

CHAPTER 3 – SITE ANALYSIS AND CONCEPTUAL TRAIL ALIGNMENTS

Chapter 3 details the findings of the site analysis and describes the conceptual trail alignments and engineering solutions to constrained areas including pedestrian/bicycle bridges, underpasses, tunnels, overcrossings and street crossings necessary to maintain the routes within the study corridors. The assessments of land availability, habitat sensitivity and roadway, creek and on-street crossing feasibilities are highlighted. These findings are then applied to develop conceptual trail alignments and engineering solutions for each of the three study corridors. The conceptual alignments and crossing solutions are based upon Caltrans bicycle transportation design standards, Santa Clara County trail design guidelines and the requirements of agencies with jurisdiction over the Three Corridors. The conceptual alignments and engineering solutions were presented to many of these agencies for preliminary feedback sufficient to determine feasibility.

The Three Corridors evaluated for the potential to develop bicycle and pedestrian trails are presented as six trail sections. The Calabazas Creek Corridor was divided into three segments and Saratoga Creek Corridor into two segments to facilitate the presentation of the feasibility findings. The Hetch Hetchy Corridor is

presented as a single segment. The sections vary in length and begin and end at natural termini that are likely to be used in developing future construction phasing limits. Maps, cross-sections and drawings are provided to illustrate the conceptual trail alignments and engineering designs concepts. The six study sections include:

CALABAZAS CREEK CORRIDOR

Section 1 – SF Bay Trail to Highway 101
Section 2 – Highway 101 to Monroe Street
Section 3 – Monroe Street to Benton Street

This investigation determined that two areas totaling approximately 3.65 miles are feasible for trail development along Calabazas Creek. These two areas are linked together by approximately 1.35 miles of on-street bike lanes to provide approximately 5 miles of continuous off-street and on-street routes along Calabazas Creek. Approximately 0.75 miles was deemed infeasible to support a creek trail.

HETCH HETCHY CORRIDOR

Ulistac Natural Area to Calabazas Creek

The entire approximately 1.75 miles of the Hetch Hetchy corridor will support trail development although there are challenging crossing issues that will require additional investigations to determine feasibility. Land ownership and utility issues complicate the

crossing at Union Pacific Railroad and Lafayette Street.



The existing Calabazas Creek Trail near the Hetch Hetchy Bridge to Sunnyvale.

SARATOGA CREEK CORRIDOR

Section 1 – Monroe Street to El Camino Real
Section 2 – El Camino Real to Forbes Avenue

The Saratoga Creek corridor connects to the existing San Tomas Aquino Creek Trail at the confluence of the two creeks at Monroe Street. This feasibility investigation determined that two areas totaling approximately 1.25 miles of the 1.75 miles evaluated are suitable for trail development along Saratoga Creek. These segments of trail are connected to the on-street facilities along Calabazas Boulevard by bicycle lanes on Cabrillo Avenue and Benton Street.

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The development of the Saratoga Creek Trail between Benton Street and Forbes Avenue will connect many residents to amenities available at Central Park including the library, sport courts and swim center. Central Park is a venue for many public events and the trail will facilitate walking and bicycling access to these special events. The expansion of the trail network along portions of Saratoga Creek will also provide more residents with access to the San Tomas Aquino Creek Trail, which extends approximately four miles to the regional San Francisco Bay Trail.

All of these conceptual routes will require further investigation through the development of a creek trail master plan. A few trail crossings that demonstrated multiple constraints that could not be fully vetted through this study, but are still considered potentially feasible are given specific attention within this chapter. The next steps to undertake in the assessments of these areas are listed and this information can serve as a jumping off point for future investigations of these challenging crossings.

TRAIL DESIGN

Several terms are used throughout the Creek Trail Network Expansion Feasibility Study. The terms describe

the trail type and on-street bicycle facilities and the engineered structures needed to develop continuous routes. This study evaluated the potential for building off-street trails along the three study corridors; however, some off-street trails must be integrated with on-street facilities to provide uninterrupted paths of travel for bicyclists and pedestrians. Engineered structures are the improvements proposed to provide trails that are grade-separated from the roadways and rail lines. These trail terms include:

Class I Bikeways

The proposed trails are intended to serve multiple uses by providing a stable, firm and slip-resistant surface. The trails provide a sufficiently smooth surface to accommodate street bicycles, in-line skates and strollers. These trails may be considered by Caltrans to be Class I Bikeways (Bike Paths) which serve the exclusive use of pedestrians and bicyclists and are defined as a right-of-way completely separated from motor vehicle street and highway traffic (California Department of Transportation, 2012, pp. 1000-3). In most areas, the corridors meet the minimum requirement of an 8-foot wide trail with 2-foot wide shoulders to accommodate Class I Bikeways. This trail type is also described in the 1995 Santa Clara Countywide Trails Master

Plan under Figure G-2 – Shared Use Trail – Paved Tread Double Track. These guidelines recommend that a trail serving multiple uses meet an optimum width of 12 feet (Santa Clara County, 1995, Chapter 5, p. 90). In situations with fewer types of trail users or less intensity of trail use, tread width is narrowed.

Engineered Structures

Engineered trail improvements include underpasses, overcrossings, tunnels, pedestrian bridges and at-grade street crossings. Several structures have been proposed throughout the trail alignments. In most cases, these engineered improvements retrofit existing roadway bridges and provide an opportunity for human scale transportation.

Underpasses extend along the creek banks and cross beneath the roadways. The underpasses follow existing Santa Clara Valley Water District (SCVWD) maintenance access roads. The underpasses retrofit existing roadway bridges to provide grade-separated trail crossings. The in-channel underpasses are typically designed to handle bicyclists, pedestrians and light duty maintenance vehicles.

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Overcrossings extend along the creek banks and cross above the roadways. The overcrossings exclusively serve bicyclists and pedestrians. The overcrossings are proposed when no opportunity exists to retrofit the existing roadway bridge for an in-channel underpass. The overcrossings provide grade-separated trail crossings at some highway and expressway locations.



Pedestrian overcrossing at Highway 85 in Mountain View.

Tunnels are under consideration in two locations to provide grade-separated crossings beneath rail lines. The tunnels are proposed when no opportunity exists to retrofit the existing rail bridge spanning Calabazas Creek and no grade-separated features are present at the Union Pacific Railroad corridor adjacent to Lafayette Street in the vicinity of the Great America Station.

Pedestrian/Bicycle Bridges are proposed to provide connections across the creek corridors. Pedestrian/bicycle bridges are intended to be of equal width to the trail and to completely span the creeks without need for in-channel support. This type of a structure is referred to as a clear span bridge. These bridges can also be designed to accommodate vehicle loading should an area of a trail require regular vehicle access.

At-Grade Street Crossings are proposed at junctions where the off street trail meets a roadway and at the intersections of Class II - Bicycle Lanes and Class III - Bicycle Routes. Several at-grade street crossings are proposed as a result of limiting conditions within the corridors that force the trails onto city streets. The at-grade street crossings are proposed at controlled intersections or require modifications to those intersections that do not meet these criteria.

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CALABAZAS CREEK STUDY CORRIDOR OVERVIEW

The potential to develop a bicycle and pedestrian trail was evaluated along approximately 5.75 miles of Calabazas Creek from the San Francisco Bay Trail upstream to Lochivar Avenue just beyond the City limit into Sunnyvale. The land availability assessment determined that approximately 70% of the west bank and approximately 60% of the east bank provide adequate width to support the development of a trail. In other areas, the land along the corridor is too narrow to support trail development. These narrow areas of the corridor are primarily located along Calabazas Boulevard and south of Benton Street. In the future, new opportunities may develop along Calabazas Boulevard that would support the development of a trail separated from the roadway.

