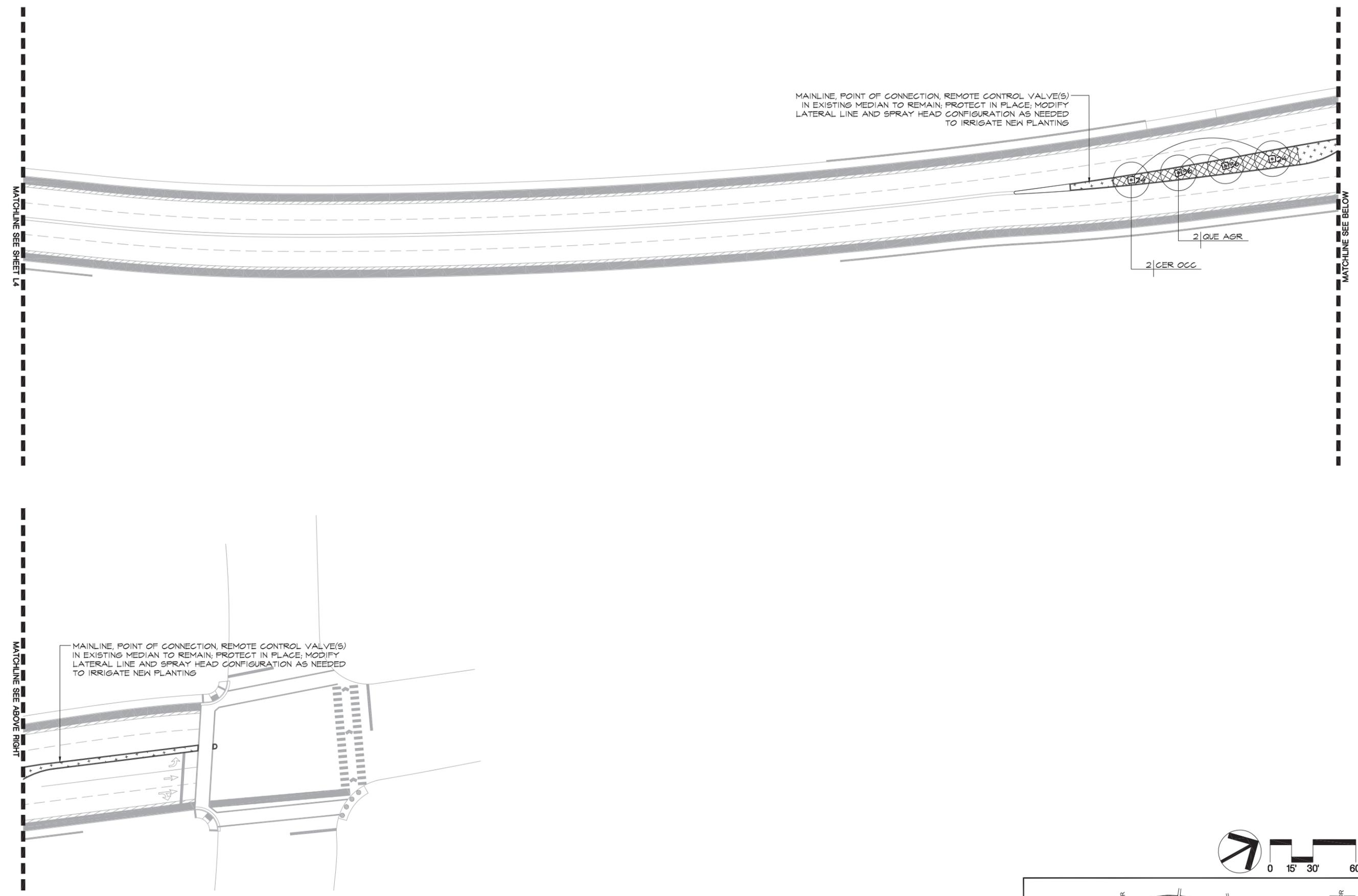
Signature: Robert Miller
Date: July 31, 2013

