City of Lafayette

FINAL

Feasibility & Options Study for a Pedestrian & Bicycle Pathway Along the EBMUD Aqueduct ROW

PREPARED BY:
Alta Planning + Design
IN ASSOCIATION WITH:
Fehr & Peers
Mark Thomas & Company

PREPARED FOR:
City of Lafayette

LAFAYETTE

alta
PLANNING + DESIGN

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February 2012

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1. Executive Summary

With this feasibility and options study (Study), the City of Lafayette seeks to identify the feasibility of a Class I bikeway/ADA-accessible pedestrian and bicycle facility along the East Bay Municipal Utility District (EBMUD) Aqueduct right-of-way (ROW) located north of Downtown Lafayette in Contra Costa County. A Class I bikeway/ADA-accessible pedestrian and bicycle facility would serve the greatest variety of users, and would be eligible for the largest sources of funding. For this Study, the City has partnered with EBMUD, Caltrans, the East Bay Regional Park District (EBRPD), and Bay Area Rapid Transit (BART) to determine if pedestrian and bicycle improvements are feasible and desirable along the EBMUD Aqueduct ROW. This Study is funded by a Caltrans Community Planning Grant.

1.1 Study Area

The EBMUD Aqueduct ROW runs east-west through downtown Lafayette and parallels State Route (SR) 24, BART, and Mt. Diablo Boulevard. The segment under study (Pathway Study Area) extends from Risa Road in the west to Brown Avenue in the east and is approximately 1.5 miles long. The aqueducts within the Pathway Study Area are part of EBMUD's water supply system. The EBMUD Aqueduct ROW has varying slopes throughout its length, from a mild 2%± slope to a steep 33%±. Within the Pathway Study Area, the EBMUD Aqueduct ROW crosses several streets including Risa Road, Dolores Drive, Happy Valley Road, Oak Hill Road, and First Street.

The EBMUD Aqueduct ROW parallels SR 24 and Mt. Diablo Boulevard and runs behind Downtown Lafayette

1.2 Policy Context

The City's interest in a trail along the EBMUD Aqueduct ROW was identified in both the 2006 Lafayette Bikeways Master Plan (BMP) and the 2009 Revised Draft Downtown Lafayette Specific Plan (DSP), which has not yet been adopted as of November 2011. Prior to the adoption of the BMP, City staff and consultants investigated potential bikeway improvements throughout Lafayette, including through the Downtown area. As one alternative, the City considered reallocation of the Mt. Diablo Boulevard public ROW through Downtown to create additional space for bicyclists and pedestrians. However, the trade-offs associated with reallocation of the limited public ROW were considered to be too great. To improve bicycle access through

and around Downtown, the City placed sharrows along Mt. Diablo Boulevard and created the Downtown bicycle boulevard bypass, which runs south of Mt. Diablo Boulevard. The City considered two east-west routes north of Downtown for improved bicyclist and pedestrian access: Deer Hill Road and the EBMUD Aqueduct ROW. The EBMUD Aqueduct ROW offers opportunities not provided by the Deer Hill Road or Mt. Diablo Boulevard: an exclusive pathway with minimum motor vehicle conflicts and short, direct connections to BART and Downtown shopping. However, exclusive use of EBMUD Aqueduct ROW is not feasible given topographic and structural constraints. This Study demonstrates that the combined use of EBMUD Aqueduct ROW and Caltrans SR 24 ROW is the only feasible route that achieves the goals and objectives defined for this Study.

1.3 Opportunities and Constraints

The Study undertook a detailed analysis of opportunities and constraints related to a pathway along the EBMUD Aqueduct ROW. Primary opportunities and constraints are summarized below.

1.3.1 Surrounding Land Uses

Within the Pathway Study Area, the EBMUD Aqueduct ROW parallels the south side of SR 24 and generally runs along the north side of downtown Lafayette. Properties near the EBMUD Aqueduct ROW have been developed with retail, office, civic, or residential land uses. The Downtown area is continually changing and is anticipated to accommodate additional residential, commercial, and office land uses in the future, as described in the Draft DSP. A pathway along the EBMUD Aqueduct ROW would link existing and future land uses along the Pathway Study Area. The pathway would also connect the Lafayette Reservoir, the Lafayette BART station, Downtown Lafayette, and eventually connect to the Briones-Las Trampas trail.

Construction or maintenance of segments of the pathway could potentially be conditioned to the development or redevelopment of adjacent parcels. There is precedent for this with the Woodbury Condominium project, located at 3758 Mt. Diablo Boulevard, near Risa Road, behind the Veteran's Memorial Building. An eight-foot wide asphalt multi-use path with two-foot wide crushed granite shoulders is proposed within the EBMUD Aqueduct ROW to the south of the project site.

1.3.2 EBMUD Structural Requirements and Topography

The EBMUD Aqueduct ROW has varying slopes throughout its length, from a mild 2%± slope to a steep 33%±. Any pathway constructed within the EBMUD Aqueduct ROW would be required to meet the structural requirements of EBMUD, which limits the types of structures and amount of grading permitted in the Aqueduct ROW. EBMUD structural requirements additionally limit where structures are permitted on the ROW. The ROW is further constrained by Caltrans ROW to the north. Topography of the EBMUD Aqueduct ROW, EBMUD structural requirements, and the constrained ROW make it difficult to meet the design standards required for Class I bikeways and ADA-accessible pathways solely within the EBMUD Aqueduct ROW. After evaluating four different hypothetical pathway alignments, the Study determined that with key encroachments into Caltrans ROW, a Class I bikeway/ADA-accessible pathway with a maximum 8.3 percent slope and a bicycle/pedestrian bridge at Happy Valley Road best meets goals of this Study. The final preferred pathway design is described further in Section 1.4.

1.3.3 Pathway Crossings

The Pathway Study Area crosses six roadways. At Risa Road, Private Drive, and Dolores Drive, topography is relatively flat and vehicle volumes and speeds are low, and do not pose major constraints to constructing pathway crossings. Just west of Happy Valley Road, the EBMUD Aqueduct ROW drops steeply to the roadway, requiring a pathway connection to an at-grade crossing to have an unmanageable number of switchbacks. However, the significant elevation drop, steep terrain, and potential to encroach into Caltrans ROW make this location ideal for a bridge crossing within Caltrans ROW. At Oak Hill Road and First Street, traffic volumes and speeds, and the presence of the off- and on-ramps to SR 24 pose serious constraints to constructing crossings for pathway users. The gradual slopes approaching these intersections limit the feasibility of constructing overcrossings. Thus, signalized at-grade crossings within Caltrans ROW are the most feasible alternative. This is supported by the DSP Environmental Impact Report (DSP EIR), which has identified signals at these intersections as a mitigation strategy.

1.3.4 Use of Caltrans ROW

As mentioned above, the Caltrans ROW for SR 24 runs parallel to the Pathway Study Area. There are three locations along the pathway alignment where an encroachment into Caltrans ROW may benefit the pathway alignment by reducing the change in grades and associated switchbacks. These are: just west of Dolores Drive, where encroachment would permit the pathway to avoid a knoll and reduce the number of switchbacks; at the Happy Valley Road crossing, where encroachment would permit construction of a bridge and avoid the numerous switchbacks that would be required for an at-grade crossing; and west of Oak Hill Road, where the pathway could connect to an existing sidewalk along the south side of the eastbound SR 24 off ramp, thus avoiding a hill and numerous switchbacks. Preliminary conversations with Caltrans indicate that the agency would work with the City to permit these encroachments.

1.3.5 Safety and Security Considerations

Pathway implementation along the EBMUD Aqueduct ROW would improve access to areas currently not open to the public, but that are currently used by the public. While the unimproved ROW does not appear to be a significant problem for adjacent property owners, it is possible that providing a pathway and identifying approved access points may alleviate concerns related to existing uses.

1.3.6 Privacy Concerns

While adjacent property owners feel it is important to provide access to the pathway, most of them requested fencing or landscaping to separate the pathway from their property and to provide privacy. Adjacent property-owners also stated a preference for the pathway to be located closer to SR 24 than to the adjoining residential/office/retail land uses. To the extent feasible, the proposed pathway alignment runs along the central or northern portions of the EBMUD Aqueduct ROW. If the City decides to construct a pathway along the EBMUD Aqueduct ROW, pathway access opportunities and potential impacts to adjacent property owners associated with loss of privacy would be addressed during subsequent project phases.

1.3.7 Environmental Constraints

A pathway along the EBMUD Aqueduct ROW would place sensitive populations (children, elderly persons, and those with pre-existing serious health problems affected by air quality) near SR 24, a particulate and ozone generator. The DSP EIR indicates that air quality impacts associated with development within the DSP

area would result in a significant impact, and requires a 250-foot buffer between the sensitive receptor and the edge of the nearest SR 24 travel lane as mitigation. Preliminary consultation with Bay Area Air Quality Management District staff[1] suggests that the air quality standards applied to sensitive receptors, such as residences, are likely too conservative to be applied to pathway use. Unlike stationary receptors, pathway users along the EBMUD Aqueduct ROW would likely to be exposed to air pollution associated with SR 24 for a significantly shorter amount of time and experience less exposure. Research exploring the relationship between proximity to motor vehicles and bicyclist exposure to air pollutants indicates that bicyclists traveling adjacent to motor vehicle traffic are less exposed to certain pollutants than motorists (e.g. carbon monoxide), but more exposed to other pollutants, particularly fine particles (e.g. PM 1.0, PM 2.5, PM 10).[2, 3] However, the health benefits of bicycling outweigh the negative impacts of increased PM exposure by nearly 80 to 1. [4] Furthermore, significant reductions in exposure can be made when only a short distance away from traffic emissions.[2,5]

1.4 Preferred Pathway Design

After evaluating the alternatives, the preferred pathway design identified in this Study is a paved surface pathway conforming as best as feasible to the requirements set forth in Caltrans Chapter 1000, 1003.1 Class I Bikeways, the structural requirements presented by EBMUD, and design guidance provided by City of Lafayette staff, the Technical Advisory Group (TAG), the Citizen Advisory Committee (CAC), and the general public. See **Figure 1-1**. The preferred pathway cross section assumes a 10 to 12-foot paved width, 2-foot clear shoulders, pathway lighting at roadway crossings, and site landscaping and amenities as appropriate to the land use context for each segment. **Figure 1-2** presents the preferred pathway design standard. Where EBMUD maintenance vehicles are expected to use the pathway, the paved width of the pathway must be 12 feet to accommodate maintenance vehicles and reduce pathway deterioration. Planning and design of a pathway through the EBMUD Aqueduct ROW would be carried out in accordance with EBMUD's structural requirements, administrative procedures, and maintenance activity needs.

[1] Phone conversation with Dave Burch, BAAQMD Senior Environmental Planner on October 12, 2010.
[2] Pattinson, Woodrow. Cyclist exposure to traffic pollution: microscale variance, the impact of route choice and comparison to other modal choices in two New Zealand cities. Master's Thesis in Geography. University of Canterbury. 2009.
3 Rank, Jette; Jens Folke, Per Homann Jespersen. Differences in cyclists and car drivers' exposure to air pollution from traffic in the city of Copenhagen. The Science of the Total Environment, Vol 279, Issues 1-3, November 12, 2001, pages 131-136.
4 Rojas-Rueda, David, et.al. The health risks and benefits of cycling in urban environments compared with car use: health impact assessment study. British Medical Health Journal. 2011. 343:d4521.
5 Hertel, Ole, et al. A proper choice of route significantly reduces air pollution exposure—A study on bicycle and bus trips in urban streets. The Science of the Total Environment, Vol 389, Issue 1, January 15, 2008, pages58-70.

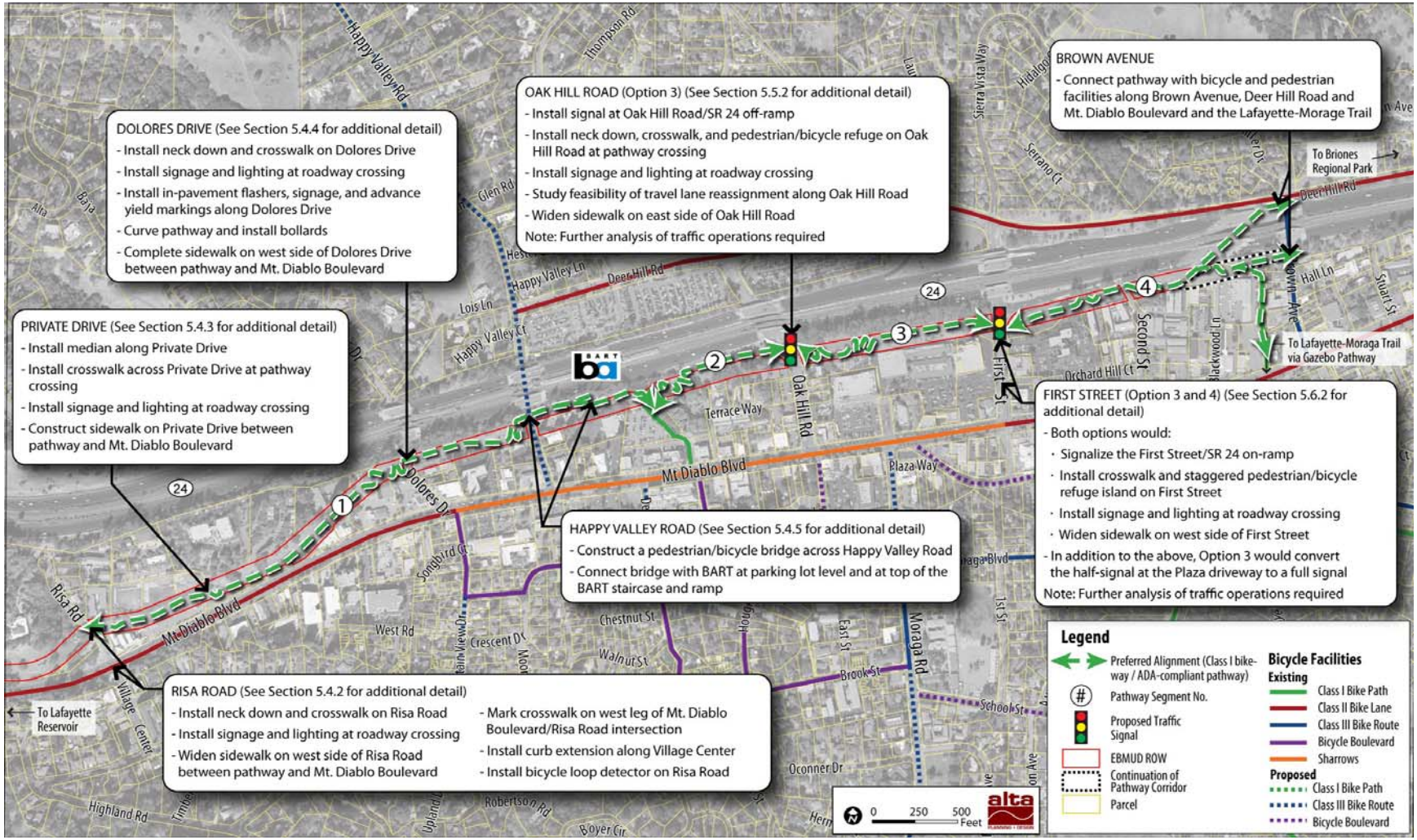

Figure 1-1: Preferred Option

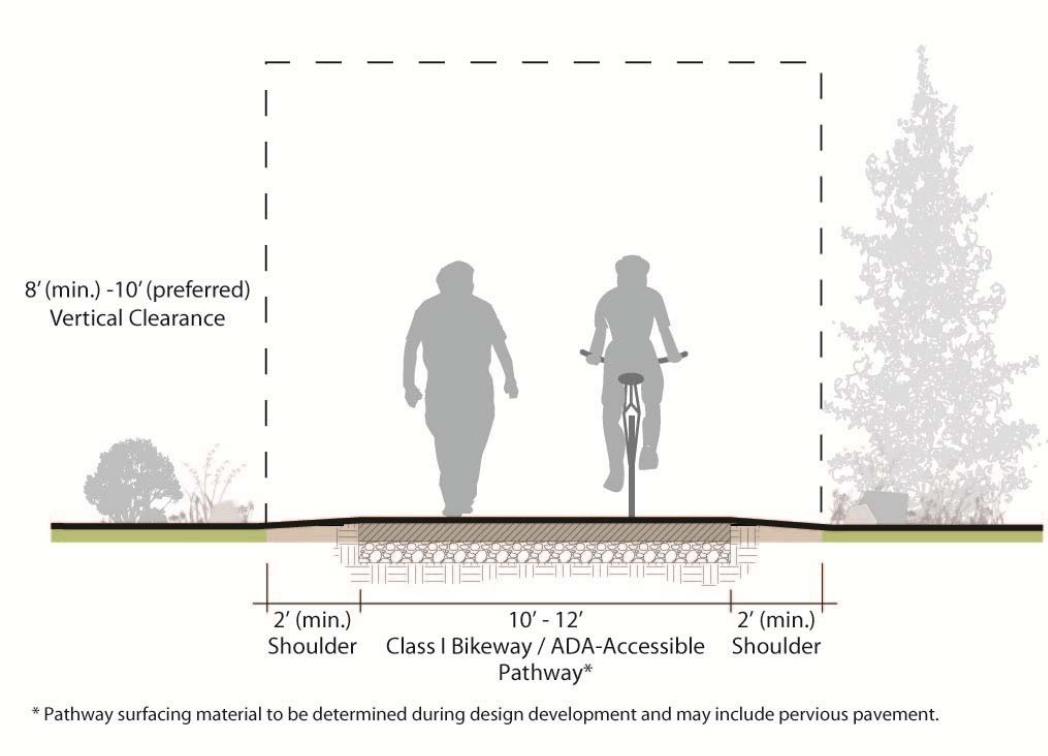

Figure 1-2: Preferred Pathway Design Standard

1.4.1 Street Crossing Design

The preferred street crossing options are based on field observations, review of the DSP EIR, and best practices in pedestrian and bicycle design and safety. The analysis presented in this Study addresses intersection geometries, roadway volumes and speeds, planned improvements, collision history, vehicle level of service, and stopping sight distances.

Three of the six roadway crossings have only one design alternative: Risa Road, Private Drive, and Dolores Drive. Pathway and crossing treatments for these three crossings include high visibility crosswalks, neck-downs, advance signage, pedestrian scale lighting, stop signs along the pathway, sidewalk improvements, and in-pavement flashers (along Dolores Drive only).

For the remaining three roadway crossings, Happy Valley Road, Oak Hill Road, and First Street, several alternative options were considered.

Happy Valley Road: Two preliminary crossing options were evaluated for Happy Valley Road: (1) an at-grade crossing entirely within EBMUD Aqueduct ROW, which would require numerous switchbacks in order to meet grade at Happy Valley Road; and (2) a bicycle and pedestrian bridge constructed in the Caltrans ROW. The preferred option for the Happy Valley Road crossing is a bicycle and pedestrian bridge. The bicycle and pedestrian bridge enables an alignment that is compliant with both EBMUD structural requirements and Caltrans standards, and is eligible for transportation funding.

Oak Hill Road: Three preliminary roadway crossing options were evaluated for Oak Hill Road: (1) routing pathway users to the Mt. Diablo Boulevard intersection, (2) signalized crossing at the Oak Hill Road /SR 24 eastbound off-ramp, and (3) signalized crossing at the Oak Hill Road/SR 24 eastbound off-ramp with median refuge and lane reduction on Oak Hill. Note that signalization of this intersection is identified in the Draft DSP EIR as a mitigation strategy. Option 3 is the preferred option for Oak Hill Road, as it provides the greatest benefit for pathway users. Based on very preliminary traffic analysis of crossing options, which considered only traffic at Oak Hill Road/SR 24 off-ramp, signal control at the Oak Hill Road/SR 24 off-ramp intersection appears to be feasible. Additional traffic study is required to fully understand the potential roadway capacity and level of service impacts of signal control and lane reduction on Oak Hill Road. A pathway extending from Risa Road to the east side of Oak Hill Road would provide a significant community benefit.

First Street: Four preliminary roadway crossing options were evaluated for First Street: (1) routing pathway users to the Mt. Diablo Boulevard intersection, (2) routing pathway users to a new full signal at the Plaza parking lot, (3) a signalized pathway crossing at the SR 24 eastbound on-ramp with full signal at the Plaza parking lot exit, and (4) signalized pathway crossing at the SR 24 eastbound on-ramp only. Note that signalization of the First Street/SR 24 on-ramp is identified in the Draft DSP EIR as a mitigation strategy. Based on preliminary traffic analysis of First Street options conducted for this Study and described more fully below, Options 3 and 4 are the two preferred alternatives for First Street. The final preferred alternative should be determined at a later date by the results of a detailed micro-simulation traffic analysis that considers all modes.

1.4.2 Signal Analysis for First Street

This Study includes a preliminary traffic analysis for intersection operations for three intersections along First Street (the SR 24 on-ramp/First Street, Plaza driveway/First Street and Mt. Diablo Boulevard/First Street intersections).[6] Preliminary traffic analysis of the preferred options indicate that given existing traffic conditions, Options 3 and 4 reduce average delay at the intersections. Given projected traffic conditions in 2030, Option 4 would have the least vehicle delay compared to Options 2 and 3, particularly during the AM peak hour at the Mt. Diablo Boulevard/First Street intersection.

Prior to making a final recommendation, the traffic operations analysis for both options should be further refined and expanded to fully identify and address potential impacts, particularly downstream traffic impacts and synchronization with other signals. The transportation analysis should address weekday conditions during the AM commute, morning and afternoon bell times, and PM commute. The detailed analysis should include the intersections of First Street, Moraga Road, Oak Hill Road, and Deer Hill Road.

[6] The analysis utilized data from the Cumulative No Project Scenario of the Lafayette Downtown Specific Plan EIR, Lafayette Circulation Commission and Whole Foods Proposal.

1.5 Phasing

Pathway construction would likely be phased. Given the overall cost and complexity of implementing this pathway project, it is critical that a the first phase of implementation serve multiple benefits for the City of Lafayette, partner agency stakeholders, and local and regional users of the multi-modal transportation network. The recommended implementation phasing and associated construction and annual maintenance costs per phase are presented in Table 1-1.

Table 1-1: Cost Estimates by Phase

Phase		Estimated Cost
1*	Segment 1: Risa Road to BART	$372,100
	Risa Road crossing	$144,400 to $148,300
	Private Drive crossing	$67,800
	Dolores Drive crossing	$249,000
	Happy Valley Road crossing	$1,238,100
	Construction Subtotal	**$2,071,400 to $2,075,300**
	Annual Maintenance**	$27,200
	Annual Contribution for Long-Term Maintenance*** (Slurry seal and AC overlay)	$2,300 to $2,500
	Annual Contribution for Reconstruction of Pathway at 30 Years*** (Optional)	$41,600 to $45,600
	Phase 1 Construction, Annual Maintenance, and Annual Contributions Total	**$2,142,500 to $2,150,600**
2	Oak Hill Road crossing (Option 3)	$721,200
	Segment 2: BART to Oak Hill Road	$1,958,300
	Construction Subtotal	**$2,679,500**
	Annual Maintenance**	$6,400
	Annual Contribution for Long-Term Maintenance*** (Slurry seal and AC overlay)	$600 to $700
	Annual Contribution for Reconstruction of Pathway at 30 Years*** (Optional)	$11,200 to $12,300
	Phase 2 Construction, Annual Maintenance, and Annual Contributions Total	**$2,697,700 to $2,698,900**
3	First Street crossing (Options 3 and 4)	$720,000 to $937,900
	Segment 3: Oak Hill Road to First Street	$274,100
	Segment 4: First Street to Brown Avenue	$246,000
	Construction Subtotal	**$1,240,100 to $1,458,000**
	Annual Maintenance**	$17,300
	Annual Contribution for Long-Term Maintenance*** (Slurry seal and AC overlay)	$1,900 to $2,000
	Annual Contribution for Reconstruction of Pathway at 30 Years*** (Optional)	$34,100 to $37,400
	Phase 3 Construction, Annual Maintenance, and Annual Contributions Total	**$1,293,400 to $1,514,700**
Pathway Subtotal Construction		**$5,991,000 to 6,212,800**
Pathway Subtotal Annual Maintenance**		**$50,900**
Pathway Subtotal Annual Contribution for Long-Term Maintenance***		**$4,800 to $5,200**
Pathway Subtotal Annual Contribution for Reconstruction of Pathway at 30 Years*** *(Optional)*		**$86,900 to $95,300**
Total Construction, Annual Maintenance, & Annual Contributions *(Including Reconstruction)****		**$6,133,600 to $6,364,200**

** Initiate further traffic analysis of recommended Oak Hill Road and First Street improvements.*

*** 2010 Dollars*

**** Low value assumes 2.5% discount rate. High value assumes 5% discount rate.*

Numbers may not sum due to rounding.

1.6 Construction and Maintenance Costs

The cost of constructing the Preferred Options is $6.0 to $6.2 million for a Class I bikeway/ADA-accessible pathway. This estimate includes the cost of two traffic signals (totaling approximately $600,000), which are recommended in the DSP Draft EIR to accommodate future traffic along Oak Hill Road and First Street. Because the traffic signals may be needed to as a result of future traffic-generating development, they may be partially or fully paid for with development fees. The Preferred Options also include a signal upgrade at the shopping center driveway on First Street (totaling $150,000).

If the City constructs a pathway, the City will be responsible for maintenance of the portions of the ROW containing the pathway and/or landscaping associated with the pathway. Costs for maintenance and operations vary significantly depending on the level of services provided. This Study uses very conservative maintenance cost estimates, which provide a high estimate of the potential cost of maintenance. Annual routine maintenance costs of the proposed 1.5-mile paved pathway are estimated at approximately $50,925 (see **Table 2-1**). It is recommended the City contribute approximately $4,800 to $5,200 annually (year 2010 dollars) to a reserve fund to pay for long-term maintenance (i.e., slurry sealing and AC overlay). Total annual and long-term maintenance costs over the lifetime of the pathway are estimated at $898,000 to $1.2 million in 2010 dollars. Actual maintenance costs will depend on final design and the final maintenance terms required by EBMUD in the renegotiated Revocable Landscaping License Agreement. The annual maintenance and long-term maintenance cost contributions cited above assume completion of all phases of the pathway. These costs include traffic signal maintenance and operations which are expenses the City would not incur until Phases 2 and 3 were implemented.

The anticipated lifespan of the pathway is 30 years, at which time the pathway will likely require replacement. Eventual pathway replacement in year 30 is estimated to cost between $1.4 million and $2.0 million in 2010 dollars, assuming the City chooses to contribute annually to a reserve fund to pay for eventual reconstruction of the pathway. Annual contributions would be between $86,900 and $95,300 in 2010 dollars. Replacement of the pathway includes the cost of replacement of all features of the pathway—retaining walls, signals, the pathway itself, etc. Given the recommended long-term maintenance (e.g. slurry sealing and AC overlay), it is likely that the pathway features will not require replacement, and may just require less expensive repairs. As such, this is a conservative estimate of the needs for replacement.

Table 1-2: Estimated Construction and Maintenance Costs by Phase

Phase		Estimated Cost
1	Construction Costs	$2,071,400 - $2,075,300
	Annual Maintenance*	$27,200
	Annual Contribution for Long-Term Maintenance** (Slurry seal and AC overlay)	$2,300 to $2,500
2	Construction Costs	$2,679,500
	Annual Maintenance*	$6,400
	Annual Contribution for Long-Term Maintenance** (Slurry seal and AC overlay)	$600 to $700
3	Construction Costs	$1,240,100 - $1,458,000
	Annual Maintenance*	$17,300
	Annual Contribution for Long-Term Maintenance** (Slurry seal and AC overlay)	$1,900 to $2,000
	Total Construction Costs	**$5,991,000 to $6,212,800**
	Total Annual Maintenance*	**$50,900**
	Total Annual Contribution for Long-Term Maintenance**	**$4,800 to $5,200**

** 2010 Dollars; includes maintenance required by the EBMUD Revocable Licensing Agreement, traffic signal maintenance and operations, lighting at pathway entrances and along bicycle/pedestrian bridge, and landscape irrigation.*

***Low value assumes 2.5% discount rate. High value assumes 5% discount rate.*

Numbers may not sum due to rounding.

1.7 Benefit-Cost Analysis

A benefit-cost analysis based on the National Academy of Sciences Transportation Research Board, *National Cooperative Highway Research Program Report 552: Guidelines for Analysis of Investments in Bicycle Facilities* (NCHRP Report 552) (2006) was prepared to estimate the number of projected existing and new bicyclists and pedestrians resulting from the pathway and the total annual benefits for pedestrian and bicyclists. The "best estimate" for the number of new bicycle commuters and daily adult cyclists attributed to the pathway is 144 cyclists, which would double estimated existing daily ridership along the corridor to 285. A conservative "best estimate" of the number of new pedestrians attributed to the pathway is 288 pedestrians. The "best estimate" annual benefits for both bicyclists and pedestrians are more than $1.7 million. This estimate represents the sum of the estimated mobility, health, recreational, and reduced auto use benefits. The benefits analysis underestimates the true value of benefits, as it does not take into account other documented benefits of pathways, such as higher property values adjacent to a pathway, increased economic activity generated by pathway users, and increased quality of life.

The benefit-cost analysis suggests that given best estimates, over the 30-year lifetime of the pathway, the benefits in health, mobility, recreation, and reduced auto use will outweigh the costs of constructing and maintaining the pathway. Given very conservative maintenance costs and benefits, as well as the intangible benefits that have not been captured by the benefit analysis, this Study recommends the City pursue construction of the EMBUD Aqueduct Pathway.