This study evaluated 19 roadway and rail bridges spanning the creek for the potential to develop in-channel trail underpasses. Four existing pedestrian bridges were also evaluated for integration into the conceptual trail alignments. The bridges evaluations determined that 7 of the 19 bridges could be retrofit to accommodate in-channel trail underpasses. The remaining 12 bridges provided no opportunity for modification and alternatives crossing solutions were

developed for the alignments. The four pedestrian bridges were integrated into the conceptual trail alignment, although one bridge may need to be repositioned to accommodate a proposed trail underpass ramp (See *Map 2 – Calabazas Creek Land Availability and Underpass Feasibility Map*).

CALABAZAS CREEK CORRIDOR

The Calabazas Creek study corridor was divided into three segments to facilitate the presentation of the site-specific findings and conceptual trail alignments. Maps, cross-sections and drawings and are provided to illustrate the conceptual trail alignments and engineering designs concepts. The three study sections include:

- Section 1: SF Bay Trail to Highway 101
- Section 2: Highway 101 to Monroe St.
- Section 3: Monroe St. to Lochinvar Ave

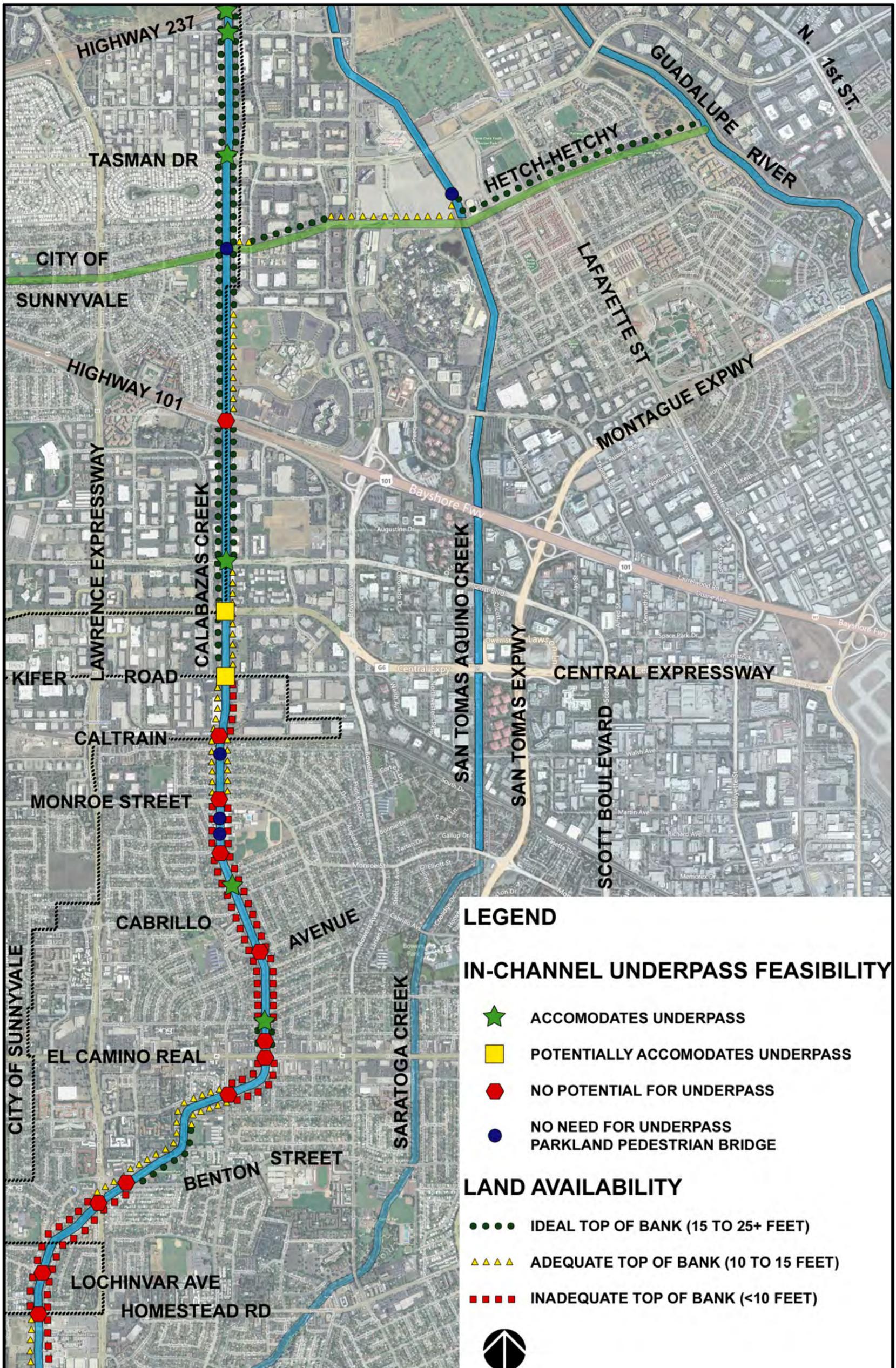
STUDY SECTION 1 LOCATION AND OWNERSHIP

Study Section 1 extends from the San Francisco Bay Trail to Highway 101. This 1.75-mile segment is aligned within the creek corridor on earthen levees owned by the SCVWD. Study Section 1 includes two highways and two roads bridges, one supporting light rail that span Calabazas Creek. An existing pedestrian bridge connects

the John W. Christian Greenbelt in Sunnyvale to the Calabazas Creek Trail in Santa Clara (See *Map 3 – Calabazas Creek – Section 1: SF Bay Trail to Highway 101 Conceptual Trail Alignments Map*).