SAN PABLO AVENUE COMPLETE STREET
 FROM RIVERS ST TO HILLTOP DR
 PLANTING AND IRRIGATION PLAN

CITY OF RICHMOND
 CALIFORNIA

DATE: 7/18/2013 SCALE: PER PLAN
 SHEET NO.: L4 OF 6
 COUNTY NO.: 20125082
 FILE NO.: 12041 PL & IR

DRAWING NAME: \\44FCALLSMA\cadd\Cadproj\12041\12041 PL AND IR.dwg
 PLOT DATE: 07-18-13 PLOTTED BY: zkatz



FOR IRRIGATION LEGEND AND NOTES SEE SHEET L2
 FOR PLANTING LIST, LEGEND AND NOTES SEE SHEET L1

NO.	DESCRIPTION	BY	DATE	APPVD



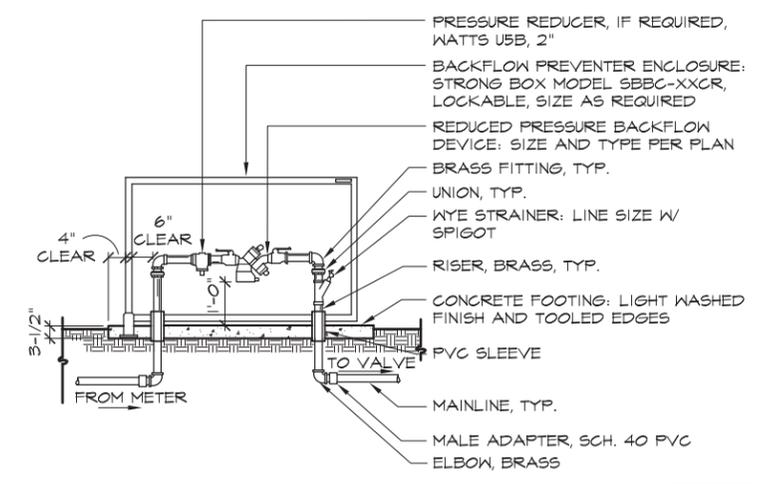
Callander Associates
 Landscape Architecture
 311 Seventh Ave.
 San Mateo, CA 94401
 T 650.375.1313



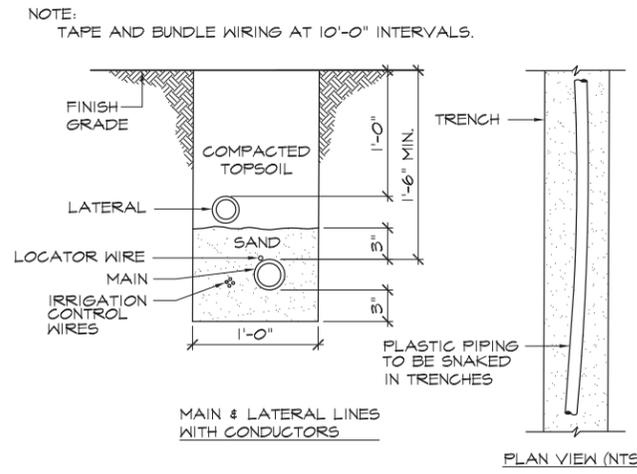
CITY OF RICHMOND

SAN PABLO AVENUE COMPLETE STREET
 FROM RIVERS ST TO HILLTOP DR
 PLANTING AND IRRIGATION PLAN

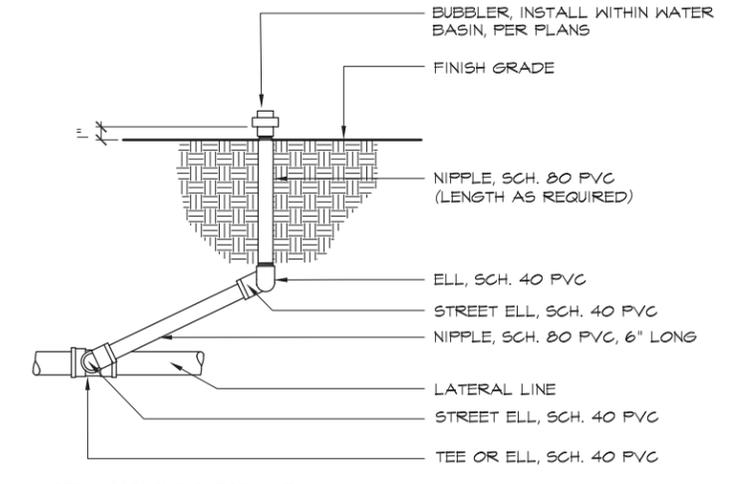
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 SHEET NO.: 20125082 L5 OF 6
 COUNTY: RICHMOND
 FILE NO.: 12041 PL & IR