1.8 Funding Options

If the City of Lafayette decides to pursue the proposed pedestrian and bicycle pathway, the City will most likely rely on grants for construction. In addition to grant sources, there are two possible local sources for

construction funding, the Lamorinda Transportation Development Fee and conditioning pathway construction to new development.

As grant funding is generally not available for on-going costs of maintenance and safety and security operations, the City of Lafayette will need to identify local revenues to fund these activities. Existing local revenue sources are currently over-subscribed, and it is unlikely that additional maintenance and operations costs could be funded with existing revenue streams. There are several options that the City may wish to consider to raise funding for maintenance and operations of the proposed EBMUD Aqueduct Pathway:

- Modifying the Core Area Landscape and Lighting District to include maintenance of the proposed EBMUD Aqueduct Pathway.
- Establish a Business Improvement District to fund maintenance of the pathway.
- Establish a business license requirement.
- Require adjacent property owners to maintain the pathway.
- Seek private foundation funding to establish an endowment to pay for pathway maintenance
- Seek corporate sponsorship for pathway maintenance.

Before exploring any of these funding options, the City would need to conduct additional public outreach and closely coordinate with affected groups, such as the Chamber of Commerce, downtown businesses, adjacent property owners, EBMUD, and East Bay Regional Parks District.

1.9 Next Steps

This feasibility and options study for the EBMUD Aqueduct Pathway is the first in a series of steps that are required prior to design and construction of the proposed pathway. This Study identified several issues that will require additional analysis and work to address, including additional traffic analysis; environmental review; Caltrans coordination and permits; revision of the EBMUD Revocable Landscaping License Agreement; technical studies, design development, and preliminary engineering; securing maintenance funding; securing construction funding; and additional public outreach.

On November 14, 2011, the Lafayette City Council received a presentation of the Draft Final Feasibility and Options Study for a Pedestrian and Bicycle Pathway along the EBMUD Aqueduct ROW. The Council also reviewed comments provided by various interested parties and stakeholders. At that time the Council provided comments and directed staff to prepare responses then return to the Council for consideration to accept the study. The Lafayette City Council accepted the Final Study at its meeting on February 13, 2012 and at that time directed that the Bikeways Master Plan retain the project to implement the pathway along the EBMUD Aqueduct. The Council also agreed to the following next step actions:

Near-Term Next Steps:

- Continue to determine the feasibility of installing the traffic signals as discussed in the Final Study. This involves monitoring the outcome of the City's Downtown Specific Plan process and its consideration of the two traffic signals at Oak Hill Road and SR 24 off-ramp and at First Street and the SR 24 on-ramp as mitigation measures.

- Pursue opportunities for implementation of the pathway via the development review process. As there are several active development applications in the vicinity of the pathway, staff may need to begin re-negotiating the existing use license with EBMUD regarding maintenance responsibilities associated with the pathway in the EBMUD's ROW. The City would re-negotiate the license along this section of the EBMUD ROW only as a first step, and wait on the future phases until such time when they become more imminent.

Near- to Mid-Term Next Steps:

- Depending on the outcome of decision to include the two traffic signals in the Downtown Specific Plan, seek grants for additional traffic analysis as appropriate.
- Depending on the outcome of the additional traffic analysis or as appropriate, pursue funding and implementation of design, engineering, and environmental work for the pathway.
- Pursue funding opportunities for construction of the pathway.

Long-Term Next Steps:

- Evaluate and consider whether to complete the entire pathway alignment over the long-term upon completion of Phase 1 or any usable segment when actual use and cost experience would then be available.

2. Introduction

With this Study, the City of Lafayette seeks to identify options for and the feasibility of a Class I bikeway/ADA-compliant pedestrian and bicycle facility along the EBMUD Aqueduct ROW located north of Downtown Lafayette in Contra Costa County. The EBMUD Aqueduct runs east-west through Downtown Lafayette and parallels State Route (SR) 24, Bay Area Rapid Transit (BART) and Mt. Diablo Boulevard before it turns northeast to cross Pleasant Hill Road and continues to the Walnut Creek border. As shown in **Figure 2-1**, the Pathway Study Area extends from Risa Road in the west to Brown Avenue in the east.

The City's interest in a trail along the EBMUD Aqueduct was identified in both the 2006 Lafayette Bikeways Master Plan (BMP) and the 2009 Revised Draft Downtown Lafayette Specific Plan (DSP), which has not yet been adopted as of November 2011. The BMP identifies a potential pathway along the EBMUD Aqueduct ROW as Projects 10A through 10D of the Lafayette Proposed Bikeway Network. Project 10A consists of a feasibility study that would identify the opportunities and constraints of constructing a Class I bike path along the EBMUD Aqueduct between the Walter Costa Trail and Brown Avenue. This was identified as a high priority project. The BMP states that the study may identify particular sections which may be most beneficial and practical to implement. It further states that the study should identify opportunities and constraints to providing connections to the facility from adjoining developments and nearby streets as well as needed improvements to trail crossings at streets. As shown in the BMP City of Lafayette Proposed Bikeways map, the proposed pathway along the EBMUD ROW would connect with a proposed Class I bike path through the Contra Costa Jewish Day School and connecting with the Walter Costa Trail, a proposed Class III bike route along Happy Valley Road, the existing Class I bike path along Happy Valley Creek, the existing Class I bike path that parallels Brown Avenue to the west, and an existing Class III bike route along Brown Avenue. The DSP identifies a Class I bike pathway parallel to and south of SR 24 freeway between El Nido Ranch Road and Brown Avenue.

The City has considered a 10-foot wide, paved, non-motorized trail that would extend 1.5 miles along the Aqueduct from the Lafayette Reservoir to Brown Avenue, but recognized that a feasibility study was needed to determine how the pathway would cross a major driveway and various streets, how it might address areas with steep terrain, and to estimate construction and maintenance costs. A pathway on EBMUD ROW would need to be approved by EBMUD and would be subject to requirements specified in a lease agreement.

For this Study, the City has partnered with EBMUD, Caltrans, the East Bay Regional Park District (EBRPD), and BART to determine if pedestrian and bicycle improvements are feasible and desirable along the EBMUD Aqueduct ROW. This Study is funded by a Caltrans Community Planning Grant.

2.1 Goals

The following goals guided the development of draft alignment options and design strategies for this Study.

GOAL 1: CONTINUOUS PEDESTRIAN AND BICYCLE PATHWAY

Determine the feasibility of a continuous pedestrian and bicycle pathway from Risa Road to Brown Avenue along the EBMUD Aqueduct ROW, identifying required segments and where additional public or private property may be required.

GOAL 2: TRANSPORTATION PATHWAY SEGMENTS

Analyze feasibility and develop conceptual design for segments to conform to Caltrans Chapter 1000 Class I Bikeway, American's with Disability Act Requirements and EBMUD construction requirements.

GOAL 3: RECREATIONAL PATHWAY SEGMENTS

Analyze feasibility and develop conceptual design for segments to conform to Caltrans Chapter 1000 multipurpose trail guidelines, Americans with Disabilities Act Access Guidelines (ADAAG) for recreational areas and EBMUD construction requirements.

GOAL 4: IMPLEMENTATION FUNDING

Develop a funding, financing and implementation strategy identifying eligible grant sources and/or potential development requirements supporting construction.

GOAL 5: MAINTENANCE FUNDING AND RESPONSIBILITY

Identify management, maintenance and law enforcement funding strategy for segments, including sponsoring agency and associated revenue sources.

GOAL 6: COMMUNITY CHARACTER

Enhance the visual and landscape character of the EBMUD Aqueduct and the adjoining City ROW.

GOAL 7: SAFETY AND SECURITY

Design the pathway segments to respond to safety and security needs as well as neighborhood privacy concerns.

GOAL 8: PATHWAY CONNECTIONS

Provide pathway connections to adjacent streets and land uses including transit, shopping, office and residential areas.

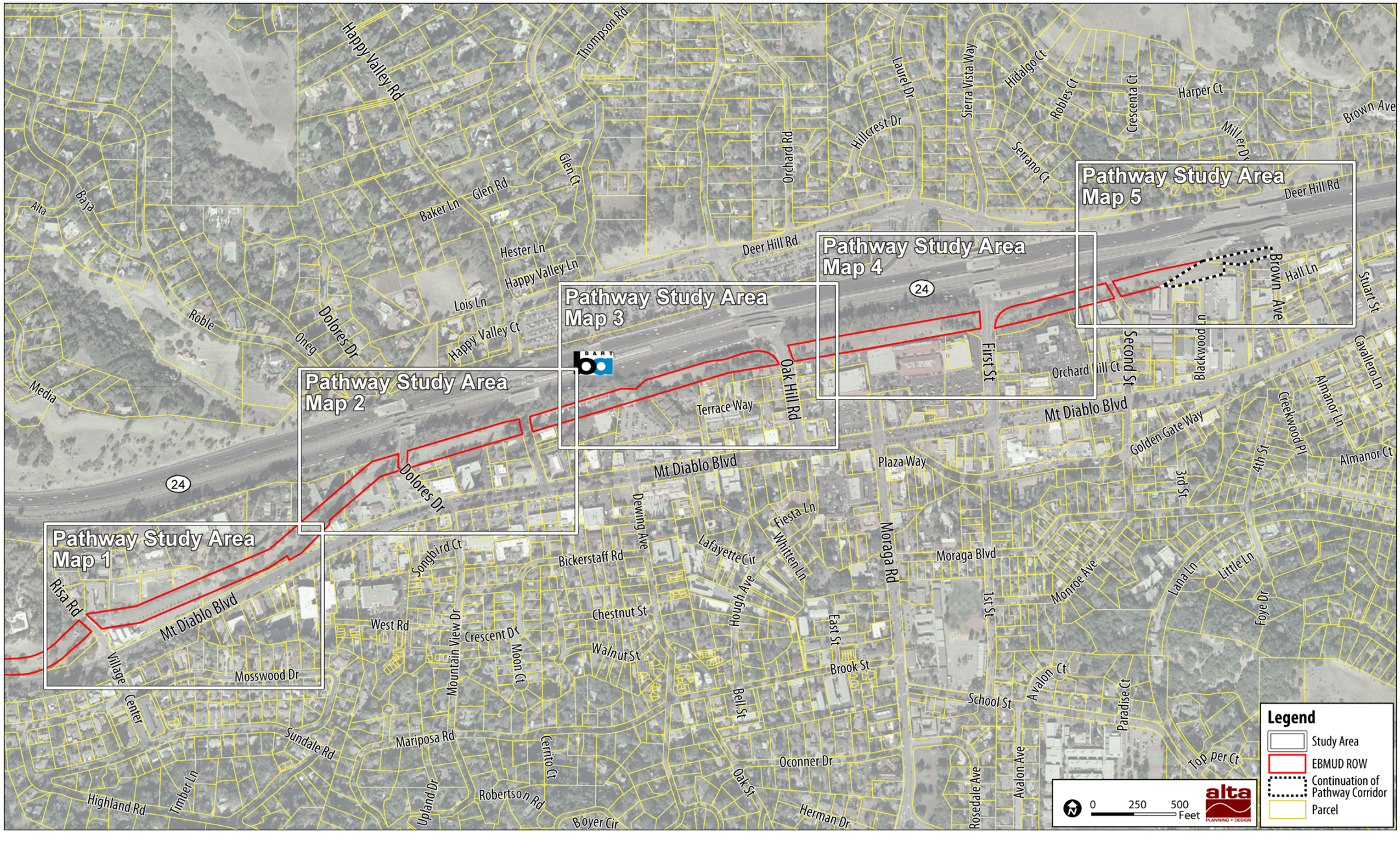

Figure 2-1: Pathway Study Area

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2.2 Agency Coordination

The project team worked closely with the numerous agencies that have an interest in the pathway under study. The primary vehicle for collaboration has been the Technical Advisory Group (TAG), which includes representatives from East Bay Municipal Utility District, Caltrans, BART, East Bay Regional Parks District, and City of Lafayette's Engineering, Public Works, Planning, and Parks, Recreation and Trails Departments. The TAG met throughout the preparation of the Study[7] and reviewed all working papers. The project team met separately with EBMUD staff on August 18, 2010 to discuss EBMUD parameters and requirements for construction of a pathway along the EBMUD Aqueduct ROW. The project team met with Caltrans staff on January 5, 2011 to identify items to be studied prior to Caltrans' review of an encroachment permit for the pathway and applicable Caltrans standards associated with reconfiguration of the Oak Hill Road off-ramp.

2.3 Public Outreach

The community has been involved in developing the Study from the start of the project. Public outreach efforts include:

- **Citizen's Advisory Committee Meetings.** The Citizen's Advisory Committee (CAC) is composed of community members who represent a cross-section of the stakeholders who may be affected by the pathway under study. The CAC has met throughout the project[8] and reviewed all working papers. Comments from the CAC have been incorporated into the Study.
- **Project Website and E-mail List.** The City hosted a website for the project (www.lafayettepathway.com), which described the Study and Study Area, identified public input opportunities and listed key contacts. Drafts of the Study chapters were posted to the website as they were completed. Persons visiting the website could send comments directly through the website and sign up for email updates. The City posted the Public Review Draft Feasibility & Options Study for a Pedestrian and Bicycle Pathway along the EBMUD Aqueduct ROW on the project website for review and comment. Comments on the draft study were accepted between August 1, 2011 and September 30, 2011. **Appendix E** presents comments received during the public review period and response to comments received.
- **Public Site Tour #1.** Lafayette community members were invited to participate in a site walk-through held on October 2, 2010. Approximately 15 people attended, including several members of the TAC and the CAC and the Mayor of Lafayette. Tour participants and the project team discussed potential planning and design issues for a pathway along the EBMUD Aqueduct ROW and at each of the pathway/roadway crossings, which needed to be addressed in the Study.
- **Focus Group Meeting.** Adjacent property and business owners were invited to participate in a focus group to discuss their concerns and hopes for the pathway. Fourteen people attended the November 10, 2010 group, representing small business owners, developers, landowners, and residential and commercial property managers. The focus group helped form a picture of the current use of the EBMUD Aqueduct ROW, the value of constructing a pathway along the ROW and identified adjacent property owner's concerns that the Study needed to address.

[7] TAG meetings were held on August 19, 2010, October 27, 2010, and February 8, 2011.
[8] CAC meetings were held on September 23, 2010, November 17, 2010, March 2, 2011, and July 19, 2011.

- **Public Meeting #1.** The project team presented existing conditions, opportunities, and constraints of the pathway under study at the first public meeting held on December 1, 2010. Participants were asked to vote on how they would use each segment of pathway. Twenty-eight people attended.
- **Public Site Tour #2.** The project team led a second walk-through of the EBMUD Aqueduct ROW on May 7, 2010. During the site tour, the project team described the draft proposed design for the pathway and intersection treatments, responded to questions, and collected public input. Seventeen people attended.
- **Public Meeting #2.** At the second public meeting, held on May 12, 2011, the project team presented the draft proposed designs for the pathway under study; findings and concerns of the TAG, CAC, focus group, and public to date; estimated construction and maintenance costs; and potential funding sources. Participants were asked to provide responses to specific questions regarding the pathway design and alignment and/or voice other project-related questions or comments.
- **Presentations to the City's Commissions and Committees.** Following release of the Public Review Draft Study, the City invited members of the City's Commissions and Committees to two meetings at which the Draft Study was presented. The meetings were held on August 15th and 22nd. Participants heard a presentation on and reviewed boards showing the Study process, recommended pathway and roadway intersection improvements, estimated costs, potential funding sources, and next steps. The City and consultants answered questions related to the Draft Study.
- **Planning Commission.** As a follow-up to the August presentations to the City's Commissions and Committees, the City addressed questions and received comments on the Public Review Draft Plan at the Planning Commission's September 19th meeting.
- **Lafayette Homeowner's Council.** As a follow-up to the August presentations to the City's Commissions and Committees, the City addressed questions and received comments on the Public Review Draft Plan at the Planning Commission's September 22nd meeting.
- **Circulation Commission Meeting.** After the public review period closed on September 30th, the City presented the public comments and draft response to comments to the Circulation Commission at its October 17th meeting.
- **City Council Meetings.** Formal comments received from the public review were incorporated where appropriate into a final draft feasibility study, which City staff presented to the Council on November 14, 2011. At the February 13, 2012 meeting, the Council accepted the Final Feasibility and Options Study for a pedestrian and bicycle pathway Along the EBMUD Aqueduct Right-of-Way as modified; directed that the project remain in the Bikeways Master Plan; and directed staff to pursue next steps as identified in the staff report. **Appendix E** presents the staff report and meeting minutes from the November 14, 2011 City Council meeting and the staff report from the February 13, 2012 City Council meeting.

If the City decides to construct a pathway along the EBMUD Aqueduct ROW, additional meetings with impacted private property owners and managers would be conducted during subsequent phases of planning and design development. Public outreach conducted for this Study identified a number of stakeholders who should be involved in future pathway development efforts.

2.4 Study Organization

The Study is comprised of seven chapters as outlined below. It begins with a description of the history and goals of the Study; existing policies and regulations within the Study Area; applicable pathway design standards; and existing conditions, opportunities, and constraints for a pathway along the EBMUD Aqueduct ROW. It continues with an analysis of pathway alignment and roadway crossing design options, identification of the draft preferred options, a cost-benefit analysis, and a funding and maintenance strategy for the pathway. The Study concludes with a phasing plan and identification of required next steps.

- **Chapter 1: Executive Summary.**
- **Chapter 2: Introduction.** This chapter discusses the history of the Study and presents the Study goals. It outlines agency coordination for and public involvement in the Study.
- **Chapter 3: Policy Context and Design Guidelines.** This chapter summarizes the existing policies and regulations within the Study Area. The design guidelines describe and illustrate the three pathways design standards considered for a pathway along the EBMUD Aqueduct ROW.
- **Chapter 4: Existing Conditions, Opportunities, and Constraints.** This chapter includes discussion of existing surrounding land uses, site topography, available ROW, the pathway relationship to adjacent land uses, safety and security considerations, roadway crossings, and environmental issues. This chapter identifies and discusses opportunities and constraints related to implementation of a pedestrian and bicycle pathway along the EBMUD Aqueduct ROW.
- **Chapter 5: Options Evaluation and Preferred Options.** This chapter presents the conceptual engineering design, traffic operations analysis, and recommended crossing improvements. Pathways meeting two design standards are evaluated: a Class I bikeway standard and an ADA-accessible pathway standard. Each individual roadway crossing is discussed independently and those crossings that warrant more than one alternative design strategy include discussion of each option. This chapter identifies the draft preferred options for a pathway along the EBMUD Aqueduct ROW and with encroachments into Caltrans ROW.
- **Chapter 6: Funding and Maintenance Strategy.** This chapter identifies cost estimates and potential funding sources for construction, maintenance, and operation of the draft preferred options. A benefit-cost analysis that considers the return on the City's investment over the 30-year life of the pathway follows the cost estimates. The chapter concludes with a description of possible funding sources for construction and maintenance of the pathway.
- **Chapter 7: Phasing Plan and Next Steps.** This chapter presents preliminary phasing of the draft preferred options and required next steps. The project segments established in *Chapter 5: Options Evaluation and Preferred Options* are presented here in terms of their recommended implementation phasing. The Next Steps section describes several issues that will require additional analysis and work to address.

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3. Policy Context and Design Standards

This chapter summarizes the existing policies and regulations that cover the Pathway Study Area.

Planning and policy documents relevant to a pathway along the EBMUD Aqueduct ROW include plans and policies from the City of Lafayette, Contra Costa County, as well as from regional entities like the Association of Bay Area Governments (ABAG), BART and the East Bay utility and park districts that have lands adjacent to the EBMUD Aqueduct ROW. These are summarized briefly below. **Appendix A** provides a more detailed review of each plan.

3.1 Policy Summary

The City's General Plan, the Lafayette Downtown Specific Plan, the Downtown Specific Plan Draft and Final Environmental Impact Reports, and the Bikeways Master Plan all directly address the Pathway Study Area, and either directly or indirectly support the development of a pathway along the EBMUD Aqueduct and Caltrans ROWs.

General Plan (2002)

The City of Lafayette's General Plan provides a set of directives and guidelines regarding future development in Lafayette. One of the themes of the General Plan is to maintain a network of bicycle and pedestrian paths between schools, commercial centers, parks and cultural centers in and around the City.

The General Plan supports creation of a network of safe bicycle and pedestrian facilities, and includes specific policies and programs that would directly affect a Pedestrian and Bicycle Pathway along the EBMUD Aqueduct ROW:

The Circulation Element states that in general, traffic signals will be designed to "favor pedestrians and bicyclists." The exception is the highly-congested Lafayette "Y" formed by Moraga Road, Mt. Diablo Boulevard, Oak Hill Road and First Street. Traffic signals that control traffic through the Lafayette "Y" and along Mt. Diablo Boulevard will be designed to "balance the needs of vehicular traffic and pedestrians" (p.II-1, Circulation Chapter, Lafayette General Plan).

Goals 2, 3, and 6 of the Circulation Element specifically address walking and bicycling in the area surrounding the EBMUD Aqueduct ROW:

- **Goal 2**: Ensure a continuous and accessible pedestrian network.
- **Goal 3**: Develop a network and facilities to serve bicycle trips to, from, and within the downtown.
- **Goal 6:** Manage downtown circulation to maximize personal mobility, recognizing that maximizing opportunities for walking, biking, taking transit, and parking in the right location when driving will mitigate traffic congestion and preserve the downtown's small town character.

Other relevant programs from the General Plan are:

- **Natural Resources:** Program NR-1.2.2. Develop off-street pedestrian walkways in the creek corridors to provide pedestrian linkages with Mt. Diablo Boulevard and other downtown streets.

- **Downtown Districts**: Program DD-1.6.3. Improve the appearance and pedestrian orientation of Oak Hill Road and First Street as direct entrances into the downtown from SR 24.
- **Downtown Districts**: Program DD-1.6.4. Improve pedestrian access to the BART station through better signing and improvements to Happy Valley Road walkways.

Downtown Lafayette Specific Plan (DSP) (Revised Draft 2009)

The following description is based on the current draft version of the DSP. The DSP may change based on work undertaken by the Planning Commission and ultimately the City Council prior to adoption.

The DSP was prepared by the City in September of 2009 to guide all future development in the downtown area of Lafayette and has not been adopted as of November 2011. If the DSP is adopted, the General Plan will be amended concurrently to ensure consistency with the DSP. Approximately one-third of the pathway alignment under study is located within the downtown area planning area. The other two-thirds abut the DSP area on the south. The plan encourages sustainability and envisions a more compact development pattern that shortens travel distances and allows more people to travel by foot, by bike, or by public transit.

Downtown Specific Plan Draft and Final Environmental Impact Reports (2010)

Draft and Final Environmental Impact Reports (Draft and Final EIRs) were prepared to evaluate potential environmental impacts of the DSP. The Draft and Final EIRs identify significant impacts related to air quality, population and housing, and traffic and transportation. The Draft EIR states that new development allowed under the DSP has the potential to cause more vehicle trips in the downtown and surrounding areas, which could result in higher levels of traffic congestion at intersections and roadways bordering the Pathway Study Area.

Goals and programs in the DSP relating to a pathway along the EBMUD ROW could partly mitigate the extent of these impacts if they are implemented (and vehicle trips are reduced). Additional examples of programs in the DSP that could help mitigate certain impacts include:

- **Program C-1.2.1.** Work with school administrators and parents to develop options for school commuting, including carpooling, walk and bike-pooling, employee parking, and satellite drop-off and pick-up locations.
- **Program C-2.3.2.** Develop off-street pedestrian walkways to provide pedestrian linkages with Mt. Diablo Boulevard and other downtown streets, including walkways along the creek corridors.
- **Program C-3.1.3.** Develop connections between properties and streets and to shorten pedestrian and bicycle travel by considering internal pathways through new development sites and connections to adjacent developments.

Bikeways Master Plan (2006)

The Lafayette Bikeways Master Plan (adopted in 2006) was prepared by the City to facilitate safe and efficient bicycle travel within Lafayette and between Lafayette and other regional bicycling destinations. The plan is a guide for planning future bike lanes, routes, paths, parking and other bicycle facilities throughout the City. The plan includes a master list of priority projects, including the EBMUD Aqueduct/Caltrans ROW pathway. This pathway is categorized as an extremely important component of the comprehensive bicycle network, but it is listed as a longer-term, lower-priority project within the context of the overall Bikeways Master Plan. The

Bikeways Master Plan identifies preparation of a feasibility study for a pathway along the EBMUD Aqueduct ROW as a high priority.

Other Plans

Several other City plans, listed below, address planning and development within the Pathway Study Area. These are described in **Appendix A**.

- BART Block Specific Plan (1986)
- Redevelopment Plan (1994)
- Master Walkways Plan (updated 2008)
- Trails Master Plan (2006)
- Park Master Plan Background Report (2009)
- Downtown Street Improvement Master Plan (1988)
- Traffic Calming Guidebook (2003)
- Zoning Ordinance and Municipal Code: Title 8 Public Welfare, Morals and Society, in Chapter 8-2 Bicycles.

3.1.1 County of Contra Costa Plans and Policies

Contra Costa Countywide Bicycle and Pedestrian Master Plan (updated 2009)

The Contra Costa Transportation Authority (CCTA) Countywide Bicycle and Pedestrian Master Plan was adopted in 2003 and updated in 2009. The Countywide plan encourages improved links to transit, development of safety and education programs, completion of regional connections, and collaboration between local agencies and citizens to build a countywide network of bicycle and pedestrian facilities.

The CCTA Comprehensive Transportation Project List contains 32 bicycle and pedestrian projects within Lafayette. This list is part of Appendix E of the Countywide Plan's 2009 update, and includes a pathway project along the EMBUD Aqueduct ROW. The CCTA Countywide Bicycle and Pedestrian Master Plan also identifies the Central County–Alameda County connection, on-road bicycle access from Central County and Lamorinda to Alameda County, as part of the Countywide Bikeway Network (p.56). A pathway along the EBMUD Aqueduct ROW could facilitate bicycle and pedestrian travel along this corridor.

3.1.2 Regional Plans and Policies

EBMUD Trails

EBMUD owns and manages the 915-acre Lafayette Reservoir Recreation Area, including the multi-use trail that surrounds the Reservoir. The entire recreation area is within Lafayette's city limits. Bicyclists and pedestrians using the Lafayette Reservoir Recreation Area trails could connect with a pathway along the EBMUD Aqueduct ROW using bike lanes or the wide sidewalk along Mt. Diablo Boulevard. EBMUD permits bicycles on the Lakeside Trail and other roads within the park on limited days at limited times. Bicycles are not permitted on any other EBMUD trails.

BART Station Profile Study (2008)

As stated in the 2008 BART Station Profile Study, parking at the Lafayette BART Station consists of 1,526 spaces, including 380 monthly permit spaces and the 1,146 daily fee spaces. In addition, 122 bicycle spaces are provided at the station. Approximately 3,270 BART riders enter the station on an average weekday, 2,658 of which come from home. According to the study, 84 percent of Lafayette station BART riders drove from their home to the station, 12 percent walked, two percent bicycled and one percent each took transit or rode a motorcycle/moped.

Other Regional Plans

Other relevant regional plans are listed below and described in **Appendix A**.

- BART Bicycle Access and Parking Plan (August 2002)
- East Bay Regional Park District (EBRPD) Master Plan (1997)
- ABAG Priority Development Area (PDA) (January 2010)

3.2 Design Standards

Any pathway along the EBMUD Aqueduct ROW should conform to California pathway design standards. Pathway design in California is governed by many design documents, the most important of which include the Caltrans Highway Design Manual (HDM), the California Manual of Uniform Traffic Control Devices (MUTCD), the California State Parks Accessibility Guidelines, and the Access Board Draft Final Accessibility Guidelines for Outdoor Developed Areas. Together these design manuals describe three types of pathways, each of which must meet different design criteria: Class I bikeways (transportation pathways), multi-use pathways, and ADA-accessible pathways. The design requirements for each of these are summarized below.

- **Class I Bikeways (also referred to as transportation pathways).** At a minimum, Class I bikeways require a minimum eight-foot-wide paved surface and a minimum of two-foot-wide clear, graded shoulders on both sides. For moderate to high-use segments, a wider paved surface of 10 feet to 12 feet (minimum) should be considered. All standards set forth in Caltrans Highway Design Manual Chapter 1000 (1003.1) shall be met in order for a Class I bikeway to serve as a transportation facility.
- **Multi-Use Pathways.** These paths vary from four to eight feet in width and are constructed with native surface materials. The prevailing grade is five percent, with limited steeper segments. Clearances and turning radius are designed to accommodate all uses. These pathways often serve as recreational and not transportation facilities.
- **ADA-Accessible Pathways.** The surface of ADA-accessible pathways must be firm and stable, have a minimum clear tread width of 36 inches and include passing spaces at least 60 inches wide. The maximum allowed obstacle height is one-half to two inches depending on surface type. Additional provisions address openings, slopes, resting intervals, protruding objects, gates and barriers.

Design standards for ADA-accessible pathways—namely those that specify minimum tread width, frequency and width of passing spaces, surface type, maximum allowed obstacle height, and maximum grades—enable this pathway type to serve the greatest range of users. Class I bikeways are inherently also ADA-accessible pathways, as the design requirements for Class I bikeways meet or exceed design requirements of ADA-accessible pathways. Multi-use pathways can be designed to meet ADA-accessible pathway design standards, but are not always ADA-accessible.

Site conditions, such as steep topography, can limit the types of pathway facilities appropriate at a given site. For example, Class I bikeways have a maximum grade of five percent (except for short segments). In order to negotiate grades greater than five percent, a pathway meeting Class I bikeway design standards must incorporate one or multiple switchbacks, depending on the grade and length of the slope. Class I bikeways along long, steep slopes that must incorporate multiple switchbacks create undesirable, circuitous routes. Pathways that meet multi-use pathway design standards, which allow for steeper running grades and design features such as stairs, are more appropriate for lengthy, steep slopes.