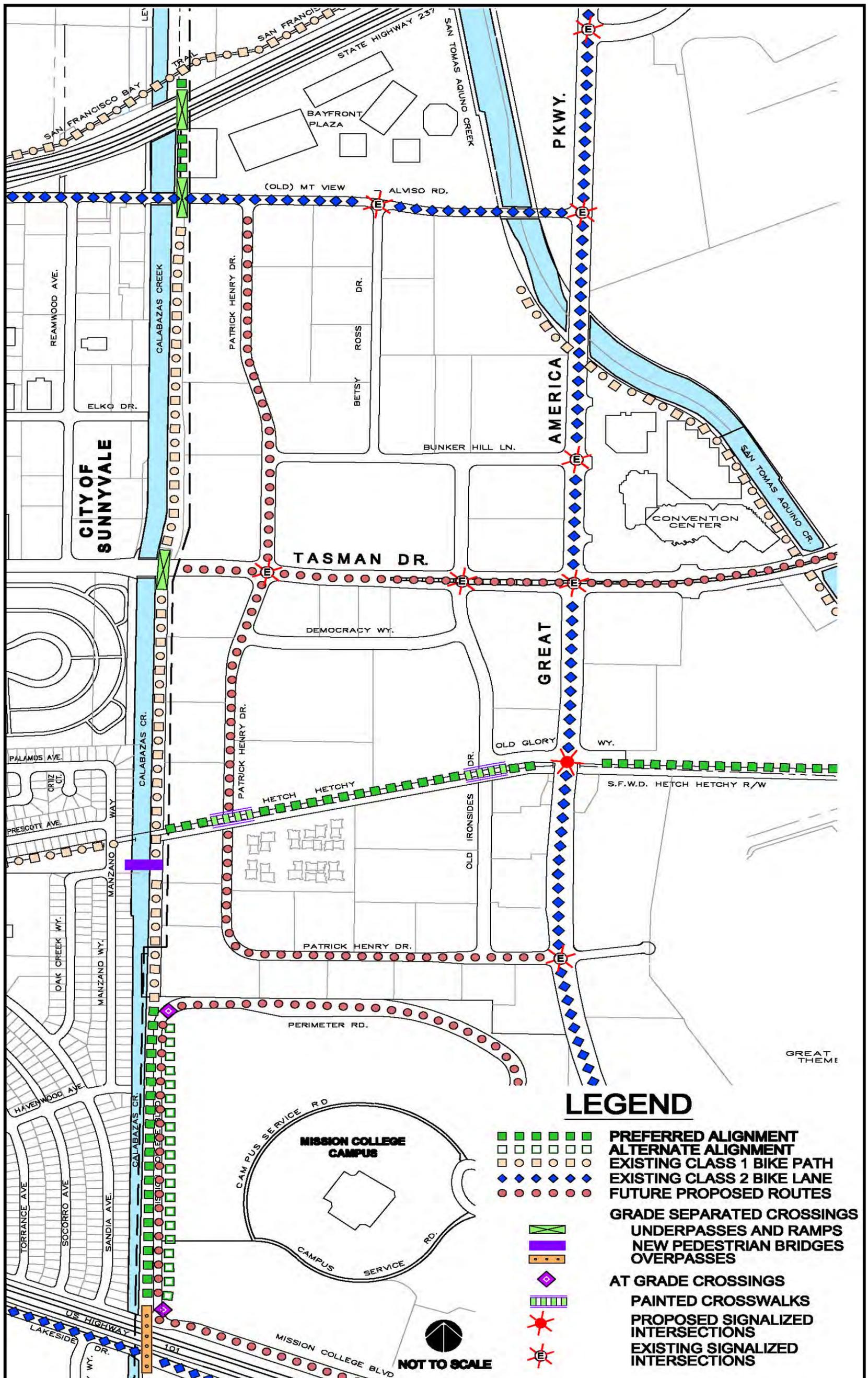
Study Section 1 encompasses Highway 237 and Highway 101, which are both owned and operated by the Caltrans. The San Francisco Public Utilities Commission (SFPUC) operates the Hetch Hetchy Aqueduct, which crosses beneath Calabazas Creek in Study Section 1. The John W. Christian Greenbelt has been developed on the Hetch Hetchy Aqueduct lands in Sunnyvale. Extension of this trail through Santa Clara is also the subject of this study (See Page 54). The Santa Clara Valley Transportation Authority (VTA) operates the Light Rail, which runs along Tasman Road in Study Section 1.

The lands surrounding Study Section 1 include open space areas and wetland mitigation sites to the north of Highway 237. Many technology businesses are located on the light industrial zoned lands to the east. Mission College is directly adjacent to the trail corridor and serves approximately 28,000 students each year (Mission College, 2011, p. 11).



Map 2 – Calabazas Creek Land Availability and Underpass Feasibility Map

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Map 3 – Calabazas Creek – Section 1: San Francisco Bay Trail to Highway 101 Conceptual Trail Alignments Map

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SITE ANALYSIS SUMMARY

Study Section 1 provides ideal top-of-bank width along the elevated levees to support the development of a trail along either the east or west banks of Calabazas Creek. A paved trail exists along the levee in many areas. An earthen levee is not present along the east bank from Mission College to Highway 101. In this area a low concrete floodwall provides protection from storm events. This area would require the narrowing of travel lanes or a slight realignment of Mission College's Perimeter Road to accommodate a trail along the east bank (See Map 2 – Calabazas Creek Land Availability and Underpass Feasibility Map).

Although portions of the levee currently accommodate a paved trail, these segment are made discontinuous by roadway crossings. Four roadways span the creek in this study section. Each of these roadways requires an engineered structure to support a fully grade-separated, continuous trail alignment. The four roadways include Highway 237, Old Mountain View-Alviso Road, Tasman Drive carrying Light Rail and Highway 101. The City and Sunnyvale have a joint capital improvement project to replace the aging Old Mountain View-Alviso Road bridge (Bridge #37C 0254). This bridge is scheduled for replacement by 2014

and is included in Sunnyvale's 2011/2012 Financial Plan (City of Sunnyvale, 2011).

CREEK CHARACTER, PLANT COMMUNITIES AND WILDLIFE

Study Section 1 of Calabazas Creek receives twice daily tidal exchange from San Francisco Bay. The channel bottom is natural gravels and bay muds that support a brackish marsh comprised of bulrush and cattail species. The channel floodplain hosts red willow thickets (*Salix laevigata*) that are interspersed with box elder (*Acer negundo*), white alder (*Alnus rhombifolia*), Fremont cottonwood (*Populus fremontii*), blue elderberry (*Sambucus mexicana*) and other willow species (*Salix spp.*).

The willow thickets are a type of riparian habitat. More than 225 species of birds, mammals, reptiles and amphibians rely on riparian habitat. Riparian habitat hosts the most diverse bird communities in the west. Less than 5% of California's riparian habitat remains (Riparian Habitat Joint Venture, 2004). The Baylands Ecosystem Habitat Goals Project states that in the South Bay riparian vegetation and willow groves should be protected and restored wherever possible (Baylands Project, 1999, p. 99). Common mammals including raccoon, opossum, striped skunk, ground

squirrel and gray fox use the creek corridor and open space lands located to the north of Highway 237. The semi-aquatic muskrat has also been observed foraging in the creek.



Snowy egret foraging in the shallows.

This lower reach of Calabazas Creek hosts abundant bird life. Great blue herons, great egrets, snowy egrets, black-crowned night herons and green herons are frequently seen fishing along the creek. Belted kingfishers also frequent the corridor to fish. Mallards, coots and pied-billed grebes are year-round residents that breed in the corridor. Calabazas Creek is part of the Pacific Flyway. During winter migration a broader range of waterfowl species can be found in the

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creek. Many migrating songbirds arrive in the spring to breed in the willow thickets that line the creek. Visitors to the corridor can also spot three species of swallows foraging along the creek including the violet-green swallows, northern rough-winged swallows and the gregarious cliff swallows that nest in large colonies and establish mud nests on the underside of the bridges that span Calabazas Creek.

A number of birds of prey species also forage and breed in the corridor. The most common raptors observed along this stretch of Calabazas Creek include white-tailed kites, northern harriers and red-tailed hawks. Red-shoulder hawks, Cooper’s hawks and American kestrels also visit the corridor.

The corridor also supports native reptiles and amphibians. The western pond turtle, a California species of concern, gopher snake, garter snake and Pacific chorus frogs have all been observed in the corridor. The creek waters support a host of native and non-native fish species.

CONCEPTUAL TRAIL ALIGNMENTS

The proposed trail alignment in Study Section 1 would extend along the elevated levee on the east bank of Calabazas Creek from the junction



A trail underpass is proposed along this access road that extends beneath Tasman Drive.

with the San Francisco Bay Trail to Highway 101. At Highway 237, Old Mountain View-Alviso Road and Tasman Drive the trail would be ramped below the roadways into the flood control channel. The trail underpass at Old Mountain View-Alviso is integrated into the design of the replacement roadway bridge. At the two other roadways sufficient clearance exists to create a trail underpass and preserve the flood carrying capacity of the channel. All three of these trail underpasses would be subject to flooding during significant winter storms resulting in temporary trail closures (See Figure 14 – Summary of Calabazas Creek Corridor Feasibility Findings).