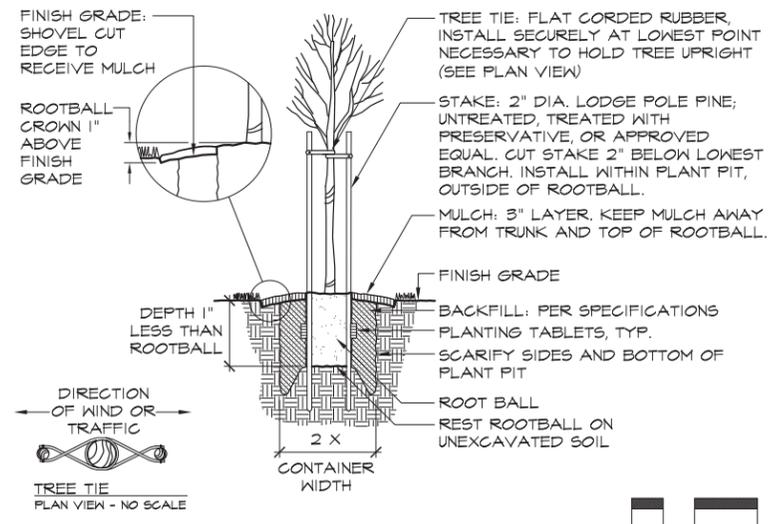
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6 **SECTION**
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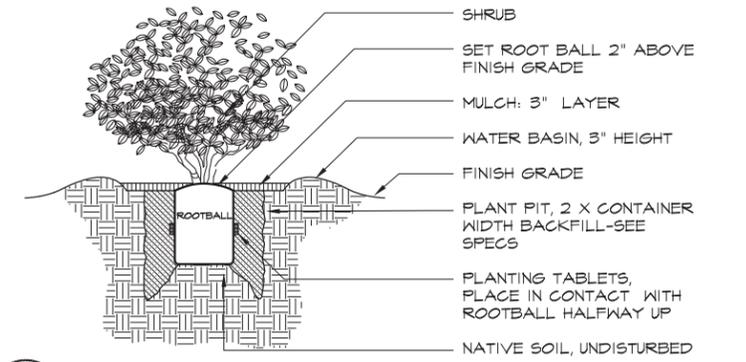
2 **TRENCHING**
6 **SECTION/PLAN**
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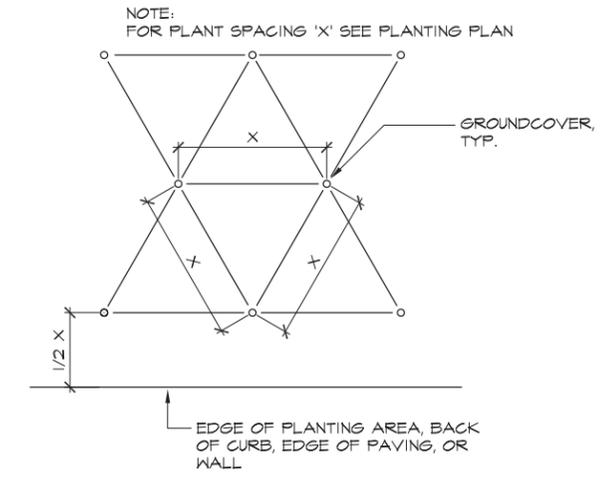
3 **BUBBLER**
6 **SECTION**
12041 Bubbler_8.dwg



4 **TREE PLANTING**
6 **SECTION**
12041 TreeStaking_32.dwg



5 **SHRUB PLANTING**
6 **SECTION**
12041 ShrubPlanting_48.dwg



6 **GROUNDCOVER SPACING**
6 **SECTION**
12041 GroundcoverSpacing_48.dwg

REVISIONS	NO.	DESCRIPTION	BY	DATE	APPROV



Callander Associates
Landscape Architecture
311 Seventh Ave.
San Mateo, CA 94401
Tel: 650.375.1515