In general, more grant funding is available for construction of pedestrian and bicycle facilities that serve as transportation facilities than those that serve primarily recreational purposes. Transportation pathways typically serve a wide range of users and connect residential land uses with transit, commercial, institutional, office, and recreational uses. Due to these characteristics, transportation pathways are more likely than recreational pathways to offset vehicular trips, potentially easing roadway congestion and reducing greenhouse gas emissions and urban runoff. Pathways meeting Class I bikeway/ADA-accessible pathway design standards provide greater transportation benefits than multi-use pathways and are eligible for a larger pot of grant funding for construction.

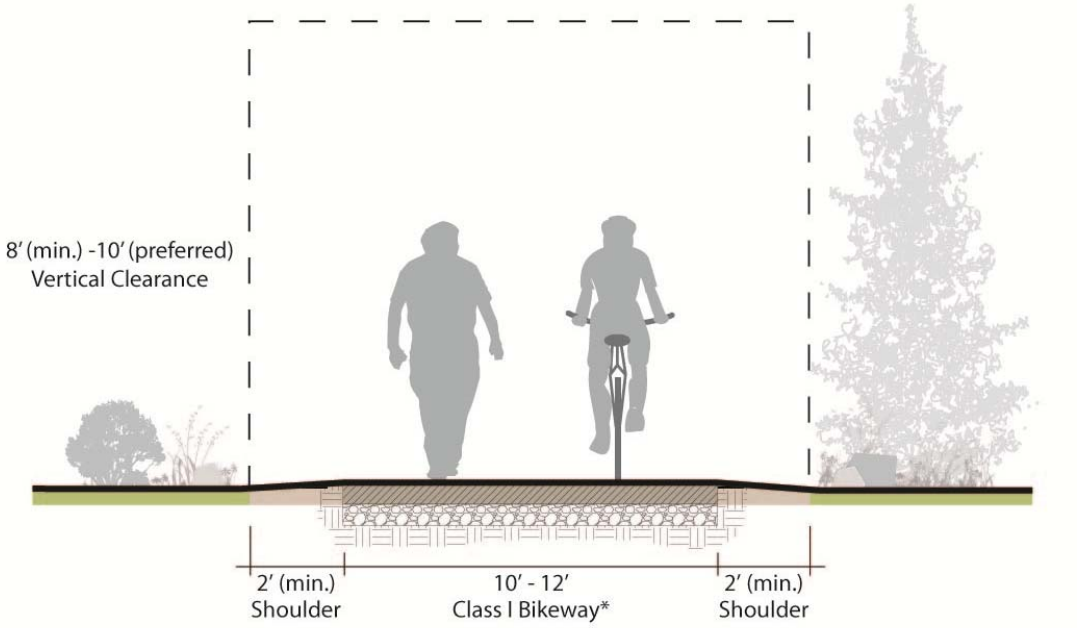
The tables on the next pages illustrate the three types of pathways and describe in detail the design standards for each type.

Table 3-1: Class I Bikeway Design Standards

Description

Class I bikeways are facilities with exclusive right-of-way for bicycles and pedestrians, with cross flows by motorists minimized. Experience has shown that if significant pedestrian use is anticipated, a completely separate facility for pedestrians is necessary to minimize conflicts. The anticipated range of users and forecast level of use by different user groups should dictate the design of each specific facility. At a minimum, Class I bikeways require a minimum eight-foot-wide paved surface and a minimum of two-foot-wide clear, graded shoulders on both sides. For moderate to high-use segments, a wider paved surface of 10 feet to 12 feet (minimum) should be considered. In areas where a variety of users are expected, expanded unpaved shoulders should be included where possible. Class I bikeways immediately parallel and adjacent to highways must be separated from automobile traffic by a five-foot horizontal separation or a two-foot separation with barrier, per the Caltrans Highway Design Manual. Under certain circumstances, Caltrans may approve exceptions to the Class I bikeway design standards.

Graphic



* Pathway surfacing material to be determined during design development and may include pervious pavement.

This graphic is presented to illustrate classification standards and not meant as design guidelines.

Standards

- 10′-12′ paved width (8′ min.)
- 12′ width where path doubles as an access route for maintenance or emergency vehicles
- 2′ minimum required clear graded shoulder width on each side, 3′ preferred
- 8′ minimum vertical clearance, 10′ preferred
- 2% cross slope to facilitate drainage
- A grade of 2% or less accommodates the widest range of cyclists and is recommended. A 5% (maximum) grade allowed. Steeper grades can be tolerated for short segments (up to about 500 feet), although design speeds should be increased and path width should allow for additional maneuverability.
- The Manual of Uniform Traffic Control Devices (MUTCD) provides guidance on appropriate signage and controls at trail roadway intersections.

Table 3-2: Multi-Use Pathway Design Standards

Description

Unless designated otherwise, all recreation trails are considered multi-use pathways. Multi-use pathways are designed and managed for all types of users. Anticipated levels of use, local public opinion, resource sensitivity and site evaluations should be used to determine whether or not a multi-purpose trail is an appropriate solution. These paths, while constructed with native surface materials, provide wide treads and clearances potentially accommodating significant volumes of hikers and bicyclists.

The Caltrans Highway Design Manual Chapter 1000, (Section 1003.5) acknowledges that:

> *"Many of these trails will not be paved and will not meet the standards for Class I bikeways. As such, these facilities should not be signed as bikeways. Rather, they should be designated as* [multi-use pathways] *(or similar designation), along with regulatory signing to restrict motor vehicles, as appropriate."*
>
> *"If* [multi-use pathways] *are primarily to serve bicycle travel, they should be developed in accordance with standards for Class I bikeways. In general,* [multi-use pathways] *are not recommended as high speed transportation facilities for bicyclists because of conflicts between bicyclists and pedestrians. Wherever possible, separate bicycle and pedestrian paths should be provided. If this is not feasible, additional width, signing and pavement markings should be used to minimize conflicts."*

Graphic

This graphic is presented to illustrate classification standards and not meant as design guidelines.

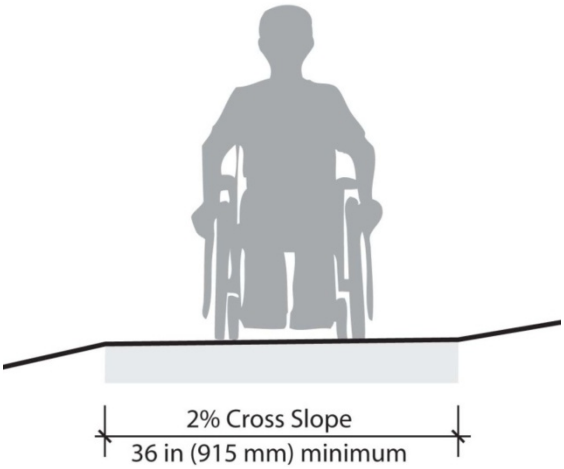
Standards

- Path width varies from four to eight feet
- Allowance for passing
- Native materials
- Obstacles occasionally present
- Blockages cleared to define route and protect resources
- Prevailing grade five percent, with limited steeper segments
- Clearances and turning radius to accommodate all uses

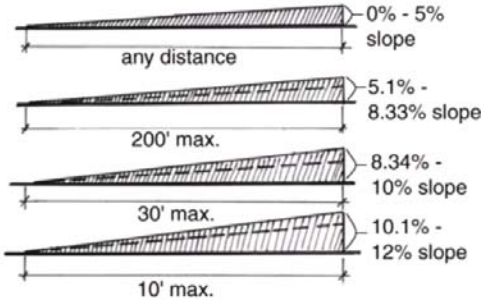
Table 3-3: ADA-Accessible Pathway Design Standards

Description

The Americans with Disabilities Act (ADA) requires that public facilities be designed so that people of all abilities can access and use them. Often, local site characteristics present constraints that make meeting ADA guidelines difficult and sometimes prohibitive. The 2009 U.S. Access Board Draft Final Accessibility Guidelines for Outdoor Developed Areas establish accessibility guidelines pursuant to the Architectural Barriers Act (ABA) for camping facilities, picnic facilities, viewing areas, outdoor recreation access routes, trails, and beach access routes that are constructed or altered by or on behalf of the Federal government. These guidelines also apply to local agencies that are using Federal funds to design or construct a facility.



The technical provisions for ADA-accessible pathways require the surface to be firm and stable, a minimum clear tread width of 36 inches, passing spaces at least 60 inches wide and maximum obstacle heights of ½ to 2 inches depending on surface type. Additional provisions address openings, slopes, resting intervals, protruding objects, gates and barriers.



Trail gradients as recommended by the California State Parks Accessibility Guidelines

California State Parks' Accessibility Guidelines (2009) present principles for providing accessibility within the State Parks. The Guidelines include standards and recommendations for numerous facilities common to parks, including pathways. As stated in the Guidelines, every effort should be made to install and maintain accessible pathways. To this end, the Guidelines contain standards for accessible pathways such as maximum running slopes, minimum width and frequency of resting spaces, maximum acceptable gaps in the pathway surface, optimal clearances and signage requirements. The Guidelines further state that accessible pathways should represent the most significant features and environmental experiences unique to the area.

The following table represents the best practices as outlined by the California State Parks Accessibility guidelines and the U.S. Access Board's Draft Final Accessibility Guidelines for Outdoor Developed Areas.

Table 3-3: ADA-Accessible Pathway Design Standards (continued)

Standards		
Item	**Recommended Treatment**	**Purpose**
Pathway Surface	Hard surface such as asphalt, concrete, wood, compacted gravel	Provide smooth surface that accommodates wheelchairs
Pathway Gradient (running slope)	5% maximum without landings 8.33% maximum with landings 10% maximum for a distance of 30 feet 12% maximum for a distance of 10 feet	Greater than 5% is too strenuous for wheelchair users
Pathway Cross Slope	2% maximum	Provide positive pathway drainage, avoid excessive gravitational pull to side of trail
Pathway Width	36" minimum, 60" passing areas	Accommodate a wide variety of users and allows for the passage of two wheelchairs
Pathway amenities, phones, drinking fountains and pedestrian- actuated buttons	Place no higher than 4' off ground	Provide access within reach of wheelchair users
Detectable pavement changes at curb ramp approaches	Place at top of ramp before entering roadways	Provide visual and/or tactile queues for visually impaired users
Trailhead Signage	Accessibility information such as pathway gradient/profile, distances, tread conditions, location of drinking fountains and rest stops	User convenience and safety
Parking	Provide at least one accessible parking area per every 25 vehicles spaces at each trailhead	User convenience and safety
Rest Areas	On pathways specifically designated as accessible, provide rest areas or widened areas on the pathway optimally at every 300 feet	User convenience and safety

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4. Existing Conditions, Opportunities, and Constraints

This chapter summarizes the existing conditions, opportunities, and constraints related to physical site conditions, land use, and traffic conditions within the Study Area for a pathway along the EBMUD Aqueduct ROW. **Section 4.1** identifies the land uses near the EBMUD Aqueduct ROW, including approved land use developments. **Section 4.2** describes EBMUD's structural and maintenance requirements applicable to construction and operation of a pathway along their ROW. EBMUD access needs are discussed in **Section 4.3** **Sections 4.4** and **4.5** describe topographic conditions along the EBMUD Aqueduct ROW and topographic and ROW constraints associated with use of the ROW, respectively. **Section 4.6** presents the roadway crossings, including information on intersection geometries, roadway volumes and speeds, and pathway crossing opportunities and constraints. The pathway relationship to adjacent land uses and safety and security considerations are discussed in **Sections 4.7** and **4.8** respectively. **Section 4.9** concludes the chapter with a discussion of environmental constraints.

4.1 Surrounding Land Uses

Within the Pathway Study Area, the EBMUD Aqueduct ROW parallels the south side of SR 24 and generally runs along the north side of downtown Lafayette. Figure 4-1 shows the 2005 City of Lafayette General Plan land use designations, location of nearby development projects, DSP boundary, Redevelopment Project Area boundary and key landmarks surrounding the EBMUD Aqueduct ROW. Properties near the EBMUD Aqueduct ROW have been developed with retail, office, civic or residential land uses. Approximately one-third of the EBMUD Aqueduct ROW has a General Plan land use designation and is within the DSP and Redevelopment Project areas.

The western one-third of the portion of the Pathway Study Area and the properties north and south of the EBMUD Aqueduct ROW are designated West End Commercial by the General Plan. This designation accommodates primarily office and other uses that complement the adjacent Downtown Core area, located immediately to the east. The central portion of the EBMUD Aqueduct ROW under study abuts the General Plan's Downtown Core land uses to the south and Caltrans ROW to the north. The eastern portion of the EBMUD Aqueduct ROW under study abuts the General Plan's East End Commercial land use designation to the south and Caltrans ROW to the north. Two properties within the continuation of the pathway corridor (both with Assessor's Parcel Number (APN) 233-040-XXX as shown in **Appendix B**) are designated East End Commercial by the General Plan. The Downtown Core area consists of a mix of uses in a pedestrian-friendly environment. The East End Commercial designation allows for a mix of uses, including retail, auto-oriented commercial, hotel and office uses. Single- and multi-family residential uses exist south of the Downtown Core and West and East End Commercial areas. The Downtown Core also includes multi-family residential uses. The maximum density for multi-family residential uses in these areas is 35.0 dwelling units per acre. Single- and multi-family residential neighborhoods, the BART station parking lots and open space are located north of the Pathway Study Area and SR 24.

The EBMUD Aqueduct ROW is located within four Downtown Districts, as designated by the DSP. The western end of the EBMUD Aqueduct ROW under study and the properties to the north and south, between Risa Road and the west side of the Diamond K parcel (located at 3671 Mt. Diablo Boulevard), are designated

West End. Moving east, the ROW is either within or abuts the Downtown Retail District, which extends from the west side of the Diamond K parcel to First Street. The Downtown Civic and Cultural District is located between First Street and the access road to the Post Office Annex (located at 3426 Mt. Diablo Boulevard) and Lafayette Creek. The Downtown Civic and Cultural District abuts the south side of the EBMUD Aqueduct ROW. Two properties within the continuation of the pathway corridor (APN 233-040-XXX) are designated Downtown Civic and Cultural by the DSP. The eastern portion of the EBMUD Aqueduct ROW abuts the Brown Avenue District to the south. Primary land uses within the West End District are office and multifamily residential; however, some medical, retail and civic uses are also located in this District. The Downtown Retail District consists primarily of retail uses. Ancillary uses include office, multifamily and civic uses. Land uses in the Downtown Civic and Cultural District include commercial, retail, auto services, offices, residential and civic uses. Within the Brown Avenue District, retail, office, residential and auto-oriented uses exist.

The Downtown area is continually changing and is anticipated to accommodate additional residential, commercial and office land uses in the future. The DSP Draft EIR projected that build-out of the DSP as currently drafted could result in up to 1,765 new housing units in the DSP area, which would increase the city's population by up to 4,589 residents. The build-out projections in the DSP Draft EIR reflect what City staff and the EIR consultant team believed to be "a realistic estimate of the amount and type of development that is reasonably foreseeable under the [DSP] by 2030, assuming a high rate of redevelopment to ensure that the Draft EIR does not understate environmental impacts" (DSP Final EIR, p. 3-2). The DSP Final EIR states that, "given the historic rate of growth in Lafayette, the high cost of land, and irregular parcel sizes in the [DSP] Area, it is unlikely that the build-out numbers would be fully realized" (p. 3-6).

Near the Pathway Study Area, the development projects listed below have received City approval and are in the pre-construction processes. These projects have not yet submitted for building permits.

- **The Woodbury Condominium project.** This project is located at 3758 Mt. Diablo Boulevard, near Risa Road, behind the Veterans Building, and consists of 80 residential units. An eight-foot-wide asphalt multi-purpose trail with two-foot-wide crushed granite shoulders is proposed within the EBMUD Aqueduct ROW to the south of the project site.
- **Branagh office building.** Located at 3722 Mt. Diablo Boulevard, the vacant lot just east of the Veterans Building, this project consists of 4,000 square feet of office space.
- **Town Center Phase 3.** This project site currently consists of a parking lot and is located between Happy Valley Road and Thompson Road, immediately south of the EBMUD Aqueduct ROW and BART parking lot turn-around. The project proposes 82 residential condominium units.
- **Eden Housing's senior housing project.** This project consists of a 46-unit senior housing development located at 3426 Mt. Diablo Boulevard, in front of the U.S. Postal Annex.

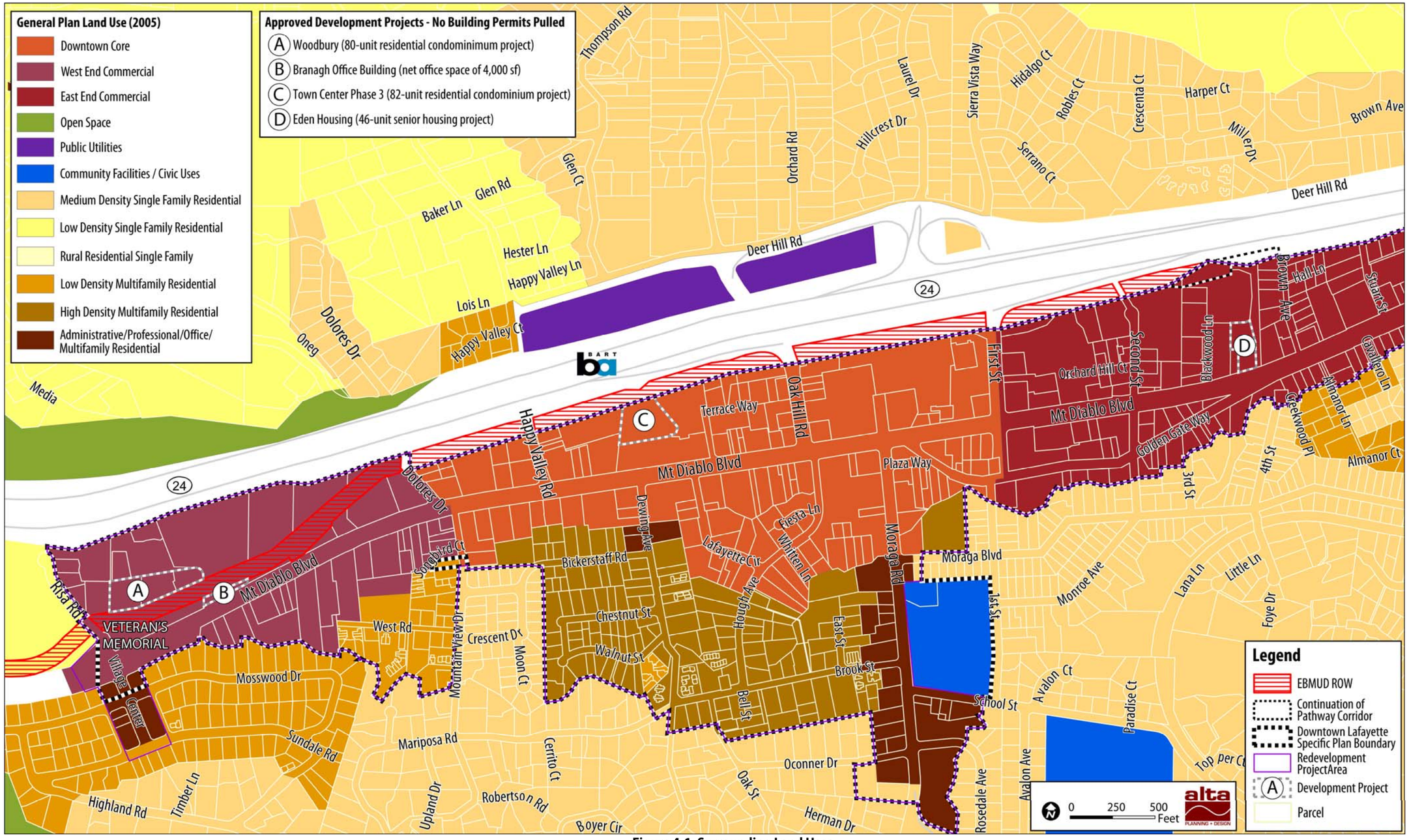

Figure 4-1: Surrounding Land Uses

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4.2 EBMUD Property Ownership and Associated Requirements

This section describes the EBMUD property ownership, and the required administrative, structural and maintenance requirements that a pathway along the EBMUD Aqueduct ROW would need to meet.

4.2.1 Property Ownership

The pathway would be located primarily within the EBMUD Aqueduct ROW, which is owned by EBMUD. SR 24 is within Caltrans ROW to the north. Additional properties adjoining the EBMUD Aqueduct ROW are privately-owned. **Appendix B** presents property ownership of parcels adjoining the EBMUD Aqueduct ROW.

Planning and design of a pathway through the EBMUD Aqueduct ROW would be carried out in accordance with EBMUD's structural requirements, administrative procedures and maintenance activity needs. These requirements are described below.

4.2.2 EBMUD Structural Requirements

The pathway along the EBMUD Aqueduct ROW would be required to comply with EBMUD's structural requirements for projects proposed within their ROW. EBMUD does not allow construction of any permanent structure foundations (spread footings, piles, etc.) that would be difficult to remove in the event of an unexpected emergency repair. EBMUD may allow a less permanent structure, such as a gravity retaining wall (e.g., a keystone retaining wall), to be installed within their ROW. These less permanent structures can be more easily removed and would not significantly obstruct EBMUD repair crews trying to access the Aqueduct. A paved pathway within the corridor is acceptable in most areas except at certain locations where the Aqueduct is deemed too close to the surface.

4.2.3 Existing Revocable Landscape License

The City of Lafayette's ability to encroach upon the EBMUD Aqueduct ROW and to construct a bicycle and pedestrian pathway are governed by two separate administrative procedures. The first step is to request encroachment rights for the necessary ROW. The second step is the more specific request to construct the actual project.

Encroachment Rights – Revocable Landscaping License

Since 2003, the City of Lafayette has had a Revocable Landscaping License agreement with EBMUD which grants the City the right to use the Aqueduct ROW. A Revocable Landscape License is the standard type of agreement EBMUD requires for public trails, landscaping, or for other crossings or lateral encroachments on its property.

The license specifically gives the City the right to encroach upon the ROW for "the construction, maintenance, and use of public pedestrian and bicycle trails." Limited Land Use Permits and Easements are other types of agreements used by EBMUD. These are generally applicable to agricultural uses and for streets, highways, railroads, and other major, publicly owned encroachments.

The 2003 revocable license spells out the legal rights, obligations, and remedies of both EBMUD and the City. The license prohibits commercial and industrial activities within EBMUD's ROW. It also prohibits vehicular traffic and parking, except as may be required by the City or other authorized persons for maintenance and

emergency purposes. Additional topics include weekly and monthly maintenance, landscaping, and policing requirements to maintain the condition of the ROW if it is improved (see *Chapter 6, Funding and Maintenance Strategy and Benefit-Cost Analysis* for a detailed summary of maintenance requirements). Per the revocable license, EBMUD must continue to maintain the unlandscaped portions of the Aqueduct ROW to Fire Marshal standards. The license also describes how EBMUD must go about notifying the City of necessary repairs to the Aqueduct and how EBMUD will be indemnified against potential losses, claims, and liabilities. Section A.3 of the Revocable Landscaping License states that, following any EBMUD work within the portions of the Aqueduct ROW covered by the Revocable Landscaping License, EBMUD shall restore the ground surface to its pre-existing grade and make its best efforts to limit damage to landscaping. The license defines landscaping as including bicycle and pedestrian paths.

If the City decides to construct a pathway along the EBMUD Aqueduct ROW, and following subsequent design-development, the City would pursue renegotiation of the maintenance requirements currently specified in the Revocable Landscaping License to reflect the proposed pathway design.

Application for Use of EBMUD Property

Any specific projects involving the Lafayette Aqueduct ROW are processed by the Water Supply Division in Stockton, CA. Procedure 718 (effective March 15, 2010) and Supplement No. 1 outline the requirements of the application and construction process. The initial application requirements include:

- A completed application containing a description of the project and the work required, plan and profile drawings, details of all county and city permits and approvals required, and any CEQA documentation relating to the project such as a Negative Declaration or Environmental Impact Statement.
- Proof of insurance: liability ($1,000,000/occurrence bodily damage, property damage, and general and auto liability); and, worker's compensation, as required by California state law.

4.2.4 Existing EBMUD Maintenance Activities

Exhibit B of the Revocable Landscaping License between EBMUD and the City (reproduced in *Chapter 6, Funding and Maintenance Strategy and Benefit-Cost Analysis* as **Table 6-2**) outlines the maintenance activities prescribed to the City if the City were to install a pathway and/or landscaping improvements. The Revocable Landscaping License states that EBMUD will continue to maintain unlandscaped real property to Fire Marshal standards. For the portions of the EBMUD Aqueduct ROW covered by the Revocable Landscaping License, EBMUD must restore the ground surface to its pre-existing grade following any EBMUD work and make its best efforts to limit damage to landscaping, including bicycle and pedestrian paths. If the City constructs a pathway, the City will be responsible for maintenance of the portions of the ROW containing the pathway and/or landscaping associated with the pathway. Currently, most of the ROW within Lafayette is unimproved such that EBMUD performs the majority of maintenance activities listed in the Revocable Landscaping License, including weed abatement, inspection and repair of fences and gates, drainage control and maintenance of culverts, and trash and graffiti removal. Access roads within the ROW are primarily gravel. EBMUD's maintenance of the gravel roads consists of either blading to remedy rough areas or laying down additional gravel. EBMUD's roadway maintenance is carried out once per year, as necessary.

4.3 Impact to EBMUD Aqueduct ROW Access

A gravel EBMUD access road exists along portions of the EBMUD Aqueduct ROW. A pathway along the EBMUD Aqueduct ROW could potentially limit EBMUD access within its ROW in locations where the pathway and maintenance road overlap and the pathway requires grading and/or a gravity retaining wall. In most locations, the pathway alignment would not interfere with the existing access road within the EBMUD Aqueduct ROW. There are two locations where this may be an issue: west of Dolores Drive and east of Oak Hill Road.

The final pathway design must provide EBMUD maintenance access. Access could be provided through a combination of pathway access and adjacent dirt road access. Where the alignment follows or crosses the access road and does not include switchbacks, maintenance access would be provided on the pathway. Where the pathway alignment includes switchbacks, maintenance access would be provided as a separate gravel/dirt roadway adjacent to the pathway. Where EBMUD maintenance vehicles are expected to use the pathway, the paved width of the pathway must be 12 feet to accommodate maintenance vehicles and reduce pathway deterioration. In situations where EBMUD maintenance vehicles would cross the pathway, concrete ramps should be provided to reduce deterioration of the pathway edge. The ultimate alignment of the pathway and maintenance access road would be designed in future stages of the project. The final pathway alignment is subject to approval by EBMUD and, as such, modifications of the proposed alignment to ensure EBMUD access may occur in subsequent design development phases of this project.

4.4 Physical Site Conditions

Physical site conditions include topography and EBMUD Aqueduct and utility locations. These factors have a significant impact on feasibility of a pathway through the Pathway Study Area.

4.4.1 Topography

The EBMUD Aqueduct ROW has varying slopes throughout its length, from a mild 2%± slope to a steep 33%±. The terrain within the corridor consists of mostly disked grassland and brush, some gravel and an occasional patch of maintained lawn. Some sections also have tree canopy. At roadway crossings and at the southern BART parking lot east of Happy Valley Road, asphalt and concrete exist along the alignment. A description of the changes in grade by Pathway Study Area segment is presented below from west to east and illustrated in **Figure 4-2**. See **Figure 2-1** on page 2-3 for a map of the entire Pathway Study Area, showing extents for the individual Pathway Study Areas described below.

- **Pathway Study Area 1.** The westernmost section from Risa Road to just before Dolores Drive is gently sloped staying around 2%±.
- **Pathway Study Area 2.** Just before reaching Dolores Drive, a 20 foot rise increases the slope to 15%± and then is followed by a sharp decline down to Dolores Drive at a slope of 25%± or 4 feet horizontal to 1 foot vertical (4:1). Continuing on to the east, the next 300± feet stay relatively flat until reaching another hill with a 12%± incline that transitions into a 33%± decline down to Happy Valley Road. The descent down to Happy Valley Road represents an elevation change of more than 35 feet.
- **Pathway Study Area 3.** After crossing Happy Valley Road, the corridor flattens out again for another 800± feet at 2%± before starting up a long incline at 12%± east of the BART station and decline at

25%± down to Oak Hill Road. This 55± foot drop down to Oak Hill Road is the most significant elevation change along the EBMUD Aqueduct ROW within the Pathway Study Area.

- **Pathway Study Area 4.** Moving east of the Oak Hill Road crossing, the terrain rises again and falls, with slopes on both sides of approximately 22%. After this 500± foot stretch the corridor flattens out to 4%± until reaching First Street.
- **Pathway Study Area 5.** The final stretch between First Street and Brown Avenue consists of multiple hills with little flat area. It starts up from First Street at 10%± and then down to Second Street at 15%±. Then back up from Second Street at 20%± and down to Blackwood Lane at 10%±. The corridor then continues down at 10%± until about 200 feet west of Brown Avenue where it rises again at 5%± until it reaches the east end of the Pathway Study Area.