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SUMMARY OF CALABAZAS CREEK CORRIDOR FEASIBILITY FINDINGS		
Corridor Characteristics	Habitat Quality	Roadway and Stream Crossings
<p>Land Availability at Top-of-Bank:</p> <p>West Bank</p> <p>Ideal 15 to 25 Feet 48%</p> <p>Adequate 10 to 15 Feet 21%</p> <p>Inadequate <10 Feet 31%</p> <p>East Bank</p> <p>Ideal 15 to 25 Feet 39%</p> <p>Adequate 10 to 15 Feet 23%</p> <p>Inadequate <10 Feet 38%</p>	<p>Habitat Types:</p> <ul style="list-style-type: none"> ◆ Red Willow Thickets/Brackish Marsh ◆ Concrete Lined Channel ◆ Sycamore Riparian Forest ◆ In-stream Freshwater Wetlands <p>Habitat Condition:</p> <p>Downstream of Highway 101 Channel has Floodplain Benches Constrained by Earthen Levees.</p> <p>Highway 101 to Lawrence Expressway the Channel is Concrete Lined with limited street tree and shrub planting at top of bank.</p> <p>Habitat Sensitivity:</p> <p>Downstream willow thicket and brackish marsh support large numbers of native fish, amphibians and reptiles as well as many breeding birds and common mammals species.</p>	<p>Highways and Expressways:</p> <ul style="list-style-type: none"> ◆ Highway 237 ◆ Highway 101 ◆ Central Expressway ◆ Lawrence Expressway <p>Rail Corridors:</p> <ul style="list-style-type: none"> ◆ VTA Light Rail ◆ Caltrain <p>Roadways:</p> <ul style="list-style-type: none"> ◆ Old Mountain View-Alviso Road ◆ Tasman Drive ◆ Wildwood Ave./Mission College Blvd. ◆ Scott Boulevard ◆ Kifer Road ◆ Monroe Street ◆ Calabazas Boulevard ◆ Machado Avenue ◆ Cabrillo Avenue ◆ Warburton Avenue ◆ El Camino Real (State Route 82) ◆ Pomeroy Avenue ◆ Benton Street ◆ Lochinvar Avenue ◆ Homestead Road <p>Pedestrian Bridges:</p> <ul style="list-style-type: none"> ◆ One at Hetch Hetchy Right-of-Way ◆ One at Agate Drive ◆ Two at Wilcox High

Figure 14 – Summary of Calabazas Creek Corridor Feasibility Findings

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This segment of the trail would connect to the Hetch Hetchy corridor between Tasman Drive and Mission College Boulevard. An existing pedestrian bridge provides access across the creek to the John W. Christian Greenbelt. The elevated levee diminishes in height and meets grade at Mission College's Perimeter Road and a low concrete floodwall is extended along the edge of the roadway to provide flood protection. The east bank in this area provides no opportunity to continue a Class I trail alignment without narrowing the travel lanes or slightly realigning Mission College's Perimeter Road.

In the absence of either of these reconfigurations, an intersection could be established at the curve in Perimeter Road to allow pedestrians to cross the street to reach the existing sidewalk and for bicyclists to access the road in appropriate directions of travel. If an intersection crossing were pursued then all of Mission College's Perimeter Road should be evaluated for bicycle improvements. Preferably one of the roadway reconfigurations would be selected so that the trail could continue along the east bank between the Perimeter Road and Calabazas Creek.



Figure 15 – Highway 101 Pedestrian Overcrossing Plan View

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No potential exists to create an in-channel trail underpass at Highway 101. However, an excellent opportunity is present to develop a pedestrian overcrossing (POC) above Highway 101. The Highway 101 POC could be developed on land owned by the SCVWD and Caltrans. Sufficient land appears to exist to maintain SCVWD maintenance access to the channel both upstream and downstream of the crossing through the use of a switchback ramp design. The placement of POC support columns will need careful design attention in order to provide adequate horizontal and vertical clearances for maintenance vehicles. Locating the support columns upstream of Highway 101 will be more challenging due to water and sewer lines in the area. The Highway 101 POC would span Wildwood Avenue, Highway 101 and Lakeside Drive. Three support columns would be placed within Caltrans right-of-way to support the overcrossing (*See Figure 15 – Highway 101 Pedestrian Overcrossing Plan View*). The trail could connect with the existing sidewalks and Class II Bike Lanes on Lakeside Drive.

The Highway 101 POC would serve both Santa Clara and Sunnysvale residents and employees. The project provides an excellent opportunity for

the cities to partner on this significant pedestrian and bicycle improvement (*See Illustration 1 – Highway 101 Pedestrian Overcrossing adjacent to Calabazas Creek*).

NEXT STEPS

All of these conceptual trail alignments and engineered crossings will require further investigation during the development of the creek trail master plan. The next steps to undertake in assessing Study Section 1 include:

- 1) Further evaluate the potential to reconfigure Perimeter Road at Mission College.
- 2) Determine any additional design guidelines for developing the trail underpass at Tasman Road, which carries the VTA Light Rail.
- 3) Refine and review the preliminary Highway 101 POC design with Caltrans, SCVWD, Silicon Valley Power and City of Santa Clara Water Department.

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Illustration 1 - Highway 101 Pedestrian Overcrossing adjacent to Calabazas Creek

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STUDY SECTION 2 LOCATION AND OWNERSHIP

Study Section 2 extends from the proposed Highway 101 pedestrian overcrossing to Monroe Street. This approximately 1.50-mile segment is aligned within the creek owned by SCVWD. Study Section 2 includes an expressway, a rail and three roadway bridges that span Calabazas Creek (*See Map 4 – Calabazas Creek – Section 2: Highway 101 to Monroe Street Conceptual Trail Alignments Map*).

Study Section 2 encompasses Central Expressway, which is owned and operated by the Santa Clara County Roads & Airports Department (County Roads). The Peninsula Corridor Joint Powers Board owns and operates Caltrain, which spans Calabazas Creek in Study Section 2. Southern Pacific Railroad is believed to have retained some right-of-way in the vicinity of Caltrain. Calabazas Creek flows through Sunnyvale between Agate Drive and Kifer Road. In this area, Sunnyvale abuts SCVWD lands on both the east and west creek banks.

The lands surrounding Study Section 2 are primarily zoned as light industrial and service lands in both Santa Clara and Sunnyvale. The area is dominated by industrial/office/R&D uses. Residential zoning begins south of the Caltrain corridor.

The land surrounding the Caltrain corridor has been the subject of the City of Sunnyvale’s Lawrence Station Area Plan (Lawrence SAP). The goal of the Lawrence SAP is to investigate options and develop strategies for maximizing the benefits of the lands within a ½ mile radius of the Caltrain station. The Lawrence SAP is intended to guide future development in this area. Calabazas Creek is on the eastern boundary of the planning area. The Lawrence SAP embraces Santa Clara’s efforts to develop the Calabazas Creek Trail (City of Sunnyvale, 2011).

SITE ANALYSIS SUMMARY

Study Section 2 provides ideal to adequate top-of-bank width along most of the west bank to support the development of a trail. One area between Kifer Road and the Caltrain corridor is designated as potentially adequate and is indicated as such due the potential for redevelopment of the adjacent parcel as part of the Lawrence SAP. Along the west bank, ideal top-of-bank conditions are present up to Scott Boulevard. Potentially adequate to inadequate conditions extend along the east bank from Scott Boulevard south to Monroe Street. This stretch of the corridor is narrow and in some instances parking lots are built up to the hinge point of the creek providing no opportunity for a trail (*See Map 2 –*

Calabazas Creek Land Availability and Underpass Feasibility Map).

Four roadways and the Caltrain corridor span the creek in this study section. Each of these roadways requires an engineered structure to support a fully grade-separated trail alignment. The four roadways include Scott Boulevard, Central Expressway, Kifer Road and Monroe Street. The Kifer Road bridge spanning Calabazas Creek is shared by the cities of Santa Clara and Sunnyvale. Central Expressway is owned by County Roads. However, the northwest corner of the bridge is within Sunnyvale city limits (*See Figure 14 – Summary of Calabazas Creek Corridor Feasibility Findings*).