SAN PABLO AVENUE COMPLETE STREET
FROM RIVERS ST TO HILLTOP DR
CONSTRUCTION DETAILS

DATE	7/18/2013	SCALE	PER PLAN
REF. JOE NO.	20125082		
COUNTY NO.			
SHEET NO.	L6	OF	6
FILE NO.	12041 DT		

San Pablo Avenue Complete Streets Study



CITY of SAN PABLO
City of New Directions

Appendix D: Detailed Cost Estimate



Engineer's Opinion of Cost
San Pablo Boulevard Improvement Project
 Rivers Street to Hilltop Avenue
 Preliminary

Revised: 05.10..13
 Engineer: J. White

PROJECT COMMENCEMENT

ITEM	DESCRIPTION	UNIT COST	QTY.	UNITS	AMOUNT
100	CONTRACTOR MOBILIZATION (LIMIT TO 5% OF TOTAL)	\$ 255,034	1	LS	\$ 255,034
102	TRAFFIC CONTROL AND CONSTRUCTION AREA SIGNS	\$ 100,000.00	1	LS	\$ 100,000
103	STORM WATER POLLUTION AND PREVENTION PLAN IMPLEMENTAION	\$ 50,000.00	1	LS	\$ 50,000
PROJECT COMMENCEMENT SUBTOTAL:					\$ 405,034

DEMOLITION/REMOVAL

ITEM	DESCRIPTION	UNIT COST	QTY.	UNITS	AMOUNT
200	CLEARING AND GRUBBING	\$ 0.45	21,000	SF	\$ 9,450
201	REMOVE CONCRETE CURB AND GUTTER	\$ 15.00	1,500	LF	\$ 22,500
202	REMOVE VERTICAL ASPHALT CURB	\$ 3.00	1,500	LF	\$ 4,500
203	REMOVE TREES	\$ 250.00	10	EA	\$ 2,500
204	REMOVE ASPHALT CONCRETE PAVEMENT	\$ 0.50	55,000	SF	\$ 27,500
205	REMOVE CONCRETE MEDIAN CURB	\$ 12.00	2,500	LF	\$ 30,000
206	REMOVE MEDIAN CONCRETE OR ASPHALT	\$ 0.80	25,000	SF	\$ 20,000
207	REMOVE TRAFFIC SIGNAL ASSEMBLY	\$ 20,000.00	3	EA	\$ 60,000
208	REMOVE STREET LIGHT AND FOUNDATION	\$ 1,000.00	3	EA	\$ 3,000
209	REMOVE ROADWAY SIGNS	\$ 100.00	10	EA	\$ 1,000
211	REMOVE CONCRETE SIDEWALKS, DRIVEWAYS, CURB RAMPS, AND VALLEY GUTTERS	\$ 2.00	600	SF	\$ 1,200
212	1.2" ASPHALT GRIND	\$ 0.14	200,000	SF	\$ 28,000
DEMOLITON/REMOVAL SUBTOTAL:					\$ 209,650

HARDSCAPE IMPROVEMENTS

ITEM	DESCRIPTION	UNIT COST	QTY.	UNITS	AMOUNT
300	PCC SIDEWALK	\$ 7.00	56,000	SF	\$ 392,000
301	PCC DRIVEWAY	\$ 8.00	1,200	SF	\$ 9,600
302	PCC MEDIAN CURB	\$ 25.00	3,300	LF	\$ 82,500
303	PCC CURB AND GUTTER	\$ 35.00	6,200	LF	\$ 217,000
304	PCC MEDIAN	\$ 6.00	1,900	SF	\$ 11,400
305	PCC STAIRS	\$ 25,000.00	1	LS	\$ 25,000
306	ASPHALT CONCRETE	\$ 120.00	2,000	TON	\$ 240,000
307	SLURRY SEAL	\$ 0.15	700,000	SF	\$ 105,000
308	CLASS 2 AGGREGATE BASE	\$ 32.00	250	TON	\$ 8,000
309	0' - 3' RETAINING WALL	\$ 125.00	1,500	SF	\$ 187,500
310	3' - 6' RETAINING WALL	\$ 135.00	5,000	SF	\$ 675,000
311	6' - 10' RETAINING WALL	\$ 155.00	4,800	SF	\$ 744,000
HARDSCAPE IMPROVEMENTS SUBTOTAL:					\$ 2,697,000