4.4.2 Aqueduct/Utility Locations

The aqueducts within the Pathway Study Area are part of EBMUD's water supply system, which serves approximately 1.3 million people in a 331-square-mile area extending from Crockett on the north, southward to San Lorenzo, eastward from San Francisco to Walnut Creek and south through the San Ramon Valley. Ninety percent of EBMUD's water supply comes from the Mokelumne River watershed in the Sierra Nevada. EBMUD's water supply system consists of a network of reservoirs, aqueducts, treatment plants, and distribution facilities that extends from the Mokelumne River Basin to the East San Francisco Bay Area.

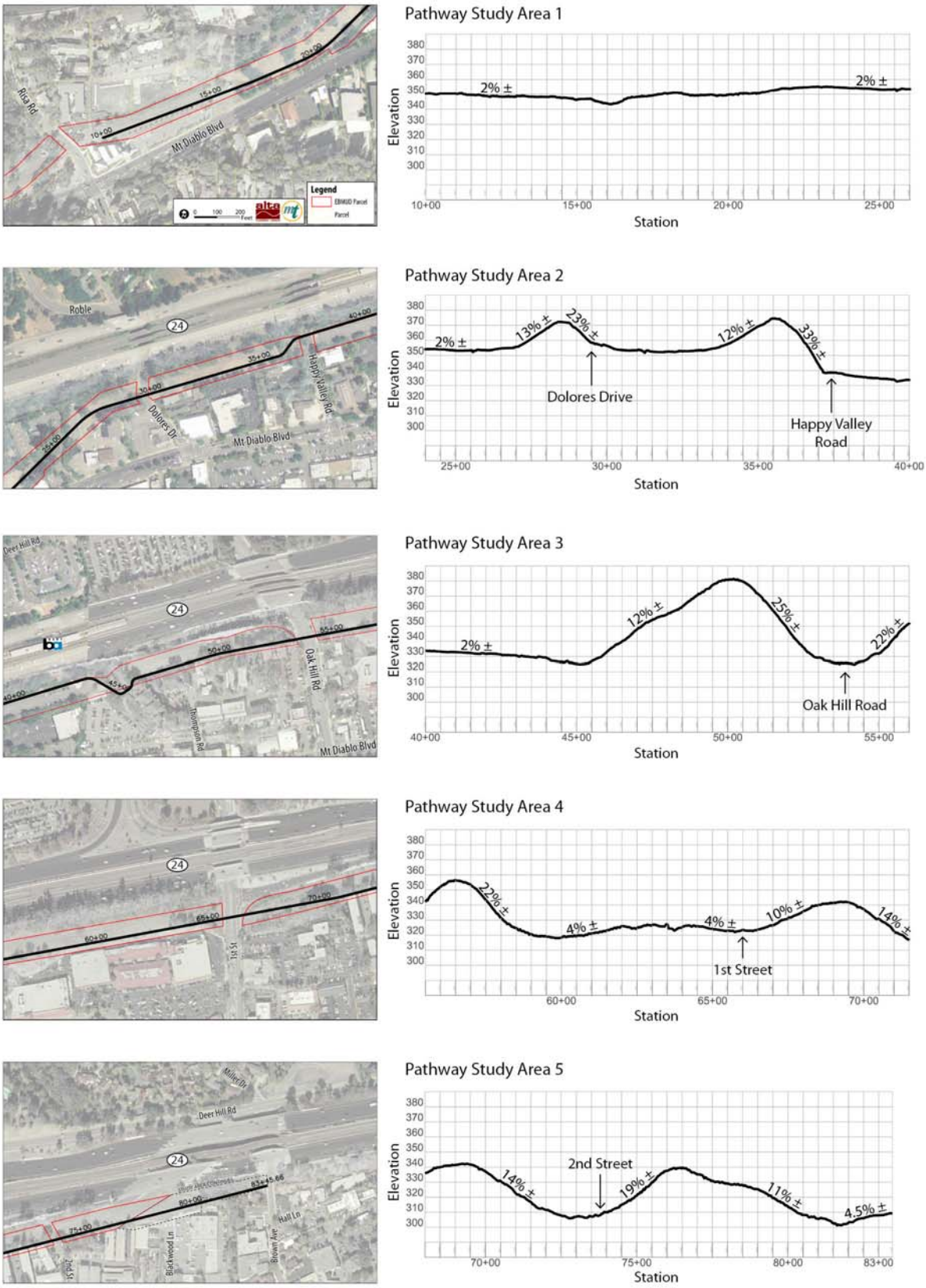


Figure 4-2: Slopes along the EBMUD Aqueduct ROW within the Pathway Study Area

Within Lafayette, the first pipeline was completed in 1929. Information gained during conversations with EBMUD representatives, through review of available as-built drawings, and during field verification imply that the Aqueducts mostly lie within the southern 50 feet of the 100-foot-wide EBMUD Aqueduct ROW. The horizontal location of the Aqueducts is much easier to determine than the vertical location due to the air release and blow off valves located throughout EBMUD's ROW. The vertical elevation of the Aqueducts is much more difficult to evaluate and potholing to determine the depths of the Aqueducts would be necessary before any construction above them could begin. At some locations within EBMUD's ROW, the Aqueducts have as little as one foot of ground cover over the top of the pipe. Due to the general layout of the Aqueducts within the southern portion of the ROW, the northern portion has been largely untouched by EBMUD. EBMUD has identified this northern area as a potential site for a future Aqueduct, although no official funding has been allocated or any construction date been set.

EBMUD has a planned capital improvement project—the Lafayette Aqueduct No. 1 Relining Project—which is scheduled for the 2015-2020 timeframe. This project will repair the lining on the Lafayette Aqueduct No. 1 from the Walnut Creek Water Treatment Plant to the Lafayette Control Works. If the City decides to pursue construction of the proposed pathway, the timing of this capital improvement project may be advantageous, as it will be easier to construct a pathway in the context of a larger project than in isolation.

Figures 5-6, **5-9**, **5-15**, and **5-16**, in Chapter 5, show the approximate location of the Aqueducts within the Pathway Study Area. Although the Aqueducts typically parallel each other along the corridor, there are a couple locations where they diverge and at one point even cross each other. About midway between Risa Road and Dolores Drive, the northerly Aqueduct #2 diverges from Aqueduct #1 for approximately 1,000 feet before rejoining Aqueduct #1 in a parallel alignment. During this stretch, Aqueduct #2 leaves the EBMUD Aqueduct ROW and is located within an easement for nearly 400 feet. From Dolores Drive to Oak Hill Road the Aqueducts stay parallel to one another and sit within the southern portion of the EBMUD right of way. Just east of Oak Hill Road the Aqueducts cross each other and Aqueduct #2 moves into the southern portion of the ROW with Aqueduct #1 occupying the center of the corridor. Once this switch occurs, the Aqueducts then diverge and converge a few times over the next 1,000 feet until once again becoming parallel at Blackwood Lane.

Conversations with EBMUD indicate that there is a major distribution line in the far northern portion of the EBMUD Aqueduct ROW between Dolores Drive and Happy Valley Road. Additional, smaller domestic water lines lie within the southern portion of the ROW. These lines typically are short longitudinal encroachments serving the residential sections abutting the ROW and do not travel to the north side of the EBMUD Aqueduct ROW.

4.5 Topographic and ROW Constraints

This section discusses the opportunities and constraints for a potential pathway presented by the site conditions and design standards.

4.5.1 Constraints to Meeting Design Standards

In order to evaluate the range of design options, this Study undertook an analysis of four hypothetical pathway alignments along the EBMUD Aqueduct ROW: a Class I bikeway, two ADA-accessible pathways (one with an at-grade crossing at Happy Valley Road and one with a bridge over the roadway) and a multi-use

pathway that is not ADA-accessible. The purpose of this exercise was to select the potential design options to evaluate further in this Study.

As described in **Section 4.4.1**, the EBMUD Aqueduct ROW has varying slopes throughout its length, from a mild 2%± slope to a steep 33%±. Topography of the EBMUD Aqueduct ROW, EBMUD structural requirements and the constrained ROW make it difficult to meet the design standards required for Class I bikeways and ADA-accessible pathways. EBMUD's structural requirements limit the type of structures and amount of grading that are permitted in the Aqueduct ROW. EBMUD structural requirements additionally limit where structures are permitted on the right-of way. The ROW is further constrained on the north by Caltrans ROW. The following is a description of the hypothetical pathway alignments:

1. **A Class I bikeway/ADA-accessible pathway with a maximum 5 percent slope.** To meet the slope requirements of a Class I bikeway—a maximum 5 percent sustained grade—requires switchbacks, significant grading or bridges. A pathway with a maximum five percent grade would require approximately 75 switchbacks if all roadway crossings are at-grade. Most switchbacks would have a turn radius of one foot. This alignment would require a design exception from Caltrans for turn radii that do not meet Caltrans design standards for Class I bikeways.
2. **A Class I bikeway/ADA-accessible pathway with a maximum 8.3 percent slope and all at-grade roadway crossings.** A pathway with a maximum 8.3 percent slope and all at-grade roadway crossings would have about 42 to 46 switchbacks. Switchbacks would have turn radii generally between one and five feet. This alignment would require a design exception from Caltrans for turn radii that do not meet Caltrans design standards for Class I bikeways.
3. **A Class I bikeway/ADA-accessible pathway with a maximum 8.3 percent slope and a bicycle/pedestrian bridge at Happy Valley Road.** A pathway with a maximum 8.3 percent slope and a bicycle/pedestrian bridge at Happy Valley Road would have approximately 35 switchbacks. Switchbacks would have turn radii generally between one and five feet. This alignment would require a design exception from Caltrans for turn radii that do not meet Caltrans design standards for Class I bikeways.
4. **A multi-use pathway that is not ADA-accessible.** A pathway along the EBMUD Aqueduct ROW that is not ADA-accessible and that does not incorporate switchbacks would experience grade changes between 2 and 33 percent.

The goals for the Study include identification of an alignment that is universally-accessible and minimizes fill and excavation. An alignment that meets these goals would serve pedestrians and bicyclists with a range of ability and skill levels and minimize impacts to the EBMUD Aqueduct. The third option, a Class I bikeway/ADA-accessible pathway with a maximum 8.3 percent slope and a bicycle/pedestrian bridge at Happy Valley Road best meets goals of this Study, and is further explored in *Chapter 5: Options Evaluation and Preferred Options*. The fourth option, a multi-use pathway that is not ADA-accessible, would be a lower cost option to improve access along the EBMUD Aqueduct ROW and is also evaluated further in this Study. The significant number of switchbacks and associated gravity retaining walls and fill required for the Class I bikeway and Class I bikeway/ADA-accessible pathway with all at-grade roadway crossings options would result in less desirable alignments and are not evaluated further in this Study.

4.5.2 Use of Caltrans ROW

The Caltrans ROW for SR 24 runs parallel to the EBMUD Aqueduct ROW that is being studied for the pathway alignment. There are several locations along the pathway alignment where an encroachment into Caltrans ROW may benefit the pathway alignment by reducing the change in grades and associated switchbacks. Although a longitudinal encroachment is typically not allowed for pedestrian facilities or utilities, there is precedence within the SR 24 corridor to the west of the Pathway Study Area in Orinda. Near downtown Orinda the St. Stephens Trail connection lies within Caltrans ROW. Another possible way to use a portion of Caltrans ROW is through a determination of excess ROW. If it can be proved that Caltrans ROW is larger than it needs to be, then Caltrans may declare excess ROW that could be transferred to the City or EBMUD to allow uses other than for state roadway facilities. Caltrans permitting requirements are discussed further in *Chapter 5: Options Evaluation and Preferred Options.*

The first potential encroachment location is just west of the Dolores Drive crossing where there is an existing knoll within the EBMUD Aqueduct ROW. Due to the knoll, adherence to ADA requirements is challenging without using several ramps and/or switchbacks. By encroaching into the Caltrans ROW to the north, the pathway would be able to avoid the knoll and reduce the number of switchbacks needed for the pathway.

The next location that would benefit from an encroachment into Caltrans ROW would be at the Happy Valley Road crossing. If the pathway alignment is constrained to the EBMUD Aqueduct ROW, the steep hill located west of Happy Valley Road would require multiple ramp switchbacks to safely navigate users from the top of the hill down to the intersection of the roadway. The significant elevation drop and steep terrain make this location ideal for a bridge crossing. Due to EBMUD foundation restrictions, it would not be possible to build the bridge within EBMUD Aqueduct ROW. However, if an encroachment within Caltrans ROW were allowed, the bridge foundations and structure could be built entirely within Caltrans ROW, resulting in the need for fewer switchbacks.

The final potential longitudinal encroachment location is located west of the Oak Hill Road crossing as shown in **Figure 4-3**. The hill west of Oak Hill Road presents topographic constraints. At this location an existing five-foot-wide sidewalk runs along the eastbound SR 24 off-ramp from the crest of the ramp down to Oak Hill Road intersection. The pathway alignment could connect to this existing sidewalk. This alignment and design would require some reconfiguration on the north side of the off-ramp and widening of the sidewalk to meet Class I pathway requirements as well as Caltrans' approval. This alignment is discussed further in *Chapter 5: Options Evaluation and Preferred Options.*

The SR 24 eastbound off-ramp at Oak Hill Road (looking west)

Figure 4-3: Potential Encroachment into Caltrans' ROW West of Oak Hill Road

4.6 Roadway Crossings

The Pathway Study Area crosses several streets including Risa Road, Dolores Drive, Happy Valley Road, Oak Hill Road, and First Street. This section provides an overview of the existing conditions, opportunities, and constraints of the following roadways within the Pathway Study Area:

- Risa Road/Mt. Diablo Boulevard
- Private Driveway/Mt. Diablo Boulevard (located approximately 600 feet east of Risa Road)
- Dolores Drive
- Happy Valley Road
- Oak Hill Road
- First Street

Data collected from field observations and the DSP EIR were used to evaluate each intersection.

4.6.1 Stopping Sight Distance

Due to the surrounding topography and street network within the Pathway Study Area, all the roadways that intersect the EBMUD Aqueduct ROW have grade changes and/or curves that affect sightlines and stopping distances to varying degrees. **Table 4-1** describes the appropriate stopping sight distances for level roads and roads at a grade. These recommendations are considered in evaluating conditions where the EBMUD Aqueduct ROW crosses roadways.

Table 4-1: Stopping Sight Distance for Vehicles

Design Speed	Stopping Sight Distance						
	Level Grade	Downgrades			Upgrades		
		3%	6%	9%	3%	6%	9%
20 mph	115 ft	116 ft	120 ft	126 ft	109 ft	107 ft	104 ft
25 mph	155 ft	158 ft	165 ft	173 ft	147 ft	143 ft	140 ft
30 mph	200 ft	205 ft	215 ft	227 ft	200 ft	184 ft	179 ft
35 mph	250 ft	257 ft	271 ft	287 ft	237 ft	229 ft	222 ft

Source: AASHTO: A Policy on Geometric Design of Highways and Streets

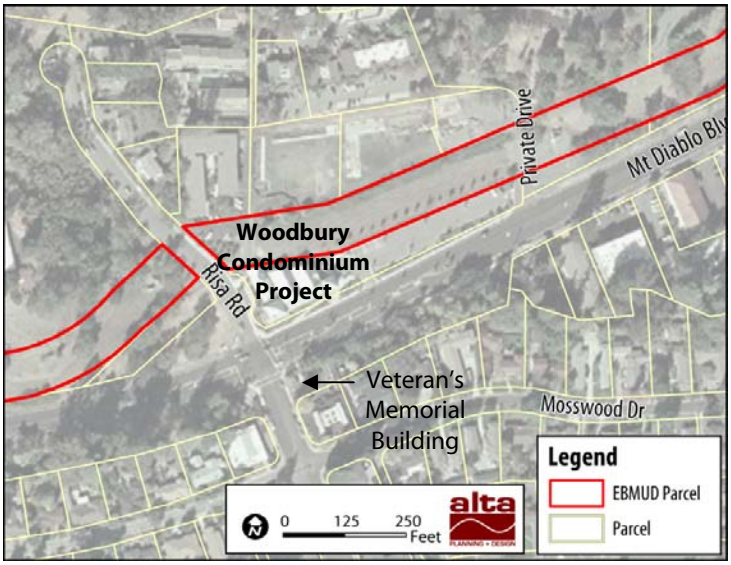
4.6.2 Risa Road/Mt. Diablo Boulevard

The EBMUD Aqueduct ROW is accessed from Risa Road on the west end of the Pathway Study Area. The intersection of Risa Road and Mt. Diablo Boulevard is signalized.

Intersection Geometrics

The EBMUD Aqueduct ROW intersects Risa Road 140 feet north of Mt. Diablo Boulevard. Risa Road is a public two-lane collector cul-de-sac that provides local access to multi-family residences, several office buildings and a synagogue. On-street parallel parking is permitted on both sides of the street on either side of the EBMUD Aqueduct ROW. There are existing sidewalks on both sides of Risa Road.

Mt. Diablo Boulevard is a four-lane arterial with a raised, planted median. East of Risa Road, Mt. Diablo Boulevard has a sidewalk on the south side of the street. The sidewalk along the north side of Mt. Diablo Boulevard east of Risa Road terminates at Private Drive. West of Risa Road, a pathway connecting to the Lafayette Reservoir runs along the south side of Mt. Diablo Boulevard. A sidewalk does not exist on the north side of Mt. Diablo Boulevard west of Risa Road within the Pathway Study Area. Class II bicycle lanes are striped along Mt. Diablo Boulevard west of Dolores Drive.



Risa Road/Mt. Diablo Boulevard Intersection (within Pathway Segment 1)

The Risa Road/Mt. Diablo Boulevard intersection has signalized pedestrian crossings and marked crosswalks on the north, south and east legs.

Looking north on Risa Road towards the entrance to the EBMUD Aqueduct ROW

Roadway Volumes & Speeds

Figure 4-4 shows the existing AM and PM peak hour volumes for intersections included in the Pathway Study Area. These data are sourced from the DSP EIR.[9] While vehicle volumes and travel speeds are low on Risa Road, Mt. Diablo Boulevard is a busy arterial with an 85th percentile speed of 45 mph, ten miles over the posted speed limit.[10]

[9] September 3, 2009 12:30 – 1:30pm.
[10] Data collected by Fehr & Peers on Mt. Diablo Boulevard between Risa Road and Reservoir Driveway, May 2008.

Planned Improvements

As stated in the DSP EIR, the Woodbury development (see **Section 4.1** for a description of this project) will affect the existing traffic circulation at the Risa Road/Mt. Diablo Boulevard intersection by creating new vehicle trips. The Woodbury project plans maintain the existing driveway across the EBMUD Aqueduct ROW.

The DSP EIR shows that traffic volumes at the Risa Road/Mt. Diablo Boulevard intersection will increase with future projects in the Downtown area. Future changes to the area surrounding the intersection of Mt. Diablo Boulevard and Risa Road show minimal changes to intersection operations. The projected Level of Service (LOS)[11] for vehicles varies between LOS A and LOS B depending on the peak hour.

Looking south on Risa Road towards Mount Diablo Boulevard from the EMBUD right-of-way crossing

Figure 4-5 shows the future AM and PM peak hour volumes for the Pathway Study Area (DSP EIR). **Table 4-3** on page 4-29 shows the future LOS and delays for the Pathway Study Area. The LOS criterion follows the Highway Capacity Manual standards for signalized and unsignalized intersections.

Opportunities and Constraints

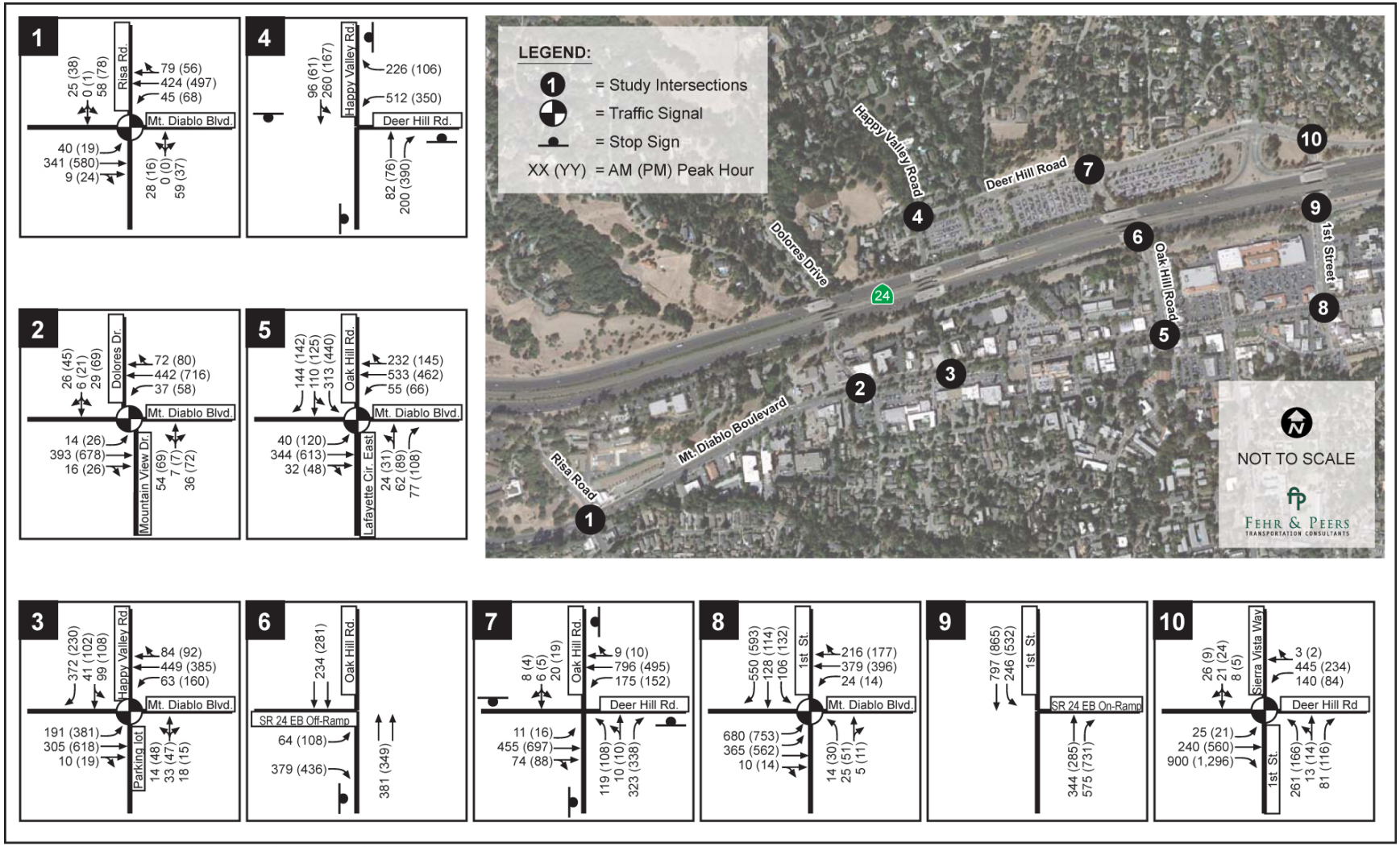
Observed vehicle speeds are low and stopping sight distance is adequate at the pathway entrance along Risa Road. A slight slope on Risa Road may encourage faster vehicle and bicycle speeds on the southbound approach to Mt. Diablo Boulevard. There is currently no street lighting on Risa Road.

The sidewalks on both sides of Risa Road between the pathway crossing and Mt. Diablo Boulevard are approximately five feet wide. Risa Road does not include dedicated bicycle facilities; the Bikeways Master Plan does not propose dedicated bicycle facilities along Risa Road. Widening of the western sidewalk to accommodate pedestrians and less experienced bicyclists should be considered.

Risa Road will be the primary access point for the west end of the pathway, and serves as a connection to existing trails around the Lafayette Reservoir. To connect to the Lafayette Reservoir trails, pathway users must cross at the Risa Road/Mt. Diablo Boulevard intersection. Currently, the posted speed on Mt. Diablo Boulevard is 35 miles per hour. Although the intersection is signalized with marked crosswalks on three legs, speeds on Mt. Diablo Boulevard will affect both the safety and comfort for pedestrians and bicyclists. Pathway users approaching from the Lafayette Reservoir and bicyclists approaching from the eastbound bike lane on Mt. Diablo Boulevard would need to cross two legs of the intersection to access the pathway. While more experienced bicyclists travelling eastbound on Mt. Diablo Boulevard may feel comfortable merging into the left-turn lane to access the pathway, merging across motor vehicle lanes is more appropriate for streets with lower vehicle volumes such as two-lane roads. Pedestrians are routed across Village Center, and then north across the east leg of Mt. Diablo Boulevard to connect to the existing sidewalk on Risa Road.

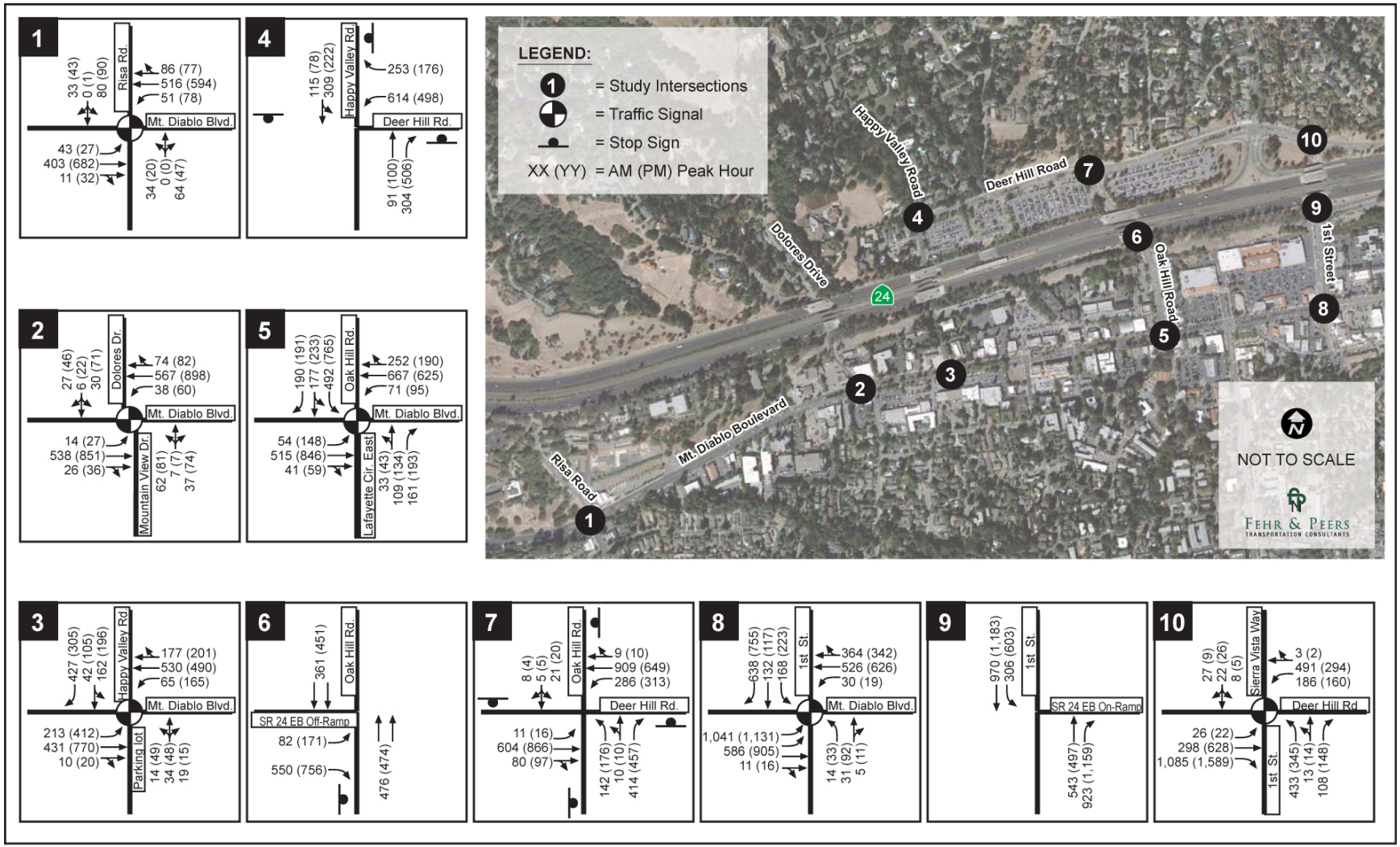
[11] The Highway Capacity Manual Level of Service is used to determine if the facility design will provide acceptable traffic operations as reported for the peak 15 minutes. The criteria for each level of service for a signalized intersection under HCM standards are depicted in **Table 4-3** for unsignalized intersections.

The current approved design for the Woodbury Development routes pathway users across the development's driveway, potentially creating conflicts between vehicles entering and exiting the driveway and pathway users. Alternatively, if circumstances permit, the proposed pathway alignment could be reevaluated to determine is a more direct route can be used.



Source: DSP EIR, collected on Sept 2007 / Sept 2009

Figure 4-4: Existing Volumes and Lane Configurations



Source: DSP EIR, collected on Sept 2007 / Sept 2009

Figure 4-5: Future Volumes and Lane Configuration

4.6.3 Private Drive/Mt. Diablo Boulevard Crossing

A private driveway, accessed from Mt. Diablo Boulevard, is located between Risa Road and Dolores Drive. The EBMUD Aqueduct ROW crosses the private driveway 65 feet north of Mt. Diablo Boulevard. The driveway provides access to the Veteran's Memorial Building parking lot, residential housing, several commercial spaces, and a large office complex. The driveway will also provide access to the Branagh Office Building development project, when it is constructed, and serve as an exit route from the Woodbury Condominium development's garage.

Private Drive/Mt. Diablo Boulevard Intersection (within Pathway Segment 1)

Intersection Geometrics

The private driveway does not have any lane striping and is 40 feet wide. There is no crosswalk across the private drive and it does not have any sidewalks or parking along its length.