CREEK CHARACTER, PLANT COMMUNITIES AND WILDLIFE

Study Section 2 of Calabazas Creek is a concrete lined channel from Highway 101 upstream to Lawrence Expressway. The concrete lining prevents vegetation from establishing in the bottom of the channel or on the channel banks. Gravel bars establish on top of the concrete lining and support annual plants. Various tree species have been planted along the SCVWD property line and some of these trees have matured sufficiently to provide some shade to the stream.

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The lack of habitat limits wildlife. Species associated with the urban environment visit the corridor for water, but few animals spend time in the channel. In areas where parks and schools are adjacent to the creek, animal life is somewhat more abundant due to the nearby landscaped grounds. Birds observed in this section of Calabazas Creek include mallards, robins, mockingbirds, house finches and crows.

CONCEPTUAL TRAIL ALIGNMENTS

The proposed trail alignment in Study Section 2 would extend along the levee on the east bank of Calabazas Creek from Highway 101 to a location past Scott Boulevard. A trail underpass is proposed at Scott Boulevard. After passing beneath Scott Boulevard the trail would cross the creek on a new pedestrian bridge. A bridge is required in this location to reach the west bank, which appears to be the only bank that has adequate width to support the construction of the pedestrian overcrossing of Central Expressway. A box culvert bridge spans Calabazas Creek at Central Expressway. This bridge design provides no opportunity to create a trail underpass. Thus, an alternative crossing solution was sought for this heavily traveled expressway, which has an average

daily trip (ADT) of 40,000 vehicles (Sunnyvale, 2010).

A pedestrian overcrossing (POC) above Central Expressway is proposed along the west bank to maintain a continuous, grade-separated trail. The Central Expressway POC could be developed on land owned by the SCVWD and County Roads. Sufficient land exists to maintain SCVWD maintenance access to the channel both upstream and downstream of the crossing. A single support column would be placed within the Central Expressway median island to support the overcrossing. All other support columns would be situated beyond the edge of curb (See Figure 16 – Central Expressway Pedestrian Overcrossing Plan View). The trail would provide access to Central Expressway for bicyclists. The Central Expressway POC would serve both Santa Clara and Sunnyvale residents and employees. The Calabazas Creek Trail provides an opportunity to enhance the walkability, bikeability and access to Caltrain. A short ½ mile spur trail could be developed from the Calabazas Creek Trail directly to the Lawrence Caltrain Station.

The roadway bridge at Kifer Road crossing is asymmetrical. A trail underpass is only feasible along the

west bank. After descending from the Central Expressway POC ramps the trail would continue along the west bank and descend below Kifer Road into the flood control channel (See Illustration 2 – Kifer Road Trail Underpass Concept). This trail underpass is quite low and would likely be the first on the trail to be inundated during winter storms. The development of the trail underpass along the west bank is likely contingent upon the acquisition of future right of way along the west bank to support both the trail underpass ramps and trail extending to the Caltrain corridor. There are multiple small slivers of land in this location and the upstream area has been the site of several flood control improvement projects that continue to raise the height of the west bank. Should the parcel between Kifer Road and the Caltrain corridor redevelop then additional right-of-way should be secured to alleviate the flooding issues and to provide adequate land to support a continuous trail alignment.

An even broader goal for this area would be to gain sufficient right-of-way to create a wider linear corridor that would allow the creek bank to be set back and this portion of the stream channel restored as riparian habitat. This action takes advantage of the natural resource afforded by the

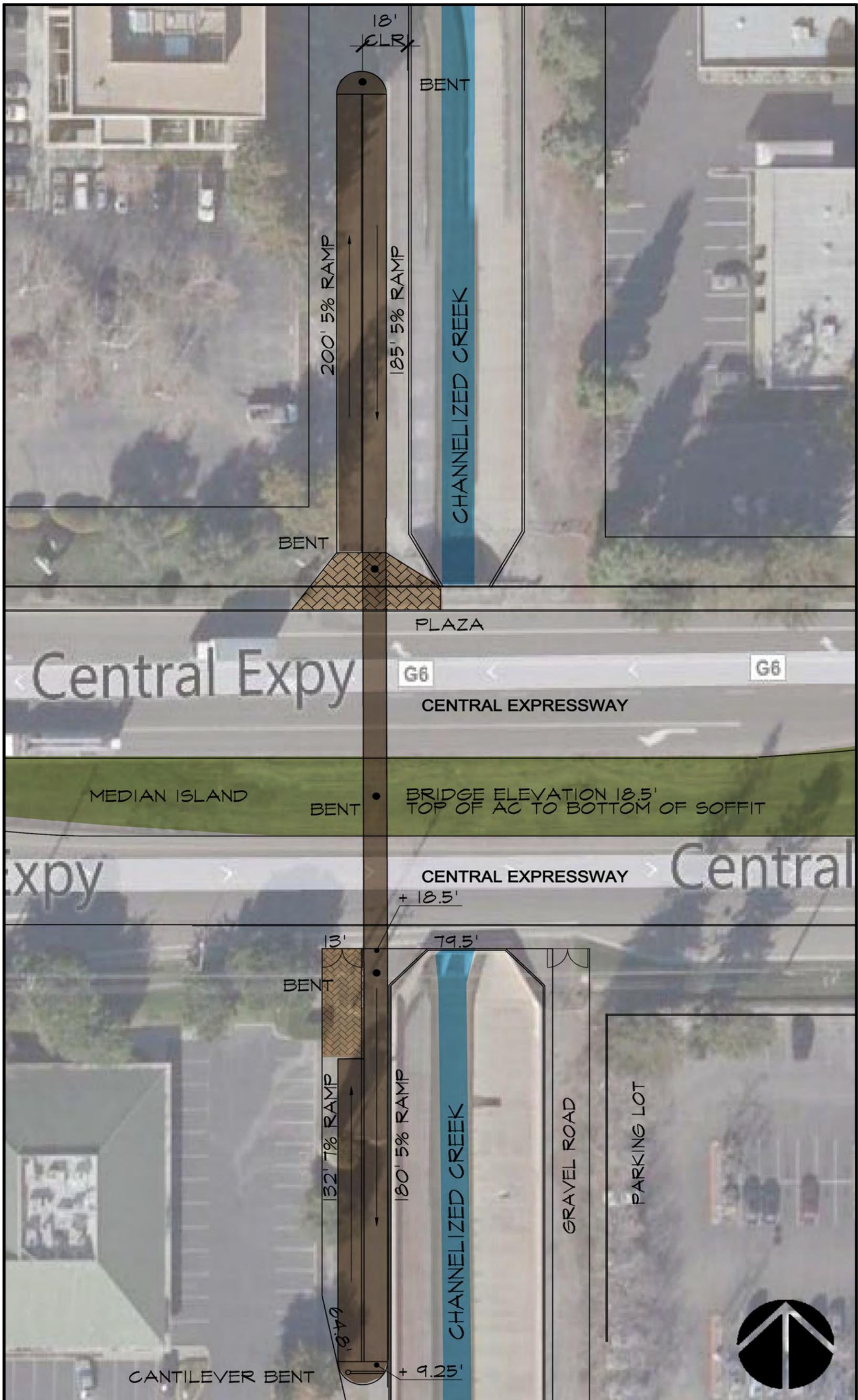


Figure 16 – Central Expressway Pedestrian Overcrossing Plan View

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Illustration 2 – Kifer Road Trail Underpass Concept

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stream course to provide green space and refuge for residents living nearby this industrial area.

The crossing of the Caltrain corridor has many constraints. The corridor is approximately 225 feet wide, which is much wider than the corridor is in other San Francisco Bay Peninsula communities that have successfully developed grade-separated facilities for pedestrians and bicyclists. The Peninsula Corridor Joint Powers Board (JPB) owns 80 feet of the right-of-way that carries Caltrain and is intended to accommodate the proposed California High-Speed Rail. Union Pacific Railroad (UPRR) owns the remaining right-of-way. UPRR continues to run freight on the lines now owned and operated by the JPB. UPRR has spur tracks and freight yards in the area surrounding Calabazas Creek. One spur track still provides service.