SIGNAGE/STRIPING

ITEM	DESCRIPTION	UNIT COST	QTY.	UNITS	AMOUNT
400	BIKE LANE BUFFER - SPECIAL STRIPING	\$ 3.00	10,000	LF	\$ 30,000
401	12" WIDE WHITE CROSSWALK STRIPE	\$ 4.00	1,800	LF	\$ 7,200
402	DASHED LANE LINE - DETAIL 10	\$ 2.00	11,000	LF	\$ 22,000
403	CHANELIZING LINE - DETAIL 38	\$ 15.00	600	LF	\$ 9,000
404	DOUBLE YELLOW - DETAIL 21	\$ 2.00	2,500	LF	\$ 5,000
406	PAVEMENT MARKING (BICYCLE LANE SYMBOL AND TEXT)	\$ 70.00	44	EA	\$ 3,080
407	PAVEMENT MARKING - ARROW (10 FOOT TYPE I)	\$ 75.00	8	EA	\$ 600
408	PAVEMENT MARKING - ARROW (8 FOOT TYPE IV)	\$ 70.00	7	EA	\$ 490

SIGNAGE/STRIPING (CONTINUED)

ITEM	DESCRIPTION	UNIT COST	QTY.	UNITS	AMOUNT
409	PAVEMENT MARKING - ARROW (13 FOOT TYPE VII)	\$ 75.00	2	EA	\$ 150
409	COLORED BIKE LANE - GREEN	\$ 12.00	10,000	LF	\$ 120,000
410	EXISTING ROADWAY SIGN ON NEW POST	\$ 350.00	10	EA	\$ 3,500

SIGNAGE/STRIPING SUBTOTAL: \$ 201,020

UTILITY IMPROVEMENTS/ADJUSTMENTS

ITEM	DESCRIPTION	UNIT COST	QTY.	UNITS	AMOUNT
500	CITY OWNED STORM DRAIN AND SANITARY SEWER MODIFICATIONS	\$ 250,000.00	1	LS	\$ 250,000

UTILITY IMPROVEMENTS/ADJUSTMENTS SUBTOTAL: \$ 250,000

ELECTRICAL/TRAFFIC SIGNAL IMPROVEMENTS

ITEM	DESCRIPTION	UNIT COST	QTY.	UNITS	AMOUNT
600	STREET LIGHT POLES, FIXTURES, AND FOUNDATIONS	\$ 7,500.00	82	EA	\$ 615,000
600	CONDUITS AND CONDUCTORS	\$ 65.00	7,700	LF	\$ 500,500
601	TRAFFIC SIGNAL SYSTEM @ LA PUERTA DR	\$ 180,000.00	1	LS	\$ 180,000
602	TRAFFIC SIGNAL SYSTEM MODIFICATION @ ROBERT H MILLER DR	\$ 100,000.00	1	LS	\$ 100,000

ELECTRICAL/TRAFFIC SIGNAL IMPROVEMENTS SUBTOTAL: \$ 1,395,500

LANDSCAPE/IRRIGATION IMPROVEMENTS

ITEM	DESCRIPTION	UNIT COST	QTY.	UNITS	AMOUNT
700	IRRIGATION SYSTEM	\$ 116,000.00	1	LS	\$ 116,000
701	PLANTING	\$ 65,500.00	1	LS	\$ 65,500
702	SITE FURNISHINGS	\$ 10,000.00	1	LS	\$ 10,000
703	LANDSCAPE MAINTENANCE	\$ 60,000.00	1	LS	\$ 6,000

LANDSCAPE/IRRIGATION IMPROVEMENTS SUBTOTAL: \$ 197,500

PRELIMINARY COST ESTIMATE SUBTOTAL: \$ 5,355,704

CONTINGENCY (15%): \$ 803,356

PRELIMINARY COST ESTIMATE SUBTOTAL: \$ 6,159,059