In this section, sidewalks exist on the south side of Mt. Diablo Boulevard and on the north side of Mt. Diablo Boulevard east of the private driveway.

Looking north on the private drive towards the entrance to the EBMUD Aqueduct ROW

Roadway Volumes & Speeds

While field observations during the mid-day found few vehicles traveling on the private drive or any heavy movements along this intersection, the driveway serves many office buildings and peak volumes for the driveway occur during AM and PM peak hours. Vehicles traveling along the private driveway either come from parking lots on the surrounding property or Mt. Diablo Boulevard. Vehicles traveling from the private driveway onto Mount Diablo Boulevard must yield to the on-coming traffic such that upon entering Mount Diablo Boulevard they have low speeds.

Planned Improvements

The Branagh Office Building development project has been approved at the northeast corner of the Private Drive/Mt. Diablo Boulevard intersection. The site plans show a one-way vehicular entrance to the building's parking area off the private driveway and south of the EBMUD Aqueduct ROW. Vehicles leaving the building would exit onto Mt. Diablo Boulevard using a separate exit located at the eastern end of the building. The site

plans include a new median at the entrance of the driveway, south of the EBMUD Aqueduct ROW, and a new sidewalk along Mt. Diablo Boulevard adjacent to the new building. Existing residential signage will be relocated within the median.

Opportunities and Constraints

The private drive slopes downward towards Mt. Diablo Boulevard and curves slightly within the Pathway Study Area. Observed vehicle speeds are low, but the slope of the private drive may encourage faster vehicle speeds on the southbound approach to Mt. Diablo Boulevard. Sightlines and sight stopping distance approaching the pathway crossing are adequate. Existing lighting at the private drive is adequate.

The private drive does not include sidewalks or dedicated bicycle facilities; the Bikeways Master Plan does not propose dedicated bicycle facilities along the private drive. Sidewalks along both sides of the private drive between the pathway entrance and Mt. Diablo Boulevard should be considered. Sidewalk improvements would serve the several apartments and office buildings nearby on the south side of Mt. Diablo Boulevard, which may generate pathway users.

The private drive entrance at Mt. Diablo Boulevard is STOP controlled. Vehicles entering the private drive from Mt. Diablo Boulevard may be traveling at high speeds. Advance signage and a median along the private drive should be considered to slow vehicles approaching the pathway crossing.

4.6.4 Dolores Drive

Dolores Drive intersects the EBMUD Aqueduct ROW on the west side of Downtown Lafayette, between Mt. Diablo Boulevard and Via Roble. Dolores Drive is a two lane collector that passes under SR 24.

Dolores Drive (within Pathway Segment 1)

Intersection Geometrics

On-street parking is not permitted on Dolores Drive except on the east side of the street north of the EBMUD Aqueduct ROW. Sidewalks are present on the east side of Dolores Drive between Mt. Diablo Boulevard and Via Roble only.

Dolores Drive approaches Mt. Diablo Boulevard on a downward slope. At the intersection, crosswalks are marked on each approach. West of Dolores Drive, Mt. Diablo Boulevard has Class II bicycle lanes. To the east, the bicycle facility becomes a Class III bike route with sharrows.

Roadway Volumes & Speeds

Lane configurations and roadway volumes for Dolores Drive and Mt. Diablo Boulevard are shown in **Figure 4-4**. The posted speed limit for Dolores Drive is 25 mph and that for Mt. Diablo Boulevard is 35 mph.

Planned Improvements

A future mixed use project is proposed at the northwest corner of Dolores Drive and Mt. Diablo Boulevard. Currently, the lot contains restaurant and retail space. The mixed use project will include residential living, retail and commercial space. The change in land use as well as other development projects in the Downtown area will increase the traffic volumes at the Dolores Drive/Mt. Diablo Boulevard intersection. Given the existing volumes and turning movements at this intersection, it is anticipated that the majority of future vehicle trips will access the new developments on Mt. Diablo Boulevard, away from the Dolores Drive crossing of the EBMUD Aqueduct ROW. **Figure 4-5** depicts the future volumes and **Table 4-3** on page 4-29 shows the change in LOS for the study intersections.

Opportunities and Constraints

Dolores Drive slopes down from Via Roble to Mt. Diablo Boulevard, which may contribute to increased vehicle speeds. The S-curve of the roadway, SR 24 support columns, and grade changes around the EBMUD Aqueduct ROW crossing on Dolores Drive limit sight lines and present stopping sight distance issues. Sight distances to a crosswalk near the center of the EBMUD Aqueduct ROW would be approximately 170 feet for the southbound approach and 120 feet for the northbound approach. As the northbound stopping sight distance does not meet AASHTO standards, crossing treatments which slow vehicle speeds and improve sightlines should be considered. There is minimal lighting as Dolores Drive passes under SR 24, further limiting visibility for drivers and pathway users. Additional street lights would enhance mid-block crosswalk visibility for drivers.

Looking south where Dolores Drive curves beneath SR 24, limiting stopping sight distances

Looking north on Dolores Drive towards the the EBMUD Aqueduct ROW. Sightlines are limited due to the curvature and grade of the roadway

Looking east across Dolores Drive to the EBMUD right-of-way. Steep slopes may encourage bicyclists to approaching the roadway at high speeds

Bicyclists traveling along the pathway would approach Dolores Drive on a steep downward sloping pathway that would encourage faster speeds. Traffic calming measures along the pathway aimed to slow bicyclists should be considered.

Mt. Diablo Boulevard is 230 feet south of the EBMUD Aqueduct ROW. The sidewalk on the west side of Dolores Drive ends 30 feet from Mt. Diablo Boulevard. Dolores Drive does not include dedicated bicycle facilities; the Bikeways Master Plan does not propose dedicated bicycle facilities along Dolores Drive. Continuing the sidewalk up to the EBMUD Aqueduct ROW would provide a connection on both sides of the street for pedestrians and less experienced bicyclists.

4.6.5 Happy Valley Road

The EBMUD Aqueduct ROW intersects Happy Valley Road between Mt. Diablo Boulevard and Deer Hill Road. Happy Valley Road is a two-lane collector that provides direct access to the Lafayette BART Station and parking lots, and terminates at Mt. Diablo Boulevard in the central Downtown area. The EBMUD Aqueduct ROW to the east of Happy Valley Road is covered by a BART Station parking lot.

Happy Valley Road (within Pathway Segment 1)

Intersection Geometrics

The east side of Happy Valley Road has a sidewalk between Mt. Diablo Boulevard and Deer Hill Road. On the west side of the street, the sidewalk terminates at a private driveway south of the EBMUD Aqueduct ROW. The City has near-term plans to install a mid-block crosswalk with in-pavement flashing lights and overhead lighting that will connect to the BART Station parking lot on the south side of SR 24 and continue the sidewalk to meet Mt. Diablo Boulevard. Sharrows will be installed between Mt. Diablo Boulevard and Deer Hill Road. On-street parallel parking is permitted on both sides of the street.

Looking north on Happy Valley Road, adjacent to the EBMUD Aqueduct ROW. Sightlines are limited due to the curvature and grade of the roadway.

Roadway Volumes & Speeds

Close proximity to the Lafayette BART Station and central Downtown Lafayette results in high vehicle, pedestrian and bicycle traffic on Happy Valley Road and Mt. Diablo Boulevard. Field

observations noted many pedestrians on the east sidewalk of Happy Valley Road heading north to the BART station. Many vehicles use Happy Valley Road to access the BART parking lot on the EBMUD Aqueduct ROW. **Figure 4-4** illustrates the peak hour volumes at the intersections of Happy Valley Road/Mt. Diablo Boulevard and Happy Valley Road/Deer Hill Road.

The posted speed limit on Happy Valley Road is 25 mph. Speed survey data recorded in May, 2008 found that the 85th percentile speed of vehicles traveling on Happy Valley Road was 32 mph southbound and 35 mph northbound.

Planned Improvements

The DSP EIR projects a considerable increase in vehicle volumes along Happy Valley Road. **Figure 4-5** illustrates the future volumes and **Table 4-3** on page 4-29 shows the change in LOS from the existing to the future for the study intersections.

Opportunities and Constraints

The west approach of the EBMUD Aqueduct ROW meets the street at an extremely steep slope, requiring any pathway connection to an at-grade crossing to have stairs or an unmanageable number of switchbacks. A grade-separated crossing could connect pathway users with the BART station and still provide access to Happy Valley Road. As stated in **Section 4.2.2**, EBMUD does not allow construction of any permanent structure foundations (spread footings, piles, etc.) that would be difficult to remove in the event of an unexpected emergency repair. A Caltrans Longitudinal Encroachment would be required in order for the retaining walls, footings, and abutments for a pedestrian and bicycle overcrossing to be placed in Caltrans ROW.

Happy Valley Road is a planned Class III bicycle route. The City's planned mid-block crosswalk with in-pavement flashing lights and overhead lighting at the southern BART parking lot entrance would serve pathway users wishing to access bicycle and pedestrian facilities along Happy Valley Road.

4.6.6 Oak Hill Road

Oak Hill Road is a four lane collector street that provides access to multiple destinations, including the BART Station parking lots on the north side of the station and commercial businesses in the Downtown area. The SR 24 eastbound off-ramp is located on Oak Hill Road to the north of the EBMUD Aqueduct ROW. There is a high amount of pedestrian and bicycle activity along the Oak Hill Road corridor because of its proximity to the BART station and the surrounding commercial land uses.

Oak Hill Road (within Pathway Segment 2)

Intersection Geometrics

Sidewalks are present on both sides of Oak Hill Road between Mt. Diablo Boulevard and Deer Hill Road. On-street parallel parking is permitted on the east side of Oak Hill Road, and on the west side from Deer Hill Road to the SR 24 off-ramp. There are no existing bicycle facilities on Oak Hill Road. Several driveways located along Oak Hill Road provide access to local businesses. There are three key intersections surrounding the EBMUD Aqueduct ROW along the Oak Hill Road corridor:

- Oak Hill Road/Mt. Diablo Boulevard is a signalized intersection 500 feet south of the EBMUD Aqueduct ROW.
- SR 24 eastbound off-ramp runs adjacent to the EBMUD Aqueduct ROW and terminates at a stop-controlled T-intersection on Oak Hill Road, north of the EBMUD Aqueduct ROW.
- Oak Hill Road/Deer Hill Road is an all-way stop-controlled intersection, 550 feet to the north of the EBMUD Aqueduct ROW.

The EBMUD Aqueduct ROW on both sides of Oak Hill Road approach at a steep downward slopes, which may encourage bicyclists to enter the intersection at high speeds. In addition, vehicles exiting the SR 24 off-ramp may have limited sight distance under certain conditions for both southbound and northbound vehicles on Oak Hill Road.

Roadway Volumes & Speeds

Proximity to the BART Station, Downtown destinations, and the SR 24 off-ramp on Oak Hill Road result in high vehicle volumes throughout the day. **Figure 4-4** illustrates the volumes at each intersection surrounding the EBMUD Aqueduct ROW on Oak Hill Road.

Oak Hill Road is a collector street with a posted speed limit of 25 mph. The wide travel lanes and downhill slope likely contribute to speeds greater than 25 mph.

Looking south on Oak Hill Road towards the Mt. Diablo Boulevard intersection

The SR 24 eastbound off-ramp at Oak Hill Road (looking west)

Pedestrians are currently not permitted to cross Oak Hill Road at the SR 24 off-ramp. A crosswalk exists across the SR 24 off-ramp to accommodate north-south pedestrian travel.

Planned Improvements

The DSP EIR identifies Oak Hill Road/SR 24 off-ramp and Oak Hill Road/Deer Hill Road intersections as potential locations for signalization. **Figure 4-5** shows the future volumes and **Table 4-3** on page 4-29 shows the change in LOS for each intersection affected within this portion of the Pathway Study Area. Build out of the DSP area will increase traffic volumes on all the adjacent intersections.

Opportunities and Constraints

Though traffic volumes, number of travel lanes, and width of Oak Hill Road suggest that a grade-separated crossing may be a potential option, the topography at Oak Hill Road would require a very long, and prohibitively expensive overcrossing. As a result, an overcrossing is not considered at this location. However, there is an opportunity for an at-grade signalized crossing of Oak Hill, as the DSP EIR has identified the need for a traffic signal at Oak Hill Road/SR 24 off-ramp to accommodate future vehicle volume increases.

West of Oak Hill Road, the EBMUD Aqueduct falls down to the road at a 25% slope. It is possible to avoid this slope by encroaching on Caltrans ROW and routing the pathway along an existing sidewalk on the south side of the SR 24 off-ramp, where grades are not as steep. If the pathway is routed along Caltrans SR 24 ROW, the off-ramp travel lanes would need to be shifted and realigned to maintain adequate queuing space.

The slope on Oak Hill Road may encourage faster vehicle and bicycle speeds on the southbound approach to Mt. Diablo Boulevard. Although the SR 24 off-ramp is stop-controlled, drivers may not anticipate a mid-block crosswalk so close to the off-ramp. Limited sightlines and grade changes around the EBMUD Aqueduct ROW crossing on Oak Hill Road present stopping sight distance issues. Further, sight lines for vehicles turning south onto Oak Hill Road from the SR 24 off-ramp may be obstructed by vehicles turning north onto Oak Hill Road from the SR 24 off-ramp. The existing lighting on Oak Hill Road south of the eastbound SR 24 off-ramps is not sufficient for a mid-block pedestrian crosswalk.

Due to steep downhill slopes on the EBMUD Aqueduct ROW approaching Oak Hill Road, traffic calming measures along the pathway aimed to slow bicyclists, such as chicanes or bollards, should be considered.

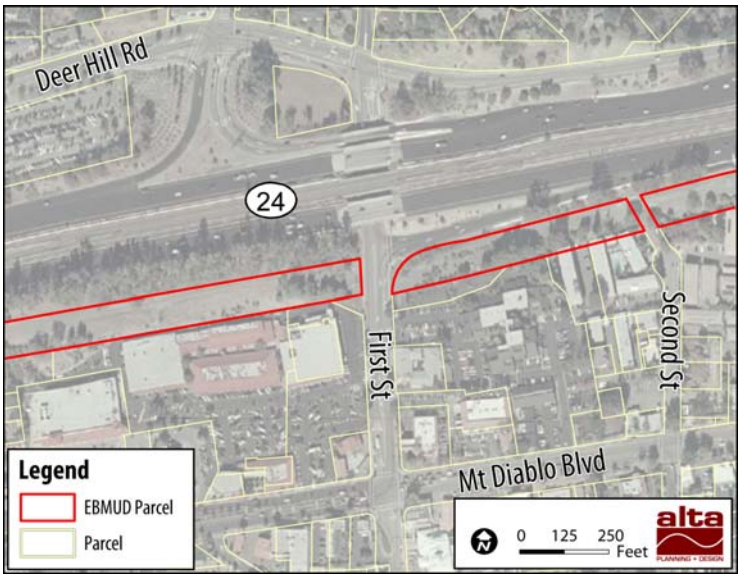
Oak Hill Road has continuous 5- to 10-foot-wide sidewalks on both sides of the street that connect with the EBMUD Aqueduct ROW. Oak Hill Road does not include dedicated bicycle facilities; the Bikeways Master Plan does not propose dedicated bicycle facilities along Oak Hill Road. Wider sidewalks would better accommodate less experienced bicyclists wishing to access the retail uses on either side of the street who may not feel comfortable riding in the street or making left turn movements across traffic.

4.6.7 First Street

First Street is four lanes, with two lanes in each direction, and a raised median. The SR 24 on-ramp has a right-turn and a shared through/right turn lane. This lane configuration presents challenges for bicyclists traveling north on First Street and for pedestrians crossing the on-ramp. There are several driveways on First Street that serve the shopping centers, including a half-signalized driveway that controls vehicles coming out of a shopping center between the SR 24 entrance and Mt. Diablo Boulevard. Sidewalks along First Street are 5 to 10 feet wide. There is a high amount of pedestrian activity along and across First Street because of the surrounding commercial land uses.

Intersection Geometrics

Sidewalks are present on both sides of First Street, though there are no on-street bicycle facilities. There is no on-street parking along First Street from Mt. Diablo Boulevard to Deer Hill Road, except on First Street between the SR 24 on-ramp and under the overpass. Nearby destinations south of the EBMUD Aqueduct ROW include a shopping center and other office and commercial spaces. The driveways along First Street access shopping centers, and so are active throughout the day.



First Street (within Pathway Segment 3)

The half-signal at the Plaza Center parking lot, located south of the EBMUD Aqueduct ROW, controls all movements exiting the shopping center, as well as the southbound movements on First Street. There is a marked crosswalk on the west side of First Street across the shopping center entrance, but no marked crosswalk across First Street at this location. The closest marked crosswalk across First Street is at the First Street/Mt. Diablo Boulevard intersection. A crosswalk exists across the SR 24 entrance along the east side of First Street.

Southbound vehicle traveling on First Street approaching the EBMUD Aqueduct ROW (looking north)

Roadway Volumes & Speeds

First Street is classified as a collector and the posted speed limit is 25 mph. **Figure 4-4** shows the existing volumes for the study intersections along First Street. First Street has the highest vehicle volumes of any roadway within the Pathway Study Area, and volumes are expected to increase further with future development in the Downtown area.

The SR 24 eastbound on-ramp is not signalized, and proximity to the highway may encourage vehicles to speed up as they approach the on-ramp. The on-ramp configuration, vehicle volumes and speeds present safety issues for the potential pathway crossing, approximately 30 feet from the on-ramp entrance.

Planned Improvements

The DSP EIR includes improvements at the intersection of Deer Hill Road/First Street intersection to accommodate the increase in vehicles traveling to and from SR 24. **Figure 4-5** depicts the future volumes and **Table 4-3** on page 4-29 shows the change in LOS for the study intersections. Build-out of the DSP as currently

drafted would increase traffic volumes on First Street and the SR 24 eastbound on-ramp such that the intersection would operate at LOS F for southbound traffic turning left onto the on-ramp. The DSP EIR recommends installing a traffic signal in order to enhance the operational value to LOS C. Whole Foods recently signalized the free-right turn at the Deer Hill Road/First Street intersection to accommodate the employee parking lot and pedestrians crossing at the free-right turn.

Opportunities and Constraints

Though traffic volumes, number of travel lanes, on-ramp configuration, and width of First Street suggest that a grade-separated crossing may be a potential option, the topography at First Street would require a very long, and prohibitively expensive overcrossing. Like Oak Hill Road, the DSP EIR identifies a signal at First Street and the SR 24 on-ramp as mitigation for future increased traffic volumes. Pathway design should take advantage of this opportunity to provide a signalized pathway crossing of First Street.

On First Street, crossing improvements near the SR 24 eastbound on-ramp access should include accommodation for bicyclists and pedestrians (looking east)

Other alternative at-grade crossing opportunities include the signalized intersection of First Street and Mt. Diablo Boulevard, 550 feet south of the EBMUD Aqueduct ROW and the half-signal at the Plaza Center parking lot 270 feet south of the EBMUD Aqueduct ROW. First Street has a raised median where the EBMUD Aqueduct ROW intersects. If an at-grade crossing is pursued, the median will need to be retrofitted to provide access across the roadway.

First Street is straight and has a gentler grade change compared to the other roadways within the Pathway Study Area. While the posted speed limit on First Street is 25 mph, the slope on First Street may encourage faster vehicle speeds on the southbound approach to Mt. Diablo Boulevard, especially during non-peak periods when traffic volumes are lower. Vehicles traveling northbound towards the SR 24 eastbound on-ramp may increase their speed as they approach the ramp, which is directly north of the EBMUD Aqueduct ROW. Sightlines and stopping sight distances are adequate around the EBMUD Aqueduct ROW crossing. The existing lighting on First Street is not sufficient for a mid-block pedestrian crosswalk.

The EBMUD Aqueduct ROW on the east side of First Street approaches the roadway on a downhill slope, which would encourage bicyclists traveling along the pathway to approach the intersection at faster speeds. Traffic calming measures along the pathway aimed to slow bicyclists should be considered.

First Street has 5- to 10-foot-wide continuous sidewalks on both sides of the street that connect to the EBMUD Aqueduct ROW. Limited public ROW and the SR 24 overpass make it difficult to widen the sidewalk beyond the street ROW, though sidewalks could be widened with redevelopment.

First Street does not include dedicated bicycle facilities; the Bikeways Master Plan does not propose dedicated bicycle facilities along First Street. The lack of bike facilities, narrow travel lanes, high vehicle volumes and on-ramp configuration along First Street create a challenging environment for bicycling.

Narrowing or reducing traffic lanes should be considered as a means to widen the sidewalks, which would improve connections for pedestrians and less experienced bicyclists.

4.6.8 Collision History

Data from Statewide Integrated Traffic Records System (SWITRS) Collision Database provides information on police-reported pedestrian-vehicle and bicycle-vehicle collisions within the Pathway Study Area. **Table 4-2** lists all pedestrian and bicycle related collisions recorded from 2005 through 2009.

Table 4-2: Police-Reported Pedestrian or Bicyclist-Related Collisions in Pathway Study Area (2005-2009)

Primary Street	Secondary Street	Involved			Collision Factor
		Ped	Bike	Vehicle	
Mt. Diablo Boulevard	Happy Valley Road	1		1	Violation of Pedestrian ROW
Happy Valley Road	N/A	1		2	Unsafe Speeds
Happy Valley Road	N/A		1	1	Not Stated
Deer Hill Road	Oak Hill Road	1		1	Violation of Pedestrian ROW
Oak Hill Road	Mt. Diablo Blvd	1		1	Violation of Pedestrian ROW
Oak Hill Road	Mt. Diablo Blvd	1		1	Pedestrian not in x-walk

Source: SWITRS Collisions Database

ROW: Right-of-Way

According to the SWITRS data, drivers are at fault in more than half of the collisions, such as violating pedestrians' ROW or traveling at unsafe speeds. Although there are no recently reported collisions at the intersections of Risa Road, Dolores Drive or First Street, pedestrian and bicycle activity was observed at all of the Study intersections.

4.6.9 Level of Service

The vehicle Level of Service (LOS) analysis included in the DSP EIR was used to evaluate the Pathway Study Area. LOS is the measure of delay a driver experiences at an intersection, and is graded A through F, with F being the worst. The City of Lafayette deems a LOS D or higher as an acceptable level of service. **Table 4-3** shows the existing and future AM and PM peak hour LOS and delays for the Pathway Study Areas based on projected development in the DSP.

Table 4-3: Existing and Future LOS and Delays

Intersection	Type of Intersection	AM/ PM	Existing		Future	
			LOS	Delay (s)	LOS	Delay (s)
Risa Road/Mt. Diablo Blvd	Signal	AM	B	11.9	A	10.0
		PM	A	9.8	B	11.2
Dolores Drive/Mt. Diablo Blvd	Signal	AM	B	11.3	B	12.1
		PM	B	17.1	B	18.0
Happy Valley Road/Mt. Diablo Blvd	Signal	AM	B	17.5	B	27.2
		PM	C	32.5	D	45.4
Happy Valley Road/Deer Hill Road[1]	AWSC[2]	AM	**F**	**71.4**	**F**	**94.6**
		PM	C	23.4	**F**	**61.8**
Oak Hill Road/Mt Diablo Blvd[1]	Signal	AM	C	28.2	D	36.5
		PM	C	31.7	**E**	**55.0**
Oak Hill Road/SR 24 EB Off-Ramp[1]	SSSC[3]	AM	B	13.5	C	18.5
		PM	A	14.6	**F**	**59.2**
Oak Hill Road/Deer Hill Road[1]	AWSC[2]	AM	C	20.0	D	34.5
		PM	C	19.2	**E**	**47.9**
First Street/Mt Diablo Blvd	Signal	AM	C	31.9	D	36.0
		PM	C	33.7	D	45.2
First Street/SR 24 EB On-Ramp[1]	Unsignalized	AM	A	3.0	A	8.5
		PM	B	13.1	**F**	**132.5**
First Street/Deer Hill Road/Sierra Vista Way[1]	Signal	AM	B	13.2	B	15.8
		PM	B	16.4	**E**	**57.2**

*1. Intersections in **bold** indicate intersections that would operate at an unacceptable level of service under existing and/or future conditions*

2. AWSC: All way stop control

3. SSSC: Side street stop control

Source: Downtown Lafayette Specific Plan EIR, 2009.

Level of Service	*Signalized Intersection*	*Unsignalized Intersection*
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

4.7 Pathway Relationship to Adjacent Land Uses

A pathway along the EBMUD Aqueduct ROW presents both opportunities to improve nonmotorized connectivity within and around downtown Lafayette and the potential need to buffer adjacent, existing land uses from privacy or security impacts. Specific opportunities and constraints associated with these topics are discussed below.

4.7.1 Access Points

If implemented, a pathway along the EBMUD Aqueduct ROW would provide an unparalleled opportunity for improving bicycling and walking access within Lafayette and the surrounding communities. **Figure 4-6** presents potential connections accessible from the EBMUD Aqueduct ROW. The alignment for the pathway would connect the Lafayette Reservoir, the Lafayette BART station, Downtown Lafayette and eventually connect to the Briones-Las Trampas trail. Additional connections include existing and planned residential, office and commercial uses adjacent to the ROW (e.g., the Woodbury development). Persons residing north of SR 24 could access a pathway along the EBMUD Aqueduct ROW using the City's bikeway, trails, and sidewalk network. Existing paths accessible from the EBMUD Aqueduct ROW include a path along Happy Valley Creek that connects Blanche Lane and the BART station and a path connecting the EBRPD trail under SR 24 with the Lafayette-Moraga Trail via Mt. Diablo Boulevard, between Brown Avenue and Golden Gate Way. A proposed Class III bike route on Happy Valley Road and an existing Class III bike route on Brown Avenue would connect a pathway along the EBMUD Aqueduct ROW with additional bike facilities on Mt. Diablo Boulevard and Deer Hill Road.

Though EBMUD's ROW continues west of the Pathway Study Area boundary, extension of a pathway along the ROW may not be feasible due to EBMUD's future filter plant expansion plans. Pathway users traveling west from Risa Road would be directed to cross at the signalized Mt. Diablo Boulevard/Risa Road intersection and travel along the wide sidewalk on the south side of Mt. Diablo Boulevard. At the eastern end of the Pathway Study Area, pathway users traveling east would be directed to either: 1) use the existing EBRPD pathway connector under SR 24 to bike lanes and the existing and planned sidewalk network along Deer Hill Road, or 2) use a pathway segment proposed as part of this Study that connects with Brown Avenue, allowing access to the commercial uses located along Brown Avenue.

Additional opportunities for access may be available through future development project review of properties adjacent to the EBMUD Aqueduct ROW. The City of Lafayette will not pursue acquisition or easements across private property to implement this pathway project without a willing seller and not without clear significant benefits to the project in terms of achieving desired grades and substantially reducing overall construction cost as well as other conceivable benefits. This study further explores these tradeoffs in *Chapter 5: Options Evaluation and Preferred Options.*

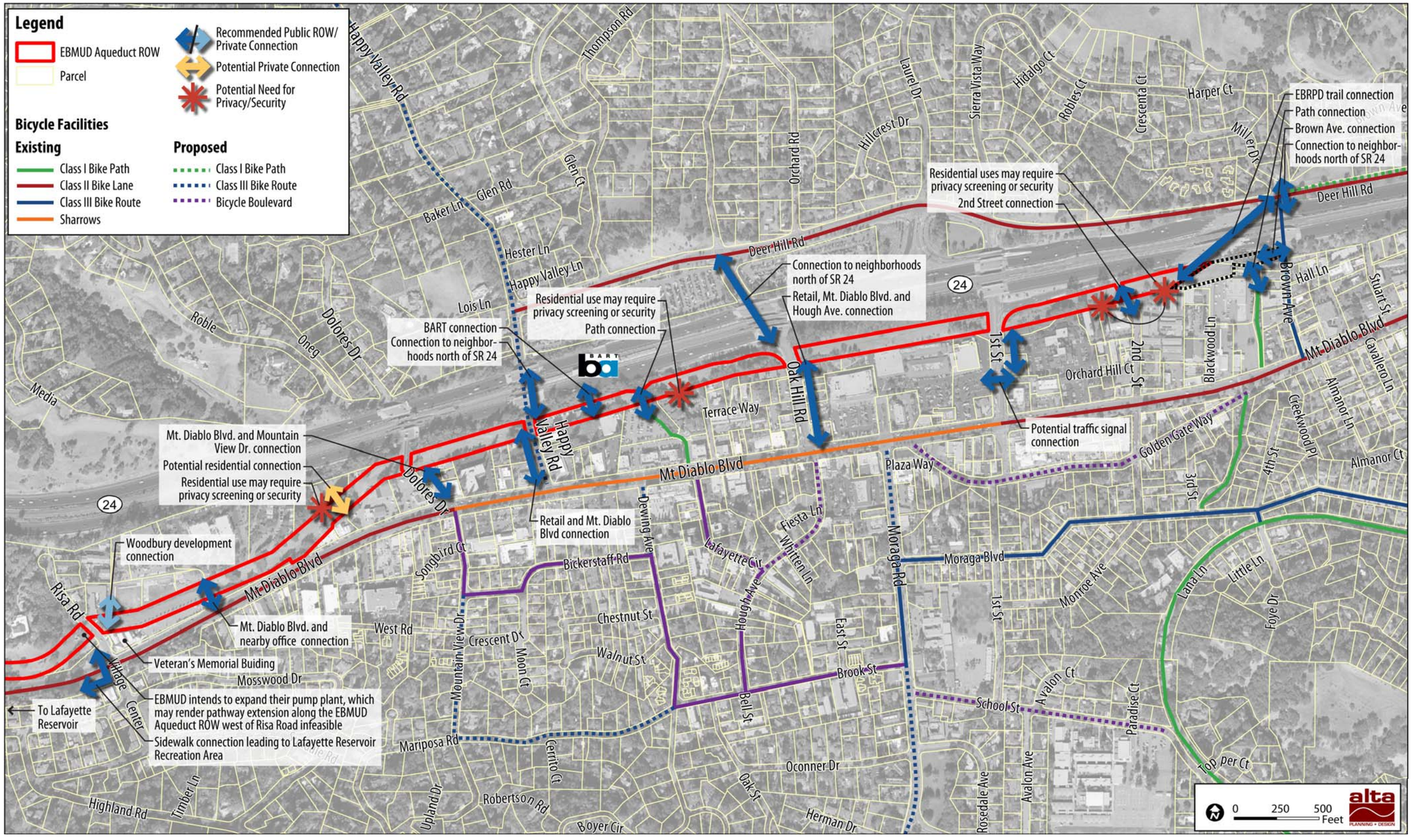


Figure 4-6: Potential Access Points and Locations for Improved Security/Privacy from the EBMUD Aqueduct ROW

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4.8 Safety & Security Considerations

Pathway implementation along the EBMUD Aqueduct ROW would improve access to areas currently not open to the public, but that are used by the public. Safety and security considerations include safety of pathway users and provision of emergency services and private property owner concerns, such as the potential for trespass, vandalism, property damage, theft and noise. Land uses potentially in need of improved privacy or security if the pathway is implemented are identified on **Figure 4-6**.