At the JPB/UPRR right-of-way, Calabazas Creek is covered by a triple box culvert type bridge with tapered wing walls that spans the entire 225-foot width of the right-of-way. SCVWD has an 80-foot by 225-foot wide easement within the UPRR and JPB lands. Two of the boxes convey Calabazas Creek flow and the third conveys flow from a tributary creek that enters at the southwest corner of the bridge structure. Box culvert bridges provide no opportunity for

constructing in-channel trail underpasses. This site is further complicated by the hydraulics at the confluence of Calabazas Creek and its tributary that drains from Lawrence Expressway area.



The active UPRR spur line.

The preliminary crossing solution to this site is a tunnel along the east bank of the creek passing beneath the 80-foot wide Caltrain corridor. The tunnel reaches grade within the existing UPRR lands and extends at grade over the top of the box culvert to the west bank of the creek. This solution affords a short tunnel and takes advantage of the existing box culvert structure to cross from the east bank to the west bank (See Figure 17 – Caltrain Tunnel Plan View). This lower cost solution will likely only be accepted by UPRR should all spur track use cease. This may occur as the area redevelops.

However, it should be noted that many businesses established along the rail lines years ago to take advantage of the door-to-door service and lower cost of shipping available by rail service.

As currently proposed, this tunnel would require modification of the tapered wing walls on the east bank of the creek to accommodate the tunnel ramping floodwall while maintaining channel capacity. SCVWD staff is unsure about modifications to the channel wing wall design due to the added complexity of the channel hydraulics. The existing water surface elevation is high and the hydraulics resulting from the tributary creek may limit the ability to develop an adjacent tunnel within the narrow 80-foot wide SCVWD lands. Further investigation regarding the feasibility to modify this structure will likely require preliminary design and water surface elevation modeling. Alternatively, if additional right-of-way could be acquired along the east bank the tunnel could be built without the need to modify the box culvert entrance structure. This challenging area offers great potential to connect residential neighborhoods in Santa Clara to businesses, recreation facilities and open space lands to the north. The constraints are significant, but not deemed insurmountable at this time.

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A trail overpass was also considered in this area. This crossing solution was not developed as a result of two interwoven constraints. The land to the south of the Caltrain corridor is residential. A trail overpass spanning the Caltrain corridor would need to provide 26 feet of clearance from the tracks. It was felt that a structure this tall would be a significant impact on the adjacent residences.

Assuming a feasible crossing can be developed at the Caltrain corridor, the trail would continue south on SCVWD lands along the east bank to Monroe Street. This segment of the trail would link to the Agate Drive pedestrian bridge. This existing bridge would allow residents living along the west bank of Calabazas Creek to access the trail. The Agate Drive bridge may need to be repositioned slightly to the south depending upon the length of ramping extending from the Caltrain tunnel. City water lines are present within the corridor and any change to the Agate Drive bridge location will need to consider underground utilities.



Figure 17 – Caltrain Tunnel Plan View

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Wilcox High School is located across Monroe Street. Calabazas Creek flows through the site and two pedestrian bridges connect the campus. No potential exists to create an in-channel trail underpass at Monroe Street. The trail will connect to city streets at Monroe Street. Intersection improvements are planned to connect trail users to existing sidewalks and proposed bicycle improvements on Monroe Street to Calabazas Boulevard (See Figure 18 – Monroe Street Pedestrian and Bicycle Improvements).

NEXT STEPS

The next steps to undertake in assessing Study Section 2 include:

- 1) Review the preliminary Central Expressway POC design with County Roads and SCVWD.
- 2) Further evaluate the Kifer Road trail underpass to make more precise determinations on right-of-way needs, if any, for trail underpass, and clarify right-of-way needs along west bank to Caltrain corridor.
- 3) Continue evaluation of Caltrain crossing including preliminary design and water surface elevation modeling. Review preliminary design and modeling with SCVWD, discuss operations and access with UPRR and coordinate with Sunnyvale Lawrence Station Area Plan.

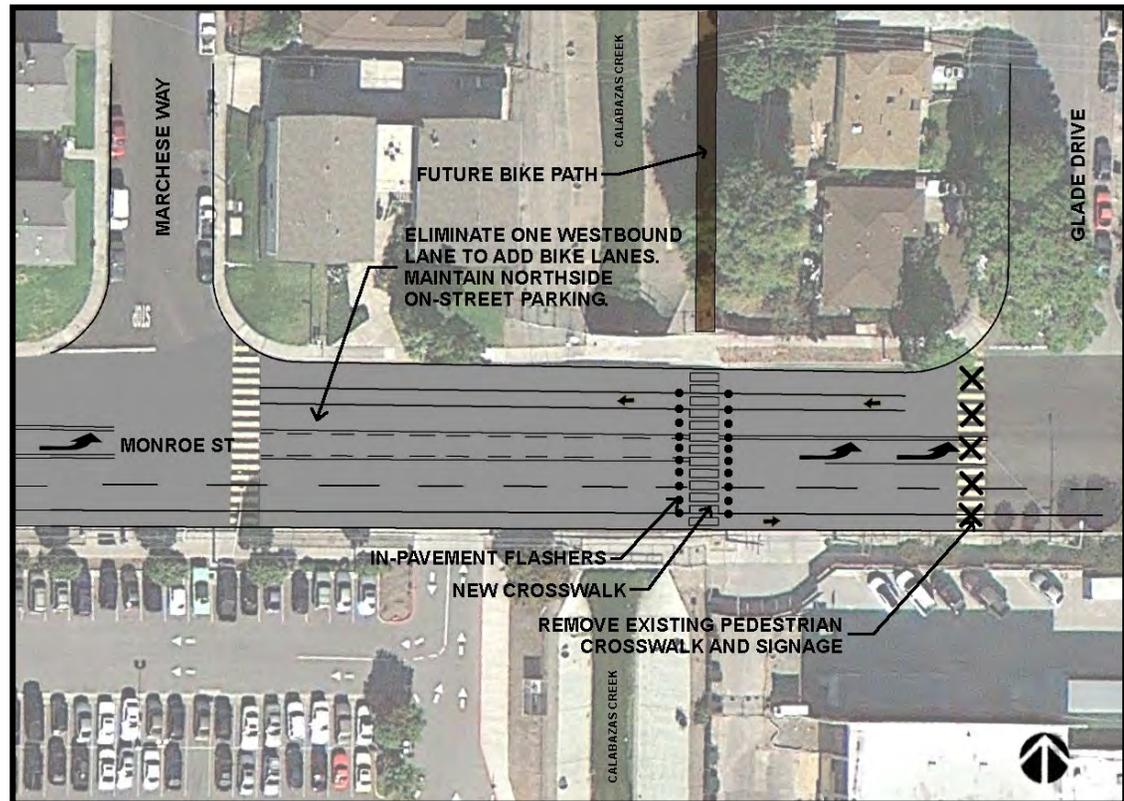


Figure 18 – Monroe Street Pedestrian and Bicycle Improvements

CHAPTER 3 – CONCEPTUAL TRAIL ALIGNMENTS – CALABAZAS CREEK

STUDY SECTION 3

LOCATION AND OWNERSHIP

Study Section 3 extends 2.50 miles from Monroe Street to Lochinvar Avenue in Sunnyvale. A trail is not feasible within approximately a ¾ mile stretch of the creek corridor extending from Benton Street to Lochinvar Avenue. About an approximately 1.75-mile segment is aligned along Calabazas Boulevard and within the creek corridor owned by the SCVWD. Study Section 3 includes eleven roadway bridges that span Calabazas Creek. Two existing pedestrian bridges link the Wilcox High School campus located along both banks of Calabazas Creek (See Map 5 – Calabazas Creek – Section 3: Monroe Street to Benton Street Conceptual Trail Alignments Map).