4.8.1 Private Property-Owner Concerns

Many properties adjoining EBMUD's ROW are privately-owned. Private property owner concerns associated with pathway implementation include impacts on security, pathway access and the potential for trespass, privacy, funding and maintenance, aesthetic impacts, lighting design and pathway access after dark, parking, traffic operations, and existing easements. Issues summarized below are drawn from several different sources, particularly from the property and business owner Focus Group meeting and the CAC. Some of these concerns will need to be addressed in the revised Revocable Landscaping License between EBMUD and the City.

Security

People are currently using all segments of the EBMUD Aqueduct ROW. From Risa Road to BART, people walk to access BART. On all other segments of the ROW, nearby residents are walking for exercise or to walk dogs. Homeless people use some sections of the ROW, and teens congregate at the west end of the Study Area, under SR 24.

Some meeting and focus group participants voiced concerns that the pathway would increase homeless encampments and other undesirable uses, including crime. It was generally agreed that policing of the pathway would be needed. It was suggested that surveillance cameras be considered along pathway for security. While the unimproved ROW does not appear to be a significant problem for adjacent property owners, it is possible that providing a pathway and identifying approved access points may alleviate concerns related to existing uses.

While these concerns are understandable, studies show that neither public nor private landowners have suffered from trail development. The Rails-to-Trails Conservancy surveyed management agencies overseeing 372 trails throughout the United States for their 1998 report titled "Rail-Trails and Safe Communities." This effort documents the level of crime on trails and identifies mitigation measures used by trail designers and managers to minimize the potential for crime. More specifically, the objectives of the study were to: 1) document the levels of crime on urban, suburban and rural rail-trails with current statistics and comprehensive data, 2) examine trail management strategies that can mitigate crime and improve trail safety, and 3) put crime on trails in perspective. The results from the study indicate that rail-trails are safe places. This can be extrapolated to other types of trails. Correspondence from law enforcement agencies consistently reported that rail-trails do not encourage crime. To the contrary, many agencies found that heavy trail usage is a crime deterrent in areas that were isolated prior to implementation of the trail. The study also found that trail managers often utilize design and maintenance strategies to reduce the potential for crime. Several other studies of trail impacts on neighborhood quality and crime conclude that trails have a negligible effect on crime (the most common infringements include illegal motorized use of the trail, litter and unleashed pets)

and that neighbors to the trail are either satisfied or neutral in their level of satisfaction with the trail once in operation. Close proximity to trails may even result in higher property values. Some of the best-known and heaviest used trails in the country bisect wealthy residential neighborhoods and are considered community assets. Fencing, patrols, and other techniques can address issues of privacy and security.

Additionally, EBMUD has a precedent for working with communities to transform unused EBMUD right-of-way into formalized recreational amenities, and sees this transformation as beneficial to security.[12]

Pathway Access and Trespassing

While adjacent property owners feel it is important to provide access to the pathway, most of them requested fencing or landscaping to separate the pathway from their property. One property owner described how people cross their property to use the ROW despite no trespassing signs. There were specific requests for access to be prohibited through private property north of the Terrace Way/Thompson Road intersection, at the private properties immediately east of Oak Hill Road, between the Town Center project (located east of the existing path) and the pathway, and at the property occupied by Blockbuster (located at 1009 Oak Hill Road). To accommodate these property-owner requests, access is being considered at the Oak Hill Road/ pathway crossing and where the existing path along Happy Valley Creek enters the EBMUD Aqueduct ROW.

Clearly-identifiable access points, landscaping, fencing, and signage can direct pathway users to locations where access is desired. Access treatments at a given location will depend on the building design. If the City decides to construct a pathway along the EBMUD Aqueduct ROW, pathway access opportunities in addition to pathway/roadway crossings and the path along Happy Valley Creek, would be identified during review of future redevelopment projects.

Privacy

Most adjacent property-owners want screening or fencing to separate pathway users from the adjacent properties. At the same time, participants noted that residential properties might want access to the pathway. Provision of fences with gates is one way to provide privacy for property-owners and allow controlled access. Adjacent property-owners stated a preference for the pathway to be located closer to SR 24 than to the adjoining residential/office/retail land uses. To the extent feasible, the proposed pathway alignment runs along the central or northern portions of the EBMUD Aqueduct ROW. Potential impacts to adjacent property owners associated with loss of privacy should be addressed during subsequent phases of planning and design development.

Aesthetics

Other concerns include visual changes to the landscape resulting from pathway implementation, including views of the pathway, bridge and landscaping design, and the pathway's effect on the "community gateway" at Happy Valley Road, Oak Hill Road, and First Street. Switchbacks and low gravity retaining walls would be needed along some segments of the pathway in order to navigate steep terrain and provide for universal access. Visual changes can be addressed through planting low landscaping that obscures a pathway bench from view at adjoining properties, but allows for visual access of pathway users for increased user safety and security. If the City decides to pursue the pathway, aesthetic impacts would be further addressed during subsequent phases of planning and design development.

[12] Phone call with Steve Frew, Manager of Security and Emergency Preparedness, January 25, 2011.

Lighting Design and Pathway Access after Dark

Adjacent property-owners stated a preference for limiting pathway operating hours to the daylight hours. Some stated that lighting is needed where the pathway would cross under SR 24 (at the eastern end of the pathway). Some community members supported lighting the pathway with the hope that lighting would deter homeless use. This Study recommends lighting at roadway crossings to improve visibility between pathway users and motorists. The design and height of any light standards should reduce light pollution for adjacent properties. Other than at roadway crossings, the pathway is not currently envisioned to be lit. It is anticipated that regular public use and patrolling by pathway maintenance staff would deter any illegal use of the pathway. If the City decides to pursue the pathway, potential lighting impacts would be further addressed during subsequent phases of planning and design development.

Parking

Some participants, particularly the representative for the Veterans Memorial Building and businesses near Brown Avenue, expressed concern about parking for pathway users. EBMUD does not permit parking on the Aqueduct ROW; the Lafayette BART station parking was constructed before this policy was in place. It was suggested that the City consider constructing parking lots on the City-owned vacant property northwest of the Risa Road/Mt. Diablo Boulevard intersection and on Caltrans-owned property near Brown Avenue under SR 24. It is recommended that the City investigate the need for staging facilities during subsequent phases of planning and design development.

Traffic Operations

Adjacent property owners stated their concern about Oak Hill Road and First Street pathway crossings. Some object to the idea of adding another signal, citing current motor vehicle delays. The Brown Avenue and Deer Hill Road intersection was noted as having long afternoon backups. Traffic operations and recommended improvements at intersections within the Pathway Study Area are discussed in **Section 4.6** of this chapter and *Chapter 5: Options Evaluation and Preferred Options.* The DSP EIR calls for signalization of the Oak Hill Road/SR 24 off-ramp and First Street/SR 24 on-ramp intersections to improve future traffic congestion. Signalization of these two intersections is not likely to occur solely to improve pathway crossings through the intersections. If constructed, the pathway may result in a reduction of vehicular trips if persons who would normally drive to destinations near the pathway choose to bike or walk instead.

Existing Private Uses along EBMUD Aqueduct ROW

A couple of adjoining property owners hold easements to use portions of the EBMUD Aqueduct ROW.[13] Any pathway design would honor the requirements of these privately-held easements. Potential impacts to private uses along the EBMUD Aqueduct ROW should be addressed in subsequent phases of planning and design development.

4.8.2 Homeland Security

Water conveyed through the EBMUD water supply system serves approximately 1.3 million people residing in the San Francisco Bay Area. As such, the Aqueduct is a critically important piece of the San Francisco Bay

[13] Private easements are held along the EBMUD Aqueduct ROW: 1) between the properties located at 3686 and 3688 Mt. Diablo Boulevard (APNs 241020004 and 241020014), and 2) north of the property located at 3578 Terrace Way (APN 243030023) (see **Appendix B**).

Area water conveyance infrastructure. The EBMUD Manager of Security and Emergency Preparedness has indicated that the proposed EBMUD Aqueduct Pathway would not be a cause for concern related to Homeland Security issues.[14] More detail is provided in *Chapter 6: Funding and Maintenance Strategy and Benefit-Cost Analysis.*

4.9 Environmental Constraints

4.9.1 Potential Construction-Related Impacts and Required Investigations

Environmental issues associated with construction of the pathway would likely include, but not be limited to, construction-related air quality impacts; pathway adjacency to sensitive animal species' habitats; tree removal; erosion and impacts to water resources; soils and geology impacts associated with construction and use of the pathway; noise impacts to adjoining uses during construction activities; and temporary impacts to traffic operations.

Air Quality

Project construction would have the potential to temporary increase particulate matter (PM_{10}) from fugitive dust emissions. Given the relatively small amount of earthwork required, this increase would not be expected to result in substantial PM_{10} concentrations, but could contribute to a violation of the PM_{10} standard. The Bay Area does not meet State or federal ambient air quality standards for ground level ozone and State standards for particulate matter (both PM_{10} and $PM_{2.5}$).[15] Implementation of standard dust control measures during construction activities would likely reduce this impact to a less than significant level.

Biological Resources

Construction of a pathway along the EBMUD Aqueduct ROW would result removal of trees and some vegetation to accommodate the pathway and to improve sight distances. The DSP EIR concluded that no special-status plant species are believed to occur within the DSP Area due to the extent of past development and urbanization. The DSP EIR further states that suitable habitat for most special-status animal species does not occur in the DSP Area and no adverse impacts are anticipated. There remains a remote possibility that one or more species could occur or forage in the undeveloped grasslands and woodland areas. Prior to site preparation and pathway construction in undeveloped areas, detailed biological surveys should be undertaken to ensure that the final pathway alignment avoids any sensitive biological resources. Further environmental review and compliance with applicable General Plan goals and policies, especially related to tree removal, and DSP EIR mitigation measures would be required prior to project approval.

Cultural and Archaeological Resources

No cultural or historical analysis has been carried out for this Study. A significant impact could occur if future construction activities, such as grading and excavation, disturb archaeological resources. However, the likelihood of this occurring is low because the Pathway Study Area is already urbanized. The existing and proposed federal, State, and local regulations, procedures, and policies would protect archaeological resources in the Pathway Study Area. Future assessment of impacts would need to be conducted prior to approval of the pathway project.

[14] Phone call with Steve Frew, Manager of Security and Emergency Preparedness, January 25, 2011.
[15] Downtown Lafayette Specific Plan Draft EIR p. 4.2-16

Soils, Erosion and Water Quality

Pathway implementation would result in new impervious surfaces and drainage structures to collect and convey drainage next to the pathway. The pathway would likely introduce between 1.5 and 2.5-acres of new impervious surface, depending on the chosen alignment and facility type and type of paving. Construction of the pathway could result in erosion associated with the excavation, fill placement, and potential spoils removal and/or stockpiling. In addition, erosion could result from vegetation removal and drainage improvements along the pathway. If not properly mitigated, erosion could result in water quality degradation of local surface waters due to the transport of sediment and silt particles off-site through stormwater runoff. Therefore, precautions must be taken, in the form of best management practices (BMPs), to ensure that the potential for erosion is minimized. If proposed, new landscaping installed along the pathway could also minimize erosion by stabilizing soils.

Between First Street and Brown Avenue, the soil within the EBMUD Aqueduct ROW is waterlogged, due to leaking pipes. The pathway alignment and design should incorporate measures to ensure structural stability of the pathway.

Noise

Equipment noise associated with site preparation and trail construction could disrupt activities at nearby homes, offices or commercial uses on weekdays during daylight hours. City of Lafayette General Plan Program N-1.2.1 specifies use of the City's Noise Ordinance in environmental review of all development proposals and incorporation of project design measures to reduce noise to allowable limits.

Traffic Operations

Temporary traffic operation impacts may occur during construction of path/roadway crossing improvements and/or bicycle/pedestrian bridge construction. Pathway improvements have not yet been determined, but would likely include includes a number of "alerts" for both cyclists and motorists that they are approaching a bicycle and pedestrian crossing, including signage, pavement markings, distinctive surfacing through the crossing and tactile warning strips on the trial adjacent to the roadway crossing.

4.9.2 Potential Air Quality Impacts to Trail Users

Implementation of the project would place sensitive populations (children, elderly persons and those with pre-existing serious health problems affected by air quality) near SR 24, a particulate and ozone generator. Air quality impacts associated with development within the DSP area were discussed and mitigated to a less than significant level in the DSP EIR. Impact AQ-2 of the DSP EIR states the following:

> "The proposed Plan could locate sensitive receptors within 250 feet of State Route 24, which would expose sensitive receptors to unhealthy levels of TACs and $PM_{2.5}$ emitted by vehicle traffic on State Route 24. This would result in a significant impact. (DSP Draft EIR p. 4.2-33)"

To mitigate this potentially significant impact, DSP EIR Mitigation Measure (MM) AQ-2 requires utilization of a 250-foot buffer between the sensitive receptor and the edge of the nearest travel lane, unless site specific analysis to determine the level of DPM and $PM_{2.5}$ exposure is conducted. If the site specific analysis identifies significant exposures of DPM or $PM_{2.5}$, then the DSP EIR requires supplementary measures, including tiered tree plantings. Additional measures outlined in MM AQ-2, such as use of indoor air filters and noticing at

residences, would not be applicable to a pathway project. The DSP EIR concludes that implementation of MM AQ-2 would result in less than significant $PM_{2.5}$ and DPM exposure levels.

Preliminary consultation with Bay Area Air Quality Management District (BAAQMD) staff[16] implies that the air quality standards applied to sensitive receptors, such as residences, are likely too conservative to be applied to pathway use. For example, the DSP EIR modeled increase in cancer risks for potential future residents in the DSP area near SR 24 were assumed to be continuous for 24 hours per day at a breathing rate of 302 liters per kilogram of body weight for a 70-year lifetime exposure. Unlike stationary receptors, pathway users along the EBMUD Aqueduct ROW would likely to be exposed to air pollution associated with SR 24 for a significantly shorter amount of time and experience less exposure.

Little research exists that directly addresses the effects of air pollution on pathway users for a pathway adjacent to a freeway. However, related research looking at bicyclists' exposure to air pollution compared to other modes of transportation (e.g. drivers & transit riders) indicates that exposure to most air pollutants is higher for drivers than for bicyclists (in some cases, 2 to 4 times higher).[17, 18,19] The exposure differences are different for different types of pollutants, with PM's typically the only pollutants showing increased exposure rates for bicyclists. A recent study comparing the risks of bicycle commuting to motor vehicle commuting found that the small increase in bicyclist deaths due to air pollution exposure were offset nearly 80 to 1 by the health benefits of increased activity due to bicycling.[20]

Bicyclist exposure to air pollutants drops significantly even with short distances from motor vehicles (e.g. 22 ft away from a roadway, exposure dropped by 30% (Ultra Fine Particles), 22% (CO), and 14% (PM2.5).)[10,21] Even comparisons between standard bike lanes and cycle tracks separated from the roadway by a parked car show significant differences in pollutant exposure.[22]

In sum, there are three key points that suggest that air pollution associated with Highway 24 traffic will not pose a significant impact to pathway users. First, as noted by BAAQMD, pathway users are not stationary sensitive receptors—they are exposed to air pollution for a short amount of time compared to people living and working within the EBMUD Aqueduct corridor. Second, research has shown that exposure to air pollutants quickly drops as you travel further from motor vehicles; much of the proposed pathway lies several hundred feet from Highway 24. Third, research has shown that with the exception of PMs, bicyclists traveling adjacent to motor vehicles are exposed to less pollution than motorists, and the health benefits of bicycling significantly outweigh the negative health impacts of increased PM pollution exposure.

[16] Phone conversation with Dave Burch, BAAQMD Senior Environmental Planner on October 12, 2010.
[17] Pattinson, Woodrow. Cyclist exposure to traffic pollution: microscale variance, the impact of route choice and comparison to other modal choices in two New Zealand cities. Master's Thesis in Geography. University of Canterbury. 2009.
[18] Rank, Jette; Jens Folke, Per Homann Jespersen. Differences in cyclists and car drivers exposure to air pollution from traffic in the city of Copenhagen. The Science of the Total Environment, Vol 279, Issues 1-3, November 12, 2001, pages 131-136.
[19] Chertok, Michael, et.al. Comparison of air pollution exposure for five commuting modes in Sydney – car, train, bus, bicycle and walking Health Promotion Journal of Australia 2004;15:63
[20] Rojas-Rueda, David, et.al. The health risks and benefits of cycling in urban environments compared with car use: health impact assessment study. British Medical Health Journal. 2011. 343:d4521.
[21] Hertel, Ole, et al. A proper choice of route significantly reduces air pollution exposure—A study on bicycle and bus trips in urban streets. The Science of the Total Environment, Vol 389, Issue 1, January 15, 2008, pages58-70.
[22] Kendrick, C. M. et al. The Impact of Bicycle Lane Characteristics on Bicyclists' Exposure to Traffic-Related Particulate Matter. Portland State University. Submitted to Transportation Research Board Annual Meeting January 23-27, 2011.

5. Options Evaluation and Preferred Options

This *Options Evaluation and Preferred Options Chapter* evaluates the pathway design and roadway crossing treatment options for a pathway along the EBMUD Aqueduct ROW and identifies the recommended preferred options.

The chapter consists of the following seven sections:

Section 5.1 presents a preliminary Project Alternatives analysis pursuant to Caltrans project development procedures requirements.

Section 5.2 illustrates the Pathway Study Area segments.

Section 5.3 summarizes the preferred options for pathway design and crossing options, and provides a map illustrating recommended preferred options and cost estimates.

Sections 5.4 through **5.7** present a detailed evaluation of pathway design and roadway crossing options for four distinct pathway segments. Pathway design options consider either a Class I bikeway/ADA-accessible pathway or a multi-use pathway that is not ADA-accessible. Each roadway crossing is discussed within the associated pathway segment. For those roadway crossings that warrant more than one design option, each design option is considered and discussed.

5.1 Project Alternatives

Due to structural, topographic and ROW constraints described in *Chapter 4: Existing Conditions, Opportunities, and Constraints*, the proposed pathway design options require use of the SR 24 ROW in addition to the EBMUD Aqueduct ROW. In order to justify use of Caltrans ROW, all practical alternatives for the proposed project need to be analyzed. This *Options Evaluation and Preferred Options Chapter* investigates use of the Caltrans ROW consistent with discussions with the agency on January 4, 2011. This section includes a preliminary documentation of project alternatives sufficient for inclusion in a Project Study Report/Project Report as outlined in Chapter 6 of the Caltrans Project Development Procedures Manual. [23]

Prior to the adoption of the 2006 City of Lafayette Bikeways Master Plan, City staff and consultants investigated potential bikeway improvements throughout Lafayette, including practical alternatives to a pathway along the EBMUD Aqueduct ROW currently under study. Findings from the Bikeways Master Plan analysis, and related planning efforts are incorporated in the discussion below.

This section considers four alternative alignments for providing bicycle and pedestrian access within the Pathway Study Area: Deer Hill Road; Mt. Diablo Boulevard; exclusive use of the EBMUD Aqueduct ROW (ROW); and combined use of the EBMUD Aqueduct ROW and SR 24 ROW.

[23] http://www.dot.ca.gov/hq/oppd/pdpm/other/PDPM-Chapters.pdf

5.1.1 Deer Hill Road Alternative

Deer Hill Road has existing Class II bicycle lanes and runs parallel to and north of SR 24 and the EBMUD Aqueduct ROW from Happy Valley Road in the west to Brown Avenue in the east. The road continues east to Pleasant Hill Road after crossing over the EBMUD Aqueduct at Brown Avenue. Sidewalks exist along both sides of the road west of First Street, but are discontinuous east of First Street.

Four streets connect Deer Hill Road to Downtown: Happy Valley Road, Oak Hill Road, First Street and Brown Avenue. Steep hills and pedestrian and bicycle conflicts at the SR 24 on- and off-ramps at Laurel Drive limit this roadway's suitability for less experienced and youth bicyclists, who may not feel comfortable using the bicycle lanes.

Construction of a separated pathway (sidepath) along Deer Hill Road is feasible; however, Deer Hill Road does not extend west of Happy Valley Road, thus providing parallel access to only a portion of the Project Study Area. Obstacles to implementation of this alignment include the need to allocate ROW from the BART parking lot or existing travel lanes. In addition, it is a three to five minute walk from Deer Hill Road to shops on Mt. Diablo Boulevard, suggesting that people would most likely not use this roadway to walk between Downtown destinations. Deer Hill Road does provide direct access to the Lafayette BART station, but the alignment is not adjacent to major pedestrian and bicycle traffic generators. Finally, a sidepath on Deer Hill Road would provide benefits for less experienced users traveling this specific street but would be redundant for experienced bicyclists given the existing bicycle lanes.

5.1.2 Mt. Diablo Boulevard Alternative

Mt. Diablo Boulevard is the primary commercial arterial serving Downtown Lafayette and runs directly parallel to and south of the EBMUD Aqueduct ROW. Mt. Diablo Boulevard connects the Lafayette Reservoir, BART, and Downtown shops and serves the majority of east-west local traffic that is not carried by SR 24. Sidewalks exist on both sides of the roadway within most of the Study Area, and the City has invested significantly in improving the pedestrian environment through Downtown. West of the Pathway Study Area, there is an existing wide sidewalk pathway on the south side of Mt. Diablo Boulevard, providing access to the Lafayette Reservoir.

Bicycle lanes exist on both sides of Mt. Diablo Boulevard west of Mountain View Drive and east of First Street. Between Mountain View Drive and First Street, wider sidewalks, on-street parking and medians with mature vegetation reduce the available roadway width for bicycle accommodations. Shared lane markings are provided from Mountain View Drive to First Street in place of bicycle lanes.

Continuous bicycle lanes through Downtown Lafayette along Mt. Diablo Boulevard were considered but locally rejected through preparation of the Bikeways Master Plan. Striping bicycle lanes on Mt. Diablo Boulevard from Mountain View Drive in the west to First Street in the east would require removal of on-street parking or other substantial modifications to the street configuration that would have a significant economic impact on Downtown businesses. Other alternatives for reconfiguring the street would have significant circulation impacts; such as auto travel lane removal, turn lane reconfiguration and median removal. All such concepts were removed from consideration through recent previous planning studies including the Bikeways Master Plan and DSP.

5.1.3 EBMUD Aqueduct ROW Only Alternative

The Bikeways Master Plan generally assumed that the 100-foot-wide EBMUD Aqueduct ROW would provide for development of a paved multi-use pathway without requirement for use of any adjacent property. This assumption was carried through the initiation of this feasibility study.

Limiting construction to within the EBMUD Aqueduct ROW would reduce the financial and administrative costs for permitting, designing, and constructing a pathway. However, as detailed in **Section 4.5.2** in *Chapter 4: Existing Conditions, Opportunities, and Constraints*, due to the topographic constraints of the site and EBMUD structural requirements, it is not feasible to construct a functional pathway along the some key sections of the EBMUD Aqueduct ROW. Any Class I bikeway or multi-purpose pathway constructed entirely within EBMUD Aqueduct ROW and engineered to address the topographic constraints and EBMUD structural requirements would require a significant number of switchback turns with extremely tight turning radii, resulting in a horizontal alignment not suitable for commuter bicycling and creating significant conflicts between pedestrians, bicyclists and other pathway users.

5.1.4 EBMUD Aqueduct/Caltrans SR 24 Combined ROW Alternative

Combined use of the EBMUD Aqueduct ROW and, at key locations, the SR 24 ROW, provides for additional horizontal width that will enable construction of a Class I bikeway or multi-purpose pathway; providing opportunity to navigate the steep grade changes and to avoid areas over the existing aqueduct pipes that impose structural limitations. Encroachment into Caltrans' ROW is preliminarily recommended at three locations: west of the Dolores Drive crossing, at Happy Valley Road and at Oak Hill Road. These options are discussed in further detail in **Sections 5.4** and **5.5**.

5.1.5 Project Alternatives Conclusions

The EBMUD Aqueduct ROW alternatives offer opportunities not provided by the Deer Hill Road or Mt. Diablo Boulevard alternatives: an exclusive pathway with minimum motor vehicle conflicts and short, direct connections to BART and Downtown shopping. However, exclusive use of EBMUD Aqueduct ROW is not feasible given topographic and structural constraints. This Project Alternatives analysis demonstrates that the combined use of EBMUD Aqueduct ROW and SR 24 ROW is the only feasible alternative that achieves the goals and objectives defined for this study.

5.2 Study Area Pathway Segments

The pathway segments are defined from west to east based on site topography, surrounding land use context, and anticipated use. The pathway segments are shown in **Figure 5-1** and consist of:

- Pathway Segment 1: Risa Road to BART
    - Includes Risa Road, Private Drive, Dolores Drive, Happy Valley Road crossings
- Pathway Segment 2: BART to Oak Hill Road
    - Includes Oak Hill Road crossing
- Pathway Segment 3: Oak Hill Road to First Street
    - Includes First Street crossing
- Pathway Segment 4: First Street to Brown Avenue

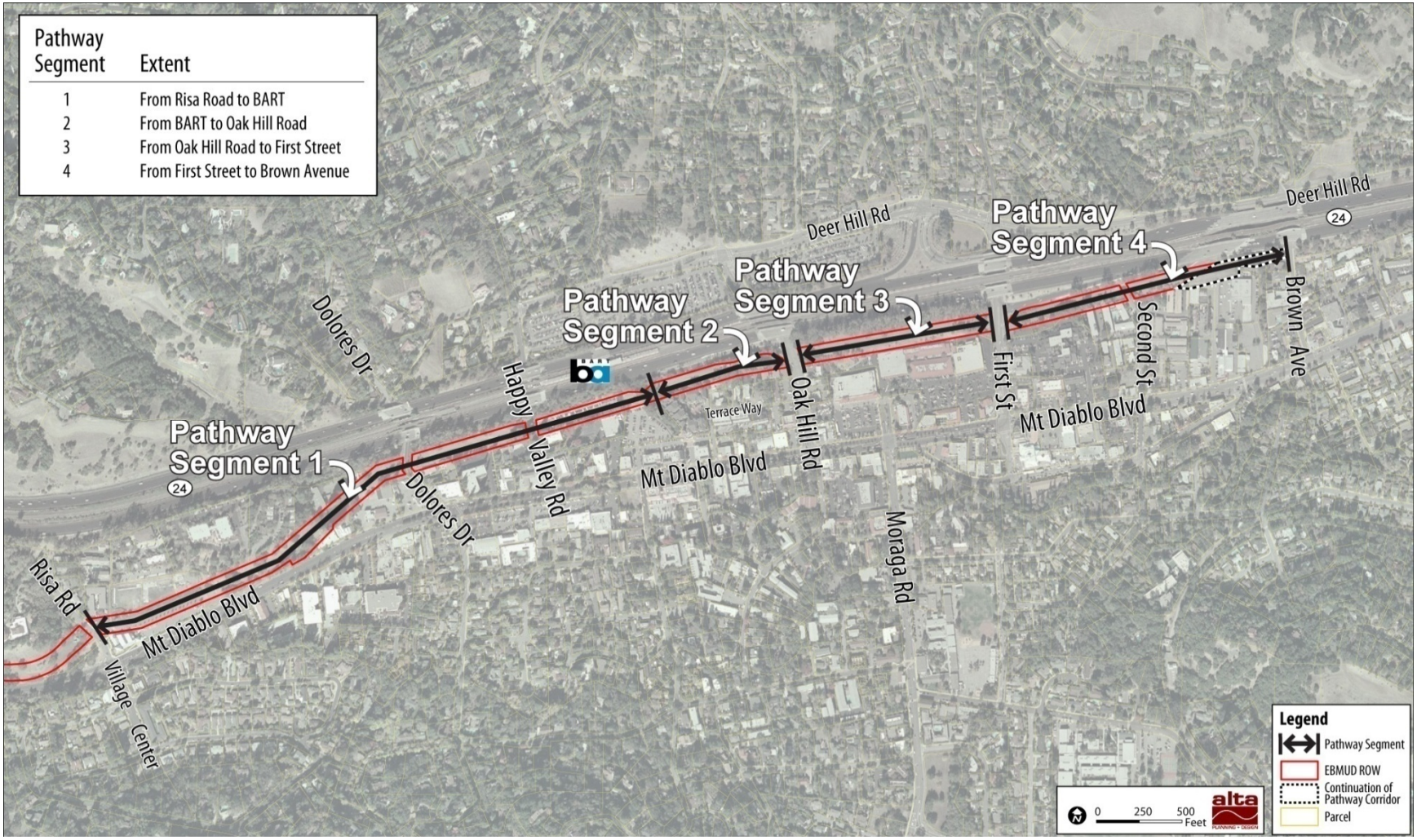

Figure 5-1: Pathway Segments

5.3 Summary of Pathway Design Options and Preferred Options

This section summarizes the preliminary pathway design and roadway treatment options and presents the preferred options and rationale for choosing each one. Further detail is provided in the segment descriptions, **Sections 5.4** through **5.7**.

5.3.1 Pathway Design

It is feasible to construct a pathway along the EBMUD Aqueduct ROW that meets the goals of this Study. However, ROW availability, topographic constraints, and structural requirements limit the possible design options. Assuming the combined use of the EBMUD and Caltrans ROWs, facility design options for a pathway along the EBMUD Aqueduct ROW include:

- A paved Class I bikeway/ADA-accessible pathway
- An unpaved multi-use pathway (not ADA-accessible)

The preferred pathway design is a paved Class I bikeway/ADA-accessible pathway that conforms as best as feasible to the requirements set forth in Caltrans Chapter 1000, 1003.1 Class I bikeways, the structural requirements presented by the EBMUD and design guidance provided by City of Lafayette staff, the TAG, the CAC, and the general public (see **Figure 5-2**). This design option combines two of the three designs described in *Chapter 4* and meets design requirements of both. Compared to the unpaved multi-use pathway option, the Class I bikeway/ADA-accessible pathway his will serve a greater range of users, will provide greater transportation benefits and is eligible for a larger pot of grant funding for construction.

The preferred alignment, shown in **Figure 5-3**, provides an ADA-accessible pathway that minimizes fill and excavation in the EBMUD Aqueduct ROW. Where the pathway alignment proposes to add fill over the EBMUD aqueducts, the aqueducts will need to be potholed and the potential loading from the fill will need to be analyzed at each location to ensure the aqueducts will be able to continue to operate as normal. The preferred alignment enters Caltrans ROW in three locations, described in more detail below.

The preferred pathway cross section assumes a minimum 10-foot paved width, 2-foot clear shoulders, pathway lighting at intersections, and site landscaping and amenities as appropriate to the land use context for each segment. Where EBMUD maintenance vehicles are expected to use the pathway, the paved width of the pathway must be 12 feet to accommodate maintenance vehicles and reduce pathway deterioration. The basic civil engineering requirements and costs for the design options and preferred option are presented in detail in **Sections 5.4** through **5.7** and are summarized in *Chapter 7, Phasing Plan and Next Steps*.

If the City decides to pursue construction of the pathway, additional discussions with EBMUD, review and approval of the pathway design, and issuance of an encroachment permit for construction will be needed during future planning and design phases.

Caltrans Chapter 1000 design exceptions[24] will be required to implement the pathway, including but not limited to design speed and horizontal curvatures (Chapter 1000, 1003.1(7)) and slope greater than five (5) percent. (Chapter 1000, 1003.1 (12)). As noted in Chapter 1000, however, steeper grades can be tolerated for short segments (e.g., up to about 150 meters; approximately 500 feet). The switchbacks presented in the conceptual design in the segment descriptions (**Sections 5.4 through 5.7**) reduce the slope to the extent feasible, and within the slope parameters promulgated by Caltrans, but require tight curves as a result. Turn radii for Class I bikeways is a function of the superelevation rate[25] of the bikeway surface, the coefficient of friction between the bicycle tires and the bicycle path surface, and the speed of the bicycle. Caltrans has granted a similar design exception for the design speed and pathway horizontal curvatures on numerous pathway projects in the San Francisco Bay Area in recent years.

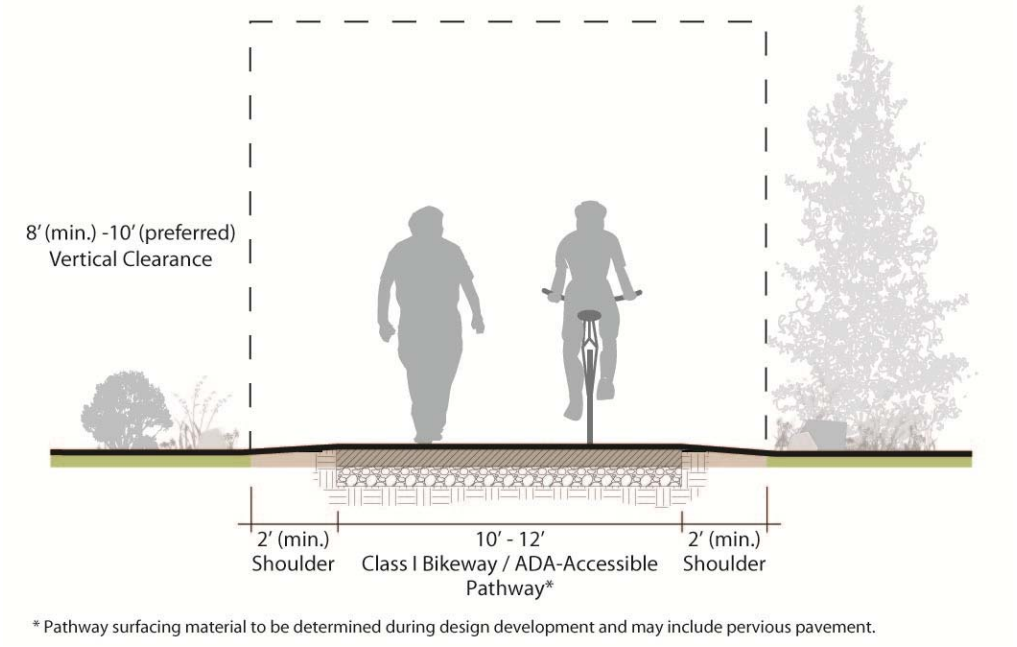

Figure 5-2: Preferred Pathway Design Standard

5.3.2 Roadway Crossings

A pathway along the EBMUD Aqueduct ROW would be required to cross six roadways. Three of the six roadway crossings have only one design option, an at-grade uncontrolled crossing: Risa Road, Private Drive, and Dolores Drive. The remaining three roadway crossings, Happy Valley Road, Oak Hill Road and First Street require a combination of significant civil engineering and traffic engineering changes in order to provide for a continuous pedestrian and bicycle pathway.

[24] The Caltrans Project Development Procedures Manual (Chapter 21) outlines the required process for obtaining approval to mandatory and advisory design standards. Additional detailed consultation with Caltrans Design Division staff from District 4 and Headquarters is required to determine the specific design exceptions required for this project.
[25] Superelevation is sloping the path or roadway to help offset centripetal forces developed as the bicycle or vehicle goes around a curve, and is comparable to cross-slope. ADA-accessible pathways require a maximum cross-slope of 2 percent.

The preferred options for Happy Valley Road, Oak Hill Road and First Street are summarized below and in **Figure 5-3**. Detailed descriptions for design options (when applicable) and preferred options for all six crossings are provided in **Section 5.4** through **5.7**.

Happy Valley Road

Two preliminary crossing options were evaluated for Happy Valley Road: (1) an at-grade crossing entirely within EBMUD Aqueduct ROW, which would require numerous switchbacks in order to meet grade at Happy Valley Road; and (2) a bicycle and pedestrian bridge constructed in the Caltrans ROW.

The preferred option for the Happy Valley Road crossing is a bicycle and pedestrian bridge. The bicycle and pedestrian bridge enables an alignment that is compliant with Caltrans Chapter 1000 Class I bikeways standards, with the potential exception of the horizontal curvatures, as described in **Section 5.3.1**. While it is more costly and requires securing an encroachment permit from Caltrans, the bridge allows a pathway designed to meet EBMUD's structural requirements and Caltrans' Class I bikeway requirements and is eligible for transportation funding.

Further detail is provided in **Section 5.5 Segment 1: Risa Road to BART**.

Oak Hill Road

Three preliminary roadway crossing options were evaluated for Oak Hill Road:

1. **Mt. Diablo Boulevard Crossing**. This option would route pathway users to the signalized intersection of Oak Hill Road and Mount Diablo Boulevard to cross. This option was not selected due to the additional distance pathway users would have to travel and safety issues related to high traffic volumes and speeds on Oak Hill Road.
2. **Signalized Crossing at Oak Hill Road /SR 24 Eastbound Off-Ramp.** This option would signalize the intersection of Oak Hill Road and the SR24 Eastbound Off-ramp, install curb extensions at pathway crossings, install high-visibility crosswalks and advanced stop bars, and widen the sidewalk on the east side of Oak Hill Road from the pathway to Mount Diablo Boulevard.

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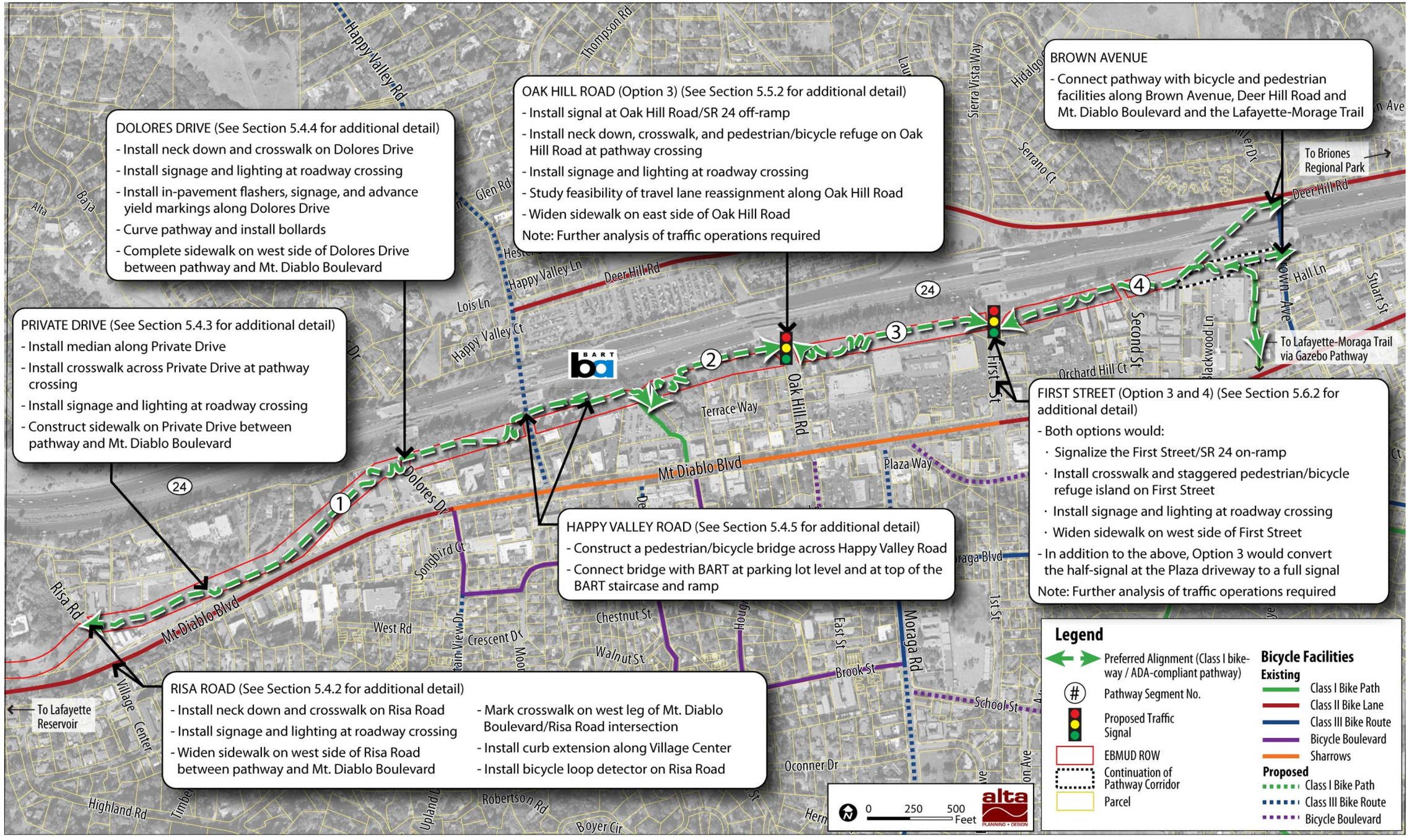

Figure 5-3: The Preferred Option: A Class I Bikeway/ADA-Accessible Pathway (Includes Roadway Crossing Improvements)

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3. **Signalized Crossing with Median Refuge and Lane Reduction on Oak Hill**. This option includes all treatments described in option 2, above, reduces the number of lanes on Oak Hill Road from four lanes to either three or two lanes, and provides a median refuge island for pathway users.

Option 3 is the preferred option for Oak Hill Road, as it provides the greatest benefit to pathway users. Additional conceptual design detail and preliminary traffic analysis are provided in **Section 5.5**.

Additional traffic study is required to fully understand the potential roadway capacity and level of service impacts of signal control and lane reduction on Oak Hill Road.

Further detail is provided in **Section 5.5**.

First Street

Four preliminary roadway crossing options were evaluated for First Street.

1. **Mount Diablo Boulevard Crossing**. This option would route pathway users to the signalized intersection of First Street and Mount Diablo Boulevard to cross. This option was not selected due to the considerable additional distance pathway users would have to travel, which could encourage undesirable mid-block crossings, and safety issues related to high traffic volumes and speeds on First Street.
2. **Signalized Pathway Crossing at the Plaza Parking Lot.** This option would route pathway users to a new full signal and crosswalk at the Plaza parking lot exit and widen the sidewalk on both sides of First Street between the pathway entrance and the proposed signal. Signalizing the Plaza parking lot exit would alleviate the observed jaywalking. However, this option was not selected due to additional travel distance for pathway users, and the need to widen sidewalks on both sides of First Street.
3. **Signalized Pathway Crossing at the SR 24 Eastbound On-Ramp with Full Signal at the Plaza Parking Lot Exit.** This option converts the half-signal at the Plaza driveway to a full signal and installs a signal and staggered crosswalk at the SR 24 on-ramp, as well as the sidewalk improvements presented in Option 1 providing improved connections to Mt. Diablo Boulevard.
4. **Signalized Pathway Crossing at the SR 24 Eastbound On-Ramp Only.** This option installs a signal and staggered pedestrian crossing at the SR 24 eastbound on-ramp and maintains the half-signal at the Plaza parking lot.

In order to provide for a safe pedestrian and bicycle crossing of First Street, traffic signal control at the intersection of First Street, the eastbound SR24 on-ramp, and the EBMUD ROW is required, at a minimum. Given the complexity of signalizing this intersection, some options need to be preserved for further investigation in future studies.

Options 3 and 4 are the preferred options, with the final preferred option to be determined by the results of a future detailed micro-simulation traffic analysis that considers all modes. Further detail is provided in **Section 5.6**.

Encroachment into Caltrans ROW

As described in *Chapter 4: Existing Conditions, Opportunities, and Constraints*, in order to minimize grade changes and switchbacks and to accommodate EBMUD structural requirements, the preferred pathway alignment

enters Caltrans ROW in two areas. These locations are summarized below, and described in more detail in **Sections 5.4** and **5.5.**

1. **East of Dolores Drive**. The preferred pathway alignment enters Caltrans ROW just west of the Dolores Drive crossing to skirt around a steep hill and reduce the number of switchbacks required.
2. **Happy Valley Road Crossing**. The preferred pathway alignment enters Caltrans ROW at Happy Valley Road, where a proposed bicycle and pedestrian bridge would cross Happy Valley Road. The bridge foundations and structure, which are not permitted within EBMUD ROW, are placed within Caltrans ROW.
3. **Oak Hill Road Off-Ramp**. The preferred pathway alignment enters the Caltrans ROW just west of Oak Hill Road. At this location, the pathway connects to the existing sidewalk that runs parallel to the south side of the SR 24 off-ramp. This alignment reduces the number of switchbacks required.

This study also considered a fourth encroachment into Caltrans ROW just east of the BART station. This option, the **BART Flyover**, continues the pathway alignment within Caltrans ROW from the BART station to the Oak Hill Road off-ramp, thus reducing user conflicts at the BART station and minimizing switchbacks. Due to site topography, to maintain grades compliant with ADA guidelines, a significant portion of this pathway must be elevated. This option was not chosen due to the high cost of constructing such an alignment, particularly when there already exists a suitable pathway from BART east to the unimproved EBMUD Aqueduct ROW. More detail is provided in **Section 5.5**.

5.4 Segment 1: Risa Road to BART

Segment 1 extends approximately 0.7 miles from Risa Road in the west to connect with the existing path along Happy Valley Creek in the east.

The preferred option for Segment 1 is a paved Class I bikeway/ADA-accessible pathway, with at-grade crossings at Risa Road, Private Drive, and Dolores Drive, and a pedestrian and bicycle bridge over Happy Valley Road. As proposed, this preferred option would cost approximately $2 million to build, including roadway crossing improvements.

Table 5-1 summarizes the planning-level costs of the preferred option for Segment 1 as well as the costs of other options that were considered. Detailed descriptions of the design options and preferred options, including the rationale for choosing each preferred option are described below.

Table 5-1: Cost Summary for Preferred and Other Considered Options for Segment 1 Risa Road to BART

Preferred Option		Other Considered Options	
Description	*Cost*	*Description*	*Cost*
Class I Bikeway/ ADA-Accessible Pathway	$372,100	Unpaved Multi-Use Pathway	$308,500
Risa Road Crossing Improvements	$144,400 - $148,300	Risa Road Crossing Improvements	$144,400 - $148,300
Private Drive Crossing Improvements	$67,800	Private Drive Crossing Improvements	$67,800
Dolores Drive Crossing Improvements	$249,000	Dolores Drive Crossing Improvements	$249,000
Happy Valley Road Pedestrian and Bicycle Bridge	$1,238,100	At-grade crossing	$2,850
Total Cost of Preferred Option	**$2,071,400 - $2,075,300**	**Total Cost of Other Considered Options**	**$772,600 - $776,500**

5.4.1 Pathway Design

Summary of Existing Conditions, Opportunities, and Constraints

Surrounding land uses include the Lafayette BART station, Downtown, and residential, office, and commercial space. The Woodbury Project, a new residential development approved by the City, is proposed north of the EBMUD Aqueduct ROW at Risa Road. The Woodbury Project includes construction of a pathway segment and landscaping along the EBMUD Aqueduct ROW for the length of the Woodbury property.

Topography along the segment varies, and is illustrated and described in detail in *Chapter 4: Existing Conditions, Opportunities, and Constraints*. Between Risa Road and Dolores Drive, the EBMUD Aqueduct ROW is relatively flat. Just west of Dolores Drive lies the first of two significant hills. The alignment rises again just west of Happy Valley Road, and drops down to Happy Valley Road at a 33 percent slope.

Design constraints through this Pathway Segment include shallow cover above the aqueduct pipes immediately west of Dolores Drive. This project should address the existing drainage ditch located approximately 300 feet east of Private Drive.

Roadway crossings within Segment 1 include Risa Road, the Private Drive east of the Lafayette Veteran's Memorial Building, Dolores Drive, and Happy Valley Road. Bicycle and pedestrian access across Risa Road and through the Mt. Diablo Boulevard/Risa Road intersection are also included in Segment 1. These are described in detail in following sections.

Options Evaluation and Preferred Option

Two facility design standards are considered for this pathway segment: a paved Class I bikeway/ADA-accessible pathway and an unpaved multi-use pathway. As shown in **Figure 5-4**, the Class I bikeway/ADA-accessible pathway alignment would require some switchbacks along the steeper portions of the EBMUD Aqueduct ROW. Approximately 70 square feet of keystone retaining wall would be needed along the switchback within the EBMUD Aqueduct ROW west of Happy Valley Road. An unpaved multi-use pathway would follow the existing slope profile and incorporate timber stairs immediately west of Happy Valley Road.

The timber stairs would be constructed using railroad ties and rebar to hold them in place. Construction would require minor ground disturbances at the timber stair location. The timber stairs would not be placed on top of the aqueducts or considered permanent structures. As described in **Section 5.3**, the preferred option for the pathway design is the Class I bikeway/ADA-accessible pathway.

Potential Timber Stair Designs
Sources: http://downtoearthscapes.com, http://buzzbakerconstruction.wordpress.com

Planning-Level Cost Estimate for Pathway Construction

Table 5-2 and **Table 5-3** present cost estimates for the two design standards for Segment 1. As proposed, an unpaved multi-use pathway would cost approximately $308,500 to build, not including roadway crossing improvements. A Class I bikeway/ADA-accessible pathway would cost approximately $372,100 to build, not including roadway crossing improvements or a pedestrian/bicycle overcrossing at Happy Valley Road. Costs associated with the crossing improvements are presented in the following sections.

Table 5-2: Segment 1 Cost Estimate for an Unpaved Multi-Use Pathway (Not Including Roadway Crossing Improvements)

No.	Description	Quantity	Unit	Unit Price	Amount
Unpaved Multi-Use Pathway Improvements					
1	Clear, Grub & Tree Removal	49,600	SF	$0.50	$24,800
2	Grading	49,600	SF	$0.75	$37,200
3	6" Aggregate Base (Class 2)	655	CY	$45	$29,475
4	Timber Stairs	1	LS	$60,000	$60,000
5	Minor Items (10% of Construction Items)	1	LS	$16,831	$16,831
6	Additions (10% of Construction Items)	1	LS	$16,831	$16,831
7	Mobilization (10% of Total Construction Cost)	1	LS	$20,571	$20,571
				SEGMENT 1 SUBTOTAL	**$205,700**
				25% SOFT COSTS[1]	**$51,400**
				25% CONTINGENCY	**$51,400**
				SEGMENT 1 TOTAL	**$308,500**

[1]*Soft costs include survey, design, permitting, and administration costs.*

LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

Table 5-3: Segment 1 Cost Estimate for a Class I Bike Path/ADA-Accessible Pathway (Not Including Roadway Crossing Improvements)

No.	Description	Quantity	Unit	Unit Price	Amount
Pathway Improvements					
1	Import Borrow	2,100	CY	$25	$52,500
2	Fine Grading	56,700	SF	$0.50	$28,350
3	3" Hot Mix Asphalt (Type A)	760	TON	$85	$64,600
4	6" Aggregate Base (Class 2)	750	CY	$45	$33,750
5	Keystone Retaining Wall	70	SF	$50	$3,500
6	Minor Items *(10% of Construction Items)*	1	LS	$20,300	$20,300
7	Additions *(10% of Construction Items)*	1	LS	$20,300	$20,300
8	Mobilization *(10% of Total Construction Cost)*	1	LS	$24,812	$24,812
				SEGMENT 1 SUBTOTAL	**$248,100**
				25% SOFT COSTS[1]	**$62,000**
				25% CONTINGENCY	**$62,000**
				SEGMENT 1 TOTAL	**$372,100**

[1]*Soft costs include survey, design, permitting, and administration costs.*

LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

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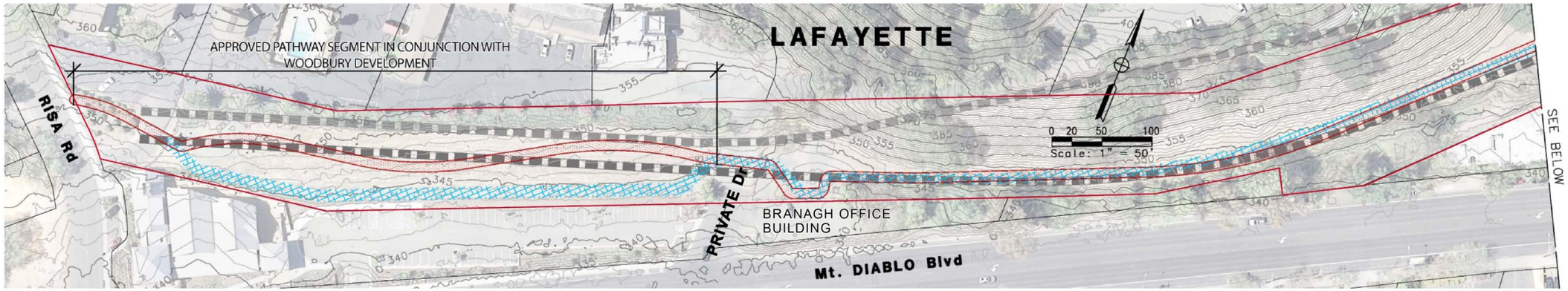

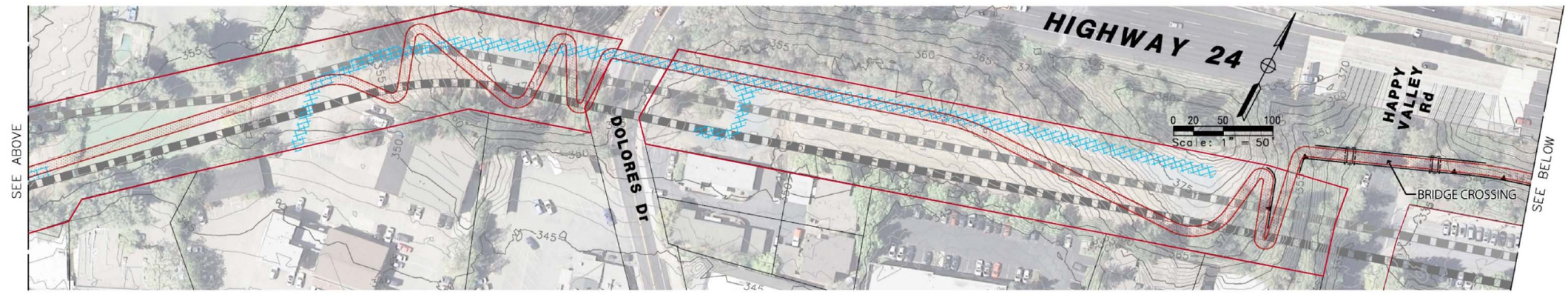

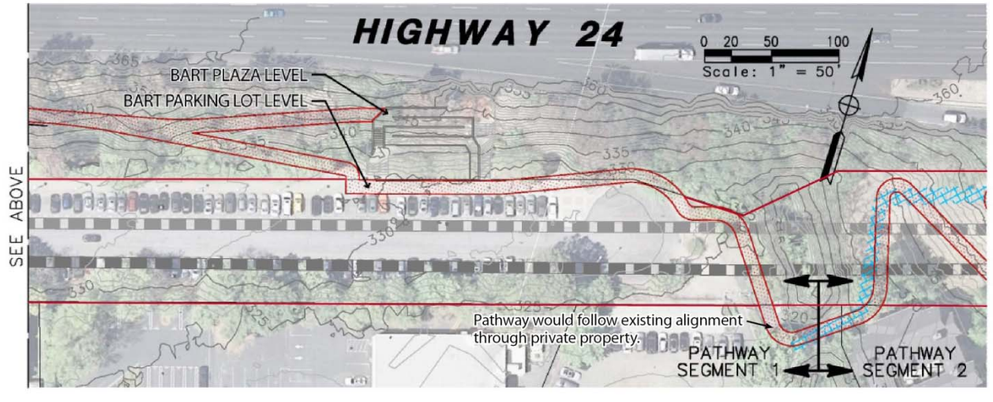

LEGEND

- AQUEDUCT 1
- AQUEDUCT 2
- EXISTING MAINTENANCE PATH*
- PROPOSED PATHWAY
- EBMUD AQUEDUCT RIGHT-OF-WAY

The final pathway alignment may vary from the conceptual alignment shown in this figure in order to accommodate EBMUD access requirements along the EBMUD Aqueduct ROW.

Figure 5-4: Pathway Segment 1 - Class I Bikeway/ADA-Accessible Pathway Alignment

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5.4.2 Risa Road and Mt. Diablo Boulevard Crossings

Risa Road is a two-lane collector that intersects the EBMUD Aqueduct ROW at the west end of the Pathway Study Area. It provides connections to the Lafayette Reservoir via the wide sidewalk on the south side of Mount Diablo Boulevard. Traffic volumes and speeds on Risa Road are low, and sightlines are clear. Traffic volumes and speeds on Mount Diablo Boulevard are high, with 85 percent of vehicles traveling at 45 mph or higher. More detail is provided in *Chapter 4: Existing Conditions, Opportunities, and Constraints.*

Preferred Option

Due to the straightforward conditions at Risa Road and Mount Diablo Boulevard, only one design option was considered: at grade crossing improvements. Recommended improvements facilitate pedestrian and bicycle connections with the existing wide sidewalk on the south side of Mt. Diablo Boulevard. **Figure 5-5** shows a conceptual design for the treatments. Additional long-term opportunities would reconfigure the angled parking spaces on Risa Road adjacent to the Lafayette Memorial Building to improve sight lines between vehicles and on-street bicyclists.

Risa Road: Pathway Entrance Treatments

The following treatments are recommended to enhance the safety and access for potential users accessing the pathway at Risa Road.