Study Section 3 encompasses El Camino Real, which is owned and operated by Caltrans and Lawrence Expressway, which is owned and operated by the County Roads. The lands surrounding Study Section 3 are primarily zoned residential with community mixed use zoning along El Camino Real.

SITE ANALYSIS SUMMARY

Study Section 3 provides inadequate top-of-bank width to support trail development along the majority of the

creek corridor. The east and west banks between Pomeroy Avenue and Benton Street provide ideal to adequate width for a trail. Santa Clara is piloting a two-to-one lane reduction, aka a “road diet”, project that reduces the lanes of travel for automobiles and adds left-side buffered bicycle lanes along Calabazas Boulevard from Cabrillo Avenue to Pomeroy Avenue for bicyclists. These painted green bicycle lanes may serve to connect the creekside portions of the trail (See Map 2 – Calabazas Creek Land Availability and Underpass Feasibility Map).

No opportunity exists to extend the trail beyond Benton Street with the creek corridor. The section of the corridor is narrow, contains SCVWD access roads that extend from the top of bank into the channel and includes a hydraulic jump at Lawrence Expressway. All of these constraints work together to limit trail potential. As a result, the conceptual trail alignment described in this chapter ends at Benton Street.

Eleven roadways span the creek in this study section. Only two of these roadways, Machado Avenue and Warburton Avenue, can be modified to accommodate in-channel underpasses.

This greatly limits the potential to develop a grade-separated trail



Adequate top of bank exists south of Pomeroy Avenue.

alignment in this study section. As a result, emphasis was placed on exploring long-range options for implementing this goal and taking advantage of the “road diet” bicycle improvements along Calabazas Boulevard in the near term (See Figure 14 – Summary of Calabazas Creek Corridor Feasibility Findings).

CREEK CHARACTER, PLANT COMMUNITIES AND WILDLIFE

Study Section 3 of Calabazas Creek includes a concrete lined channel from Monroe Street upstream to Lawrence Expressway and a more natural creek channel from Lawrence Expressway to Lochinvar Avenue. The concrete lined portion of the channel prevents

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vegetation from establishing in the bottom of the creek or on the banks. Gravel bars establish on top of the concrete lining and support annual plants. Various tree species have been planted along the SCVWD property line and some of these trees have matured sufficiently to provide some shade to the stream. Calabazas Boulevard travel lanes are split with opposite directions of travel located on either side of Calabazas Creek from Georgetown Place to Pomeroy Avenue. In this section of the creek, a small planting pocket was left on either bank to provide a tree lined boulevard. The plantings include nonnative eucalyptus trees and oleander shrubs. The lack of habitat limits wildlife.

Upstream of Lawrence Expressway the creek corridor is wider and unchannelized. The upper banks support California sycamore woodland (Sawyer, 2009). This plant community includes California sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*) and a large number of coast live oak (*Quercus agrifolia*) trees. The creek bottom is gravel and contains patches of in-stream freshwater wetlands.

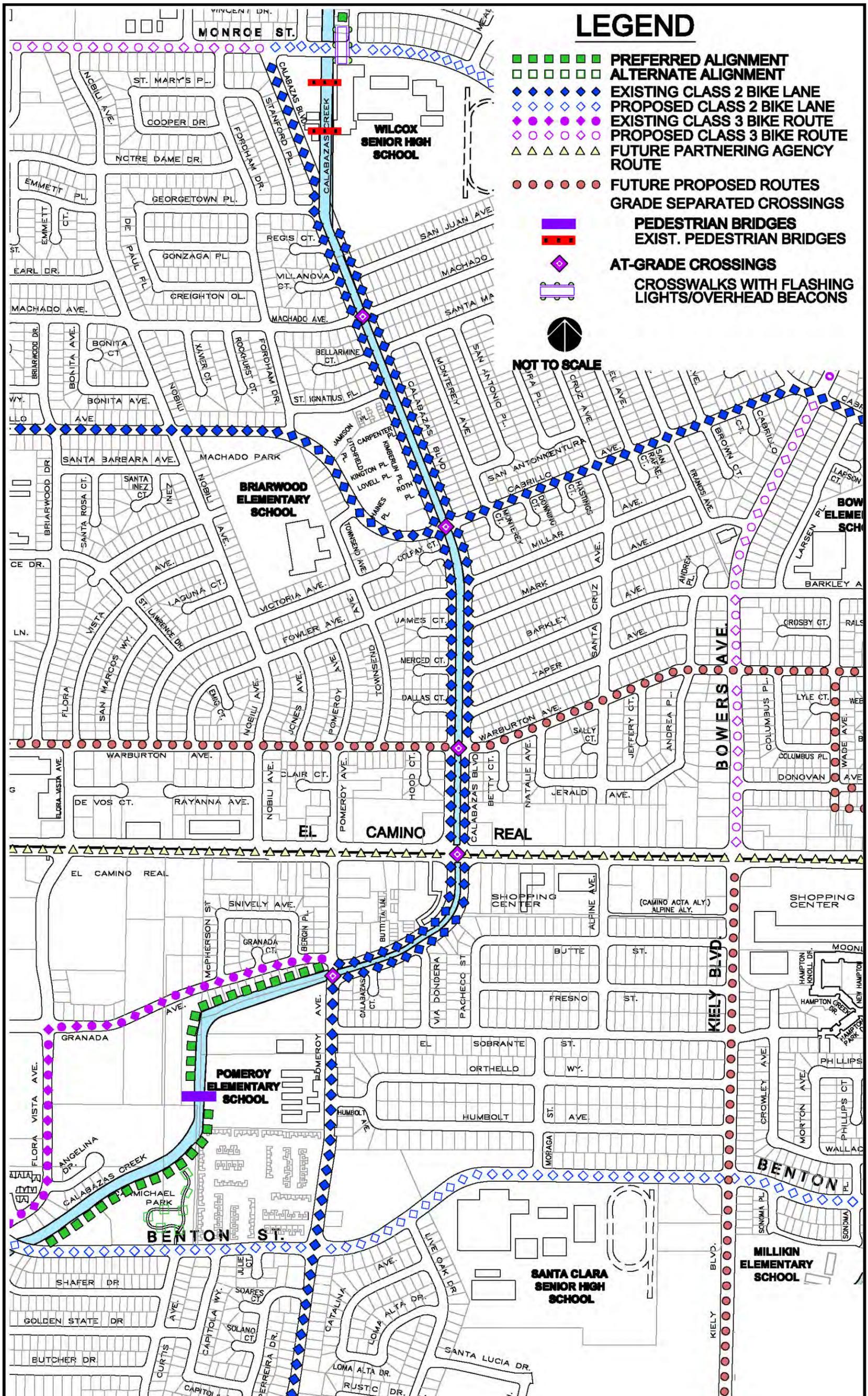
CONCEPTUAL TRAIL ALIGNMENTS

The proposed trail alignment in Study Section 3 would initially use the bicycle and pedestrian facilities planned for Calabazas Boulevard. These facilities include left-side buffered bicycle lanes on the city street. These improvements are part of Santa Clara's effort to complete Reach 4 of the San Tomas Aquino/Saratoga Creek Trail, which uses city streets to link to Cupertino. Calabazas Boulevard will be reduced from four to two lanes of travel to accommodate the new bicycle facilities. Pedestrians would use the existing sidewalks. These improvements would extend from the intersection with Cabrillo Avenue the full length of the roadway to the intersection with Pomeroy Avenue (See Figure 19 – Calabazas Boulevard Bicycle and Pedestrian Improvements at Georgetown Place).