1. **Stripe a High-Visibility Ladder Crosswalk** at the pathway entrance to connect users to the west side of Risa Road.
2. **Install Neck-Downs** at the crosswalk entrance to shorten the crossing time for users, enhance safety by decreasing vehicle speeds and increase visibility.
3. **Install Advance Signage** on northbound and southbound approach on Risa Road to warn drivers of an upcoming pedestrian/bicycle crossing.
4. **Install Pedestrian Scale Lights** at the pathway entrance to improve visibility between drivers and pathway users and to enhance personal security at night. Light poles should be installed within City of Lafayette's ROW or easement over the EBMUD Aqueduct ROW.
5. **Install Stop Signs** on the pathway to ensure pathway users stop and look for oncoming traffic before crossing Risa Road.
6. **Widen Sidewalk on the west side of Risa Road between** the pathway crossing and Mt. Diablo Boulevard to eight feet in width for pedestrians and less experienced bicyclists and to discourage wrong way riding.
7. **Long-Term Opportunity:** Change the front-in parking at the Veteran's Memorial Building to reduce potential conflicts between vehicles backing out of the spaces and bicyclists accessing the pathway. The following are a list of options to consider:
    a. Remove angled parking spaces (four spaces total)
    b. Reconfigure to back-in angled parking (no loss of parking spaces)
    c. Reconfigure to parallel parking (likely loss of two parking spaces)

If the Woodbury Project does not come to fruition or is redesigned, the City may seek to place the pathway on the south side of the Woodbury Project Driveway and the pathway/Risa Road crossing adjacent to the south of driveway.

Mt. Diablo Boulevard Crossing Enhancements

The following treatments are recommended to enhance the safety and access for potential pathway users navigating the Risa Road/Mt. Diablo Boulevard intersection.

1. **Install Curb Extension** on the southeast corner of the Mt. Diablo Boulevard and Risa Road intersection. A curb extension would help bicyclists who need to make a two legged turn. Use of the waiting area would enhance bicycle safety as they connect to/from Mt. Diablo Boulevard and the Lafayette Reservoir.
2. **Stripe a Crosswalk** on the west leg of the Mt. Diablo Boulevard and Risa Road intersection. Adding a crosswalk at this location provides a direct connection to the west side sidewalk on Risa Road and may minimize wrong-way riding.

The existing curb extension southwest of the Risa Road/Mt. Diablo Boulevard/Village Center intersection creates a shorter crossing distance and a larger waiting area for pedestrians and bicyclists than a standard curb

3. **Install a Bicycle Loop Detector** along southbound Risa Road to trigger the traffic signal when bicyclists are waiting to turn left onto Mt. Diablo Boulevard.

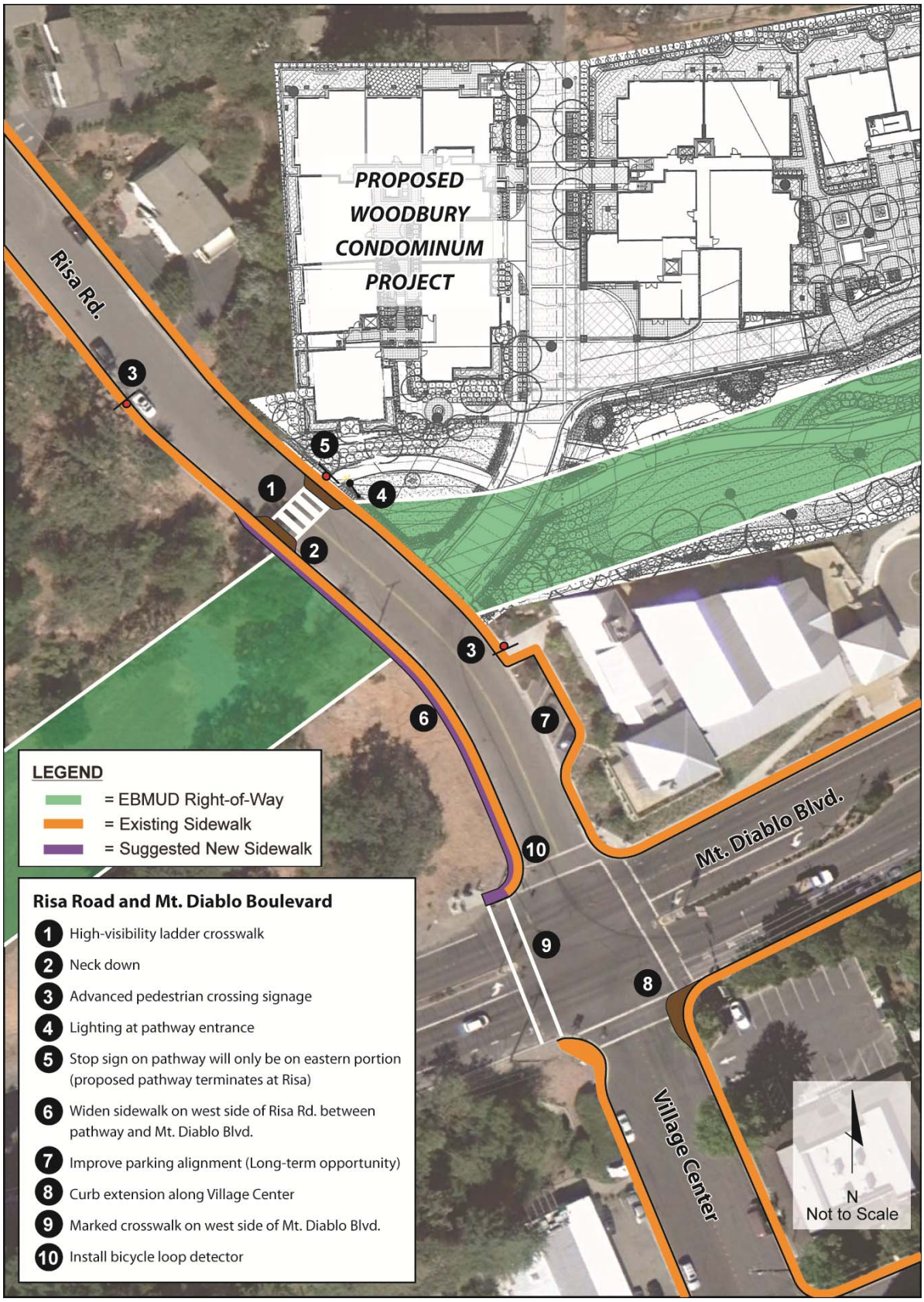

Figure 5-5: Risa Road and Mt. Diablo Boulevard Crossing Improvements

Risa Road and Mt. Diablo Boulevard Crossings Planning-Level Cost Estimates

Planning-level construction cost estimates are presented in **Table 5-4**. The improvements to Risa Road and Mt. Diablo Boulevard would cost between $144,400 and $148,300, depending on whether the angled-parking on Risa Road is removed and, if so, which alternative parking configuration is put in place.

Table 5-4: Cost Estimate for Risa Road and Mt. Diablo Boulevard Improvements

No.	Description	Quantity	Unit	Unit Price	Amount
Risa Road					
1	Ladder Crosswalk at Pathway Entrance	250	LF	$7	$1,750
2	Neck-Downs	1	LS	$25,000	$25,000
3	Advanced Signage	2	EA	$700	$1,400
4	Lights at Pathway Entrance	2	EA	$1,000	$2,000
5	Stop Sign for Pathway Users	2	EA	$700	$1,400
6	Widen Sidewalk on West Side to 8′	975	SF	$20	$19,500
7	Bicycle Loop Detector	1	EA	$500	$500
8	Landscaping and Irrigation at Pathway Entrance	300	SF	$20	$6,000
Crossing improvements (Mt. Diablo Blvd./Risa Rd.)					
9	Crosswalk	160	LF	$7	$1,120
10	Pedestrian Signal Heads/Buttons	2	LS	$2,000	$4,000
11	Curb Extension (SE corner Village Center/Mt. Diablo Blvd. intersection)	120	SF	$20	$2,400
12	Minor Items (10% of Construction Items)	1	LS	$7,230	$7,230
13	Additions *(10% of Construction Items)*	1	LS	$7,230	$7,230
14	Mobilization *(10% of Total Construction Cost)*	1	LS	$8,837	$8,837
	CROSSING IMPROVEMENTS SUBTOTAL				**$84,800**
Long-Term Opportunity					
(1) Reconfigure to Back-In Angled Parking					
15	New Sidewalk	250	SF	$20.00	$5,000
16	Striping Removal and New	100	LF	$4.00	$400
17	Landscape Removal	120	SF	$16.67	$2,000
18	New Landscaping	150	SF	$20.00	$3,000
19	Minor Items *(10% of Construction Items)*	1	LS	$1,156	$1,156
20	Additions *(10% of Construction Items)*	1	LS	$1,156	$1,156
21	Mobilization *(10% of Total Construction Cost)*	1	LS	$1,413	$1,413
	LONG-TERM OPPORTUNITY 1 SUBTOTAL				**$14,100**

Table 5-4: Cost Estimate for Risa Road and Mt. Diablo Boulevard Improvements (continued)

No.	Description	Quantity	Unit	Unit Price	Amount
(2) Change to Parallel Parking					
22	New Sidewalk	300	SF	$20.00	$6,000
23	Striping Removal and New	100	LF	$4.00	$400
24	Landscape Removal	120	SF	$16.67	$2,000
25	Minor Items *(10% of Construction Items)*	1	LS	$934	$934
24	Additions *(10% of Construction Items)*	1	LS	$934	$934
25	Mobilization *(10% of Total Construction Cost)*	1	LS	$1,141	$1,141
	LONG-TERM OPPORTUNITY 2 SUBTOTAL				**$11,400**
	25% SOFT COSTS[1] (CROSSING IMPROVEMENTS)				**$21,200**
	25% CONTINGENCY (CROSSING IMPROVEMENTS)				**$21,200**
	CROSSING IMPROVEMENTS TOTAL				**$127,200**
	25% SOFT COSTS[1] (LONG-TERM OPPORTUNITIES)				**$2,900 - $3,500**
	25% CONTINGENCY (LONG-TERM OPPORTUNITIES)				**$2,900 - $3,500**
	LONG-TERM OPPORTUNITIES TOTAL[2]				**$17,200 - 21,100**
	CROSSING IMPROVEMENTS AND LONG-TERM OPPORTUNITIES TOTAL				**$144,400 - $148,300**

[1] *Soft costs include survey, design, permitting, and administration costs.*

[2] *A range is presented to capture both long-term recommendations.*

LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

5.4.3 Private Drive Crossing

Private Drive is located east of the Veteran's Memorial Building and accessed from Mt. Diablo Boulevard. Traffic volumes and speeds are low, and sightlines approaching the proposed pathway crossing are adequate. Additional detail is provided in *Chapter 4: Existing Conditions, Opportunities, and Constraints.*

Preferred Option

Due to the low traffic speeds and volumes at Private Drive, only one design option was considered: an uncontrolled at-grade crossing. Recommended treatments to Private Drive are described below and illustrated in Figure 5-6.

Crossing Treatments

1. **Stripe a High-Visibility Ladder Crosswalk** across Private Drive.
2. **Install Advance Signage** on northbound and southbound approach of Private Drive to alert drivers to the upcoming pedestrian/bicycle crossing.
3. **Install Pedestrian Scale Lights** at the pathway entrance to improve visibility between drivers and pathway users and to enhance security. Light poles should be installed within City of Lafayette's ROW or easement over the EBMUD Aqueduct ROW.

4. **Install Stop Signs** on the pathway to ensure pathway users stop and look for on-coming traffic before crossing.
5. **Complete the Sidewalk** on both sides of Private Drive and between the pathway and Mt. Diablo Boulevard.
6. **Install Median on Private Drive**. The proposed plans for the Branagh Office Building include a median at the entrance of the Private Drive from Mt. Diablo Boulevard to the proposed driveway entrance of the office building. Consider extending the median north of the Branagh Office Building along Private Drive to the Woodbury Condominium Project driveway; extension of the median would define the roadway and slow vehicles as they pass the pathway crossing. This extension of the median falls within the City's easement over the EBMUD Aqueduct ROW. If a raised median is not feasible per EBMUD's procedures, a painted median can be considered as an alternative. The median would be a minimum of six feet wide at the pathway crossing and include a gap to accommodate the length of a bicycle. A second gap in the median would be maintained to allow vehicular access to the proposed Branagh project driveway. Vehicles exiting the Branagh Office Building use a separate one-way egress on Mt. Diablo Boulevard and would not be impacted by the median.

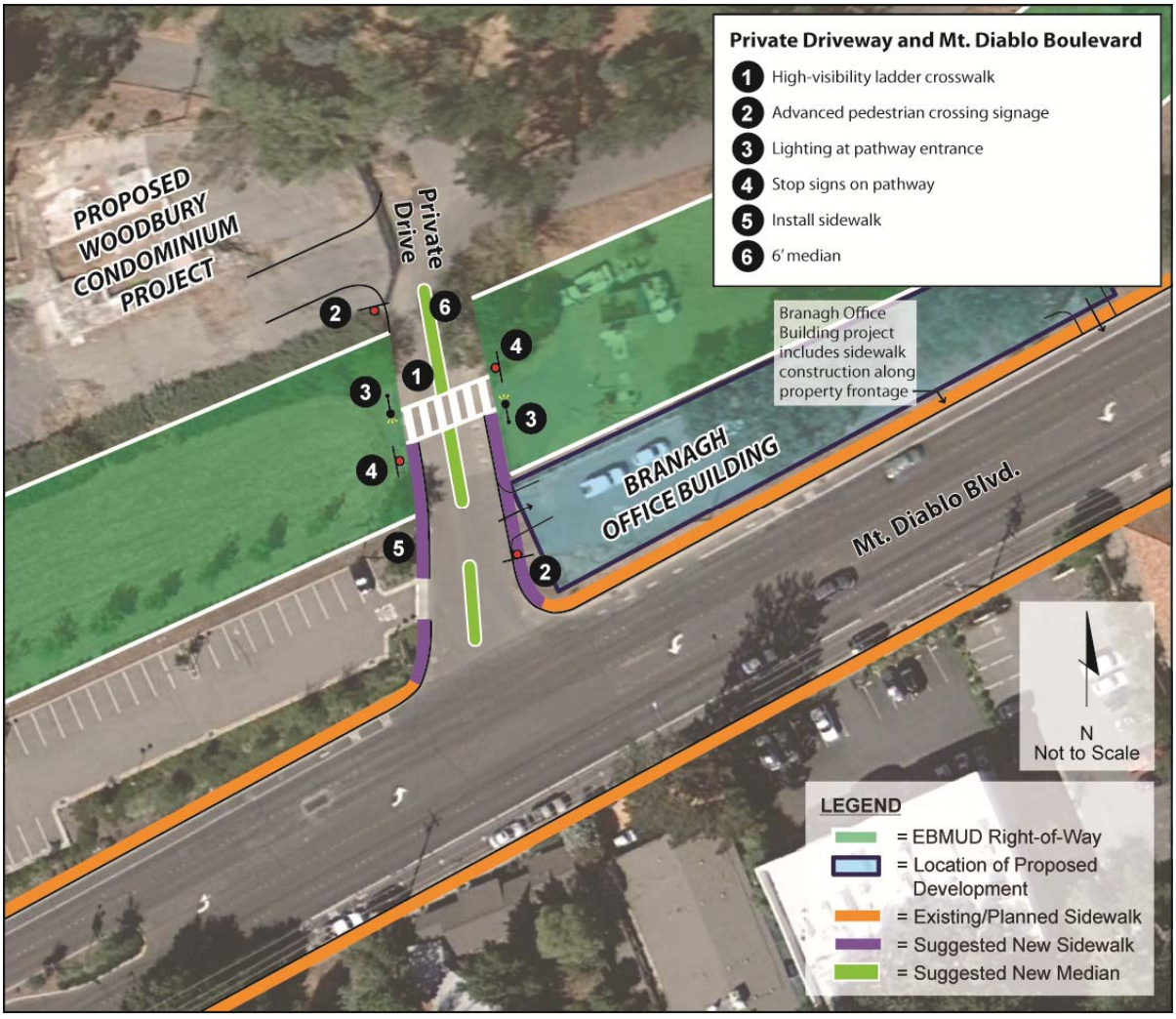

Figure 5-6: Private Drive Crossing Improvements

Private Drive Crossing Planning-Level Cost Estimates

Table 5-5 presents planning-level construction cost estimates. As proposed, the improvements to Private Drive are estimated at $67,800.

Table 5-5: Cost Estimate for Private Drive Improvements

No.	Description	Quantity	Unit	Unit Price	Amount
Private Drive					
1	Ladder Crosswalk	290	LF	$7	$2,030
2	Advanced Signage	2	EA	$700	$1,400
3	Lights for Pathway Entrance	2	EA	$1,000	$2,000
4	Stop Sign for Pathway Users	2	EA	$700	$1,400
5	Sidewalk	600	SF	$20	$12,000
6	Landscaping and Irrigation at Pathway Entrance	300	SF	$20	$6,000
7	Vertical Median	160	LF	$22	$3,520
8	Median Concrete Surface	450	SF	$11	$4,950
9	Minor Items *(10% of Construction Items)*	1	LS	$3,700	$3,700
10	Additions *(10% of Construction Items)*	1	LS	$3,700	$3,700
11	Mobilization *(10% of Total Construction Cost)*	1	LS	$4,523	$4,523
				SUBTOTAL	**$45,200**
				25% SOFT COSTS[1]	**$11,300**
				25% CONTINGENCY	**$11,300**
				CROSSING IMPROVEMENTS TOTAL	**$67,800**

[1]*Soft costs include survey, design, permitting, and administration costs.*

LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

5.4.4 Dolores Drive Crossing

Dolores Drive is a two-lane collector with a posted speed limit of 25 mph. The geometric design of Dolores Drive poses sight distance (especially for the northbound approach) and speed control issues for both motorists and pathway users. Additional detail is provided in *Chapter 4: Existing Conditions, Opportunities, and Constraints.*

Preferred Option

Due to the straightforward conditions at Dolores Drive, only one design option was considered: at grade crossing improvements. Recommended treatments to Dolores Drive are described below and illustrated in Figure 5-7.

Crossing Treatments

1. **Stripe a High-Visibility Ladder Crosswalk** across Dolores Drive.

2. **Stripe Advance Yield Lines** in advance of the crosswalk to warn drivers where to stop in advance of the crosswalk when it is occupied.

3a. **Install Advanced Signage with Activated Flashers** on the northbound and southbound approach on Dolores Drive to alert drivers to the upcoming pedestrian/bicycle crossing. The purpose of the advanced flashing signage is to warn drivers with limited sight stopping distance that the mid-block crossing will be in use.

3b. **Passive video detection** should be installed to detect pathway users approximately 200 feet in advance of the crossing, to activate flashing signage only when pedestrians or bicyclists are present. As pedestrians will take longer than a bicyclist to arrive at the crossing, flashers need to remain activated long enough for pedestrians to pass through the crossing. Add a detection point for pedestrians approaching from the south on Dolores Drive who wish to cross at the mid-block crossing as well. Cameras should either be installed outside of the EBMUD ROW, which would require an encroachment permit from adjacent property owners (Caltrans or other), or at the roadway crossing looking back at the path, on City of Lafayette's ROW.

4. **Install Curb Extensions/Neck Down** at the crossing entrance to enhance safety by shortening the roadway exposure time for pathway users and by decreasing vehicle speeds. Curb extensions may also improve the sight distance issues on Dolores Drive as pathway users will be more visible at the extended curb and will also improve sightlines for approaching vehicles. **Remove Parking Space** immediately north of the eastern curb extension to improve pathway user view of southbound motor vehicles. **Stripe Northbound Shoulder** approaching the crosswalk to guide northbound motor vehicles toward the centerline, thereby improving sight distances.

5. **Install Pedestrian Scale Lights** at the pathway entrance to improve visibility between drivers and pathway users and to enhance personal security of pathway users. Light poles should be installed within City of Lafayette's ROW or easement over the EBMUD Aqueduct ROW.

6. **Install In-Pavement Flashers** in northbound and southbound directions which flash as pathway users cross the marked crosswalk. The in-pavement flashers will help drivers be more aware of pedestrian and bicycle activity at the mid-block crossing. In-pavement flashers can be activated passively, using a bollard detector, or can require pathway users to press a pedestrian push button to activate. Costs are given for a passive bollard detector. If EBMUD will not support in-pavement flashers at this location, consider a rapid flashing beacon that could be installed in advance of the crossing and away from EBMUD infrastructure.

Pathway Treatments

The following treatments recommended along the pathway would enhance the safety for pathway users.

1. **Install Stop Signs** on the pathway to ensure pathway users stop and look for on-coming traffic before crossing.

2. **Install Bollards** and **Curve the Pathway** at the pathway entrances to slow down bicyclists as they approach the roadway. Bollards narrow the pathway, requiring bicyclists to slow down to navigate. Reducing bicyclist speeds are particularly important at this crossing due to limited sight distances on Dolores Drive.

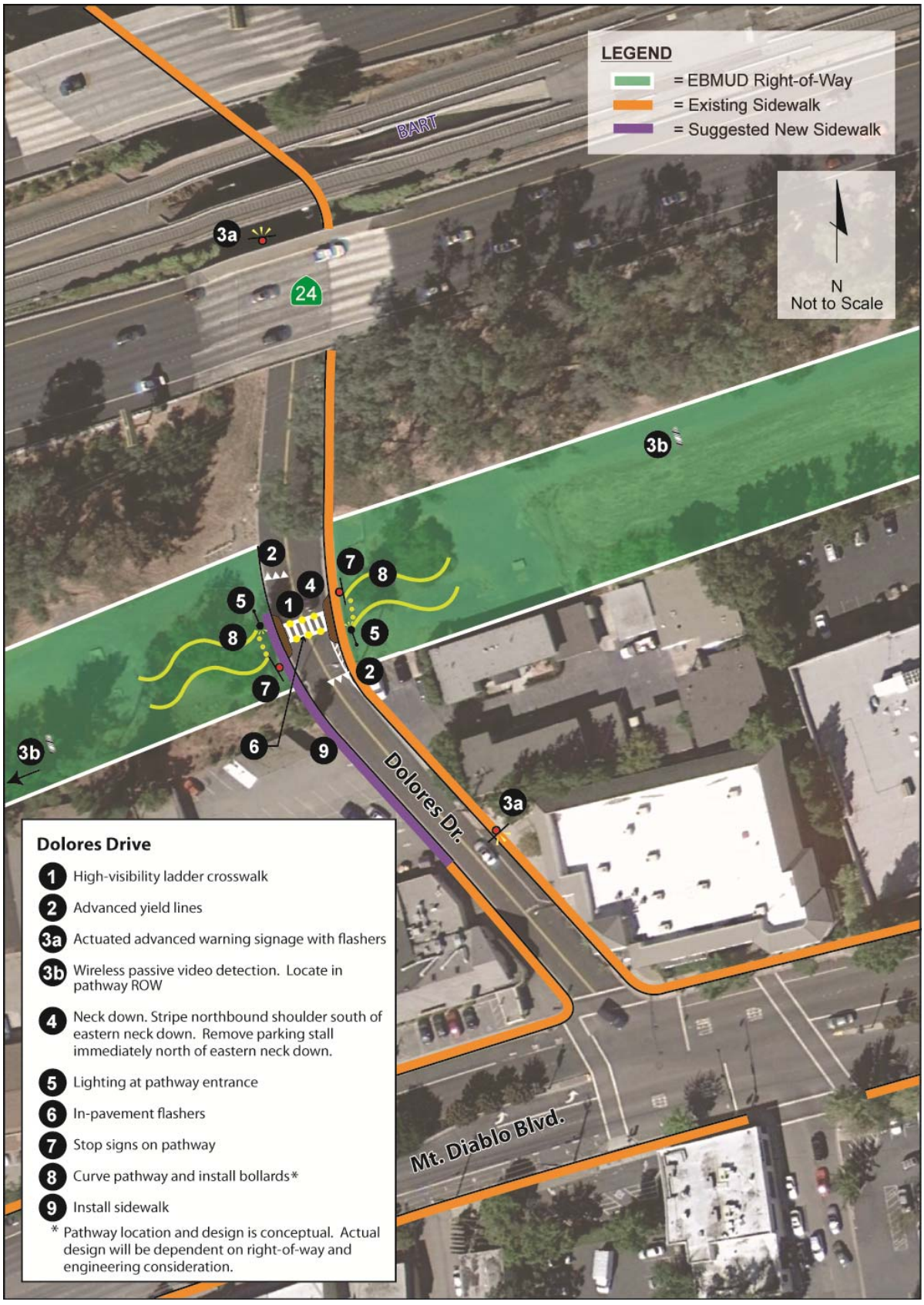

Figure 5-7: Dolores Drive Crossing Improvements

Other Improvements

Sidewalk treatments along Dolores Drive would improve pedestrian connections with pedestrian facilities along Deer Hill Road and Mt. Diablo Boulevard and with nearby land uses.

1. **Complete the Sidewalk** along the west side of Dolores Drive, south of the EBMUD Aqueduct ROW, to improve safe connections between the pathway and Mt. Diablo Boulevard. In addition, the existing sidewalk on the east side of Dolores Drive north of the EBMUD Aqueduct ROW should be cleared of debris and vegetation to provide a clear path of travel for pedestrians.

Dolores Drive Planning-Level Cost Estimates

Planning-level construction cost estimates are presented in **Table 5-6**. As proposed, the improvements to Dolores Drive are estimated at $249,000.

Table 5-6: Cost Estimate for Dolores Drive Improvements

No.	Description	Quantity	Unit	Unit Price	Amount
1	Ladder Crosswalk	290	LF	$7	$2,030
2	Advanced Yield Lines	10	SF	$8	$80
3	Advanced Signage[1]	4	EA	$700	$2,800
4	Neck-Downs	1	LS	$25,000	$25,000
5	Paint (striping south of eastern neck down)	100	LF	$7	$700
6	Lights at Pathway Entrance	2	EA	$1,000	$2,000
7	In-Pavement Flashers	1	LS	$20,000	$20,000
8	Stop Sign for Pathway Users	2	EA	$700	$1,400
9	Bollards	6	EA	$700	$4,200
10	Sidewalk	2,900	SF	$20	$58,000
11	Landscaping and Irrigation at Pathway Entrance	300	SF	$20	$6,000
12	Minor Items *(10% of Construction Items)*	1	LS	$13,579	$13,579
13	Additions *(10% of Construction Items)*	1	LS	$13,579	$13,579
14	Mobilization *(10% of Total Construction Cost)*	1	LS	$16,597	$16,597
				SUBTOTAL	**$166,000**
				25% SOFT COSTS[2]	**$41,500**
				25% CONTINGENCY	**$41,500**
				CROSSING IMPROVEMENTS TOTAL	**$249,000**

[1] The cost estimated costs do not include costs for conduit and electrical hook-ups. These costs should be calculated in more advanced stages of the project design.

[2] Soft costs include survey, design, permitting, and administration costs.
LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

5.4.5 Happy Valley Road Crossing

Happy Valley Road is a two lane collector with a 25 mph posted speed limit. Surrounding land uses include the Lafayette BART station, Downtown, and office and commercial space. Future land uses include a redevelopment site south east of the EBMUD ROW to a mixed use land use. The geometric design of the EBMUD ROW crossing on Happy Valley Road presents dramatic slopes from 2 percent to 33 percent. More detail is provided in *Chapter 4: Existing Conditions, Opportunities, and Constraints.*

Options Evaluation and Preferred Option

Two options were considered for the Happy Valley Road crossing, an at-grade crossing or a bicycle and pedestrian bridge. Due to topographic constraints, a pedestrian/bicycle bridge is the preferred option at this location.

Crossing Option 1: At-Grade Crossing

An at-grade crossing option would require multiple switchbacks to traverse the west side of the Happy Valley Road where the slopes are approximately 3:1, or 33 percent, and the height from the top of the EBMUD Aqueduct ROW to street level is nearly 50 feet. The geometry of a pathway with an approximately eight percent running slope would be extremely circuitous west of Happy Valley Road and would require engineered fill material and hundreds of square feet of gravity retaining wall. Cutting into the existing slope or placement of permanent foundations within the ROW, which might otherwise permit a less circuitous alignment, are not allowed by EBMUD structural requirements. The City is currently designing a mid-block crossing that will provide a pedestrian connection between the BART parking lot and the west side of Happy Valley Road, where the sidewalk will also be extended north. This crossing would be adequate for the at-grade crossing option. Advanced signage is recommended to alert drivers to the pathway crossing.

Planning-level construction cost estimates for an at-grade crossing are presented in **Table 5-7**. The at-grade improvements are estimated at $2,900.

Table 5-7: Cost Estimate for Happy Valley Road At-Grade Crossing Improvements

No.	Description	Quantity	Unit	Unit Price	Amount
1	Advanced Signage	2	EA	$700	$1,400
2	Minor Items *(10% of Construction Items)*	1	LS	$156	$156
3	Additions *(10% of Construction Items)*	1	LS	$156	$156
4	Mobilization *(10% of Total Construction Cost)*	1	LS	$191	$191
				SUBTOTAL	**$1,900**
				25% SOFT COSTS[1]	**$500**
				25% Contingency	**$500**
				CROSSING IMPROVEMENTS TOTAL	**$2,900**

[1]*Soft costs include survey, design, permitting, and administration costs.*

LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

Crossing Option 2: Pedestrian and Bicycle Overcrossing

The second option uses a pedestrian and bicycle overcrossing to span the roadway and connect the embankments on opposite sides of the roadway, as shown in **Figures 5-8** and **5-9**. The overcrossing would provide a 10- to 12-foot-wide travelway and 17 feet of clearance above Happy Valley Road. This option would require a Caltrans Longitudinal Encroachment in order for the retaining walls, footings, and abutments for the pedestrian and bicycle overcrossing to be placed in state ROW. As discussed in *Chapter 4: Existing Conditions, Opportunities, and Constraints*, EBMUD will not allow these structural features within their ROW.

East of Happy Valley Road, the pathway "splits" such that one pathway directly connects with the top of the BART staircase and ramp and a second pathway slopes down to the level of the BART parking lot. Due to topographic constraints, a pedestrian/bicycle overcrossing is the recommended crossing option