Calabazas Creek is channelized and lined by eucalyptus tree and oleander shrubs.

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Map 5 – Calabazas Creek – Section 3: Monroe Street to Benton Street Conceptual Trail Alignments Map

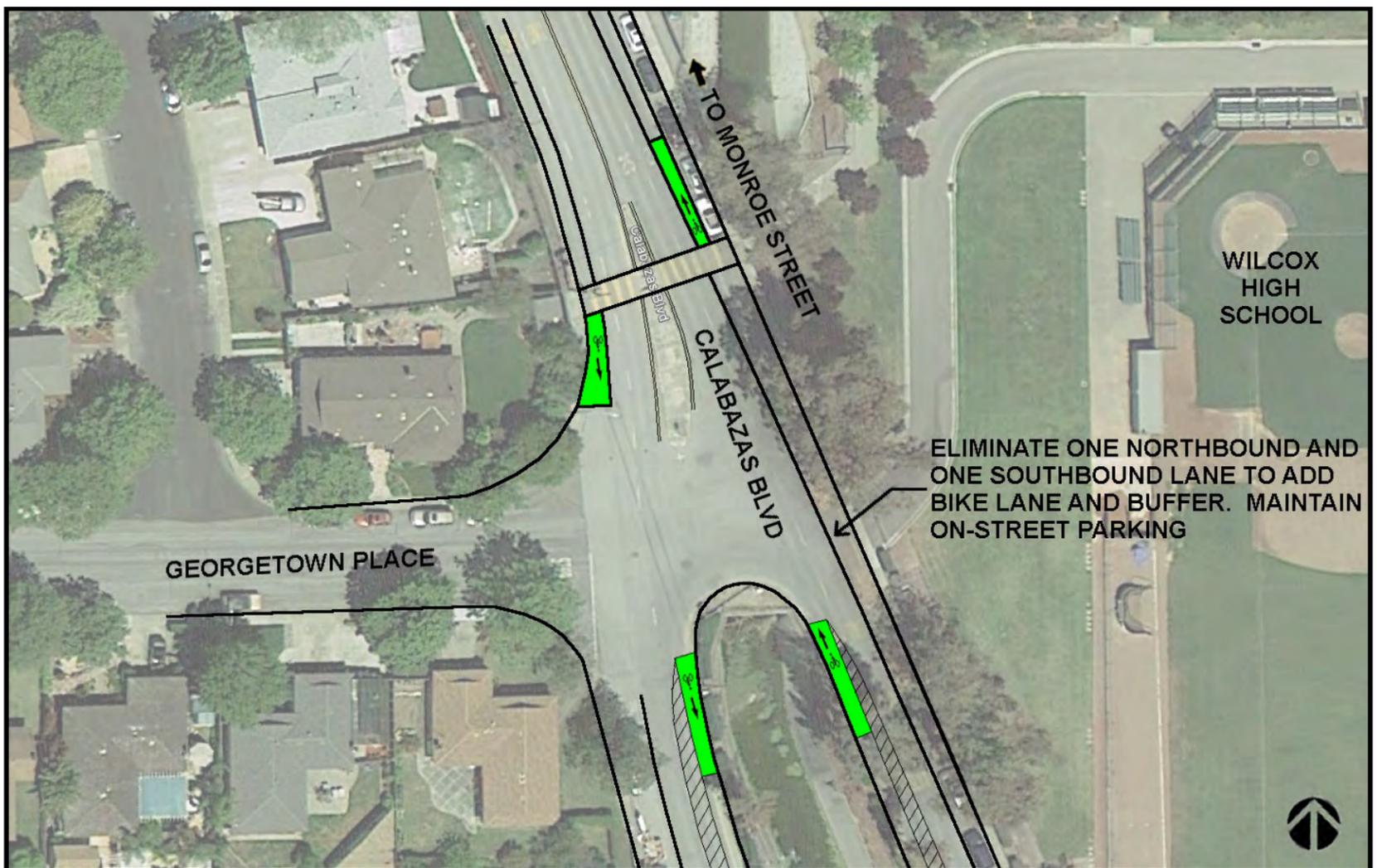


Figure 19 – Calabazas Boulevard Bicycle and Pedestrian Improvements at Georgetown Place

CHAPTER 3 – CONCEPTUAL TRAIL ALIGNMENTS – CALABAZAS CREEK

This study also raised the possibility of widening and restoring Calabazas Creek should the lane reduction project be successful. If two lanes of travel could be permanently eliminated then it may be possible to widen the creek, create a single multiuse trail and restore habitat along this channelized stream. This opportunity would enhance the residential neighborhoods and could potentially be used as mitigation for other flood control improvement projects. This is a long-range solution to improving bikeability and walkability and greening the urban core along a natural watercourse in the heart of Santa Clara.

At the Calabazas Boulevard/Pomeroy Avenue intersection the trail would cross Pomeroy Avenue at-grade to rejoin the creek corridor. Additional improvements may be desirable at the intersection to facilitate access to the creek corridor and should be further evaluated in the creek trail master plan. Once across Pomeroy Avenue the trail would extend along the west bank until crossing in the vicinity of Pomeroy Elementary School. A pedestrian bridge is proposed within this general area to provide access to Carmichael Park located on the east bank. The trail would serve many residents living in the low to medium density housing that is adjacent to the school and creek (See Map 5 – Calabazas

Creek – Section 3: Monroe Street to Benton Street Conceptual Trail Alignments Map).

At Carmichael Park the trail would connect with existing pathways that extend to Benton Street. An existing crosswalk is located at Benton Street that would allow trail users to access the bicycle and pedestrian facilities located on the roadway. Additional intersection improvements may be desirable at the Benton Street/Curtis Avenue intersection to facilitate access to the trail.

NEXT STEPS

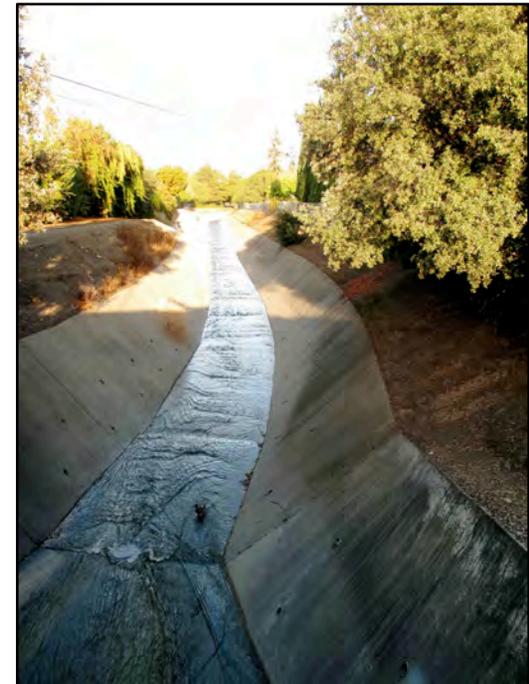
The next steps to undertake in assessing Study Section 3 include:

- 1) Integrate the assessment of the Calabazas Boulevard lane reduction project into future trail planning efforts.
- 2) Maintain outreach to SCVWD regarding continuing interest and funding for a possible project to include a trail, lane reduction with accompanying widening of the channel and restoration of the banks of Calabazas Creek as it flows through the Calabazas Boulevard area.
- 3) Initiate outreach to Pomeroy Elementary School regarding the

potential to site a pedestrian bridge in vicinity of school.

4) Further evaluate the Calabazas Boulevard/Pomeroy Avenue intersection for trail crossing improvements.

5) Further evaluate the Benton Street/Curtis Avenue intersection for trail access improvements.



The general vicinity for a new pedestrian bridge connecting to Pomeroy Elementary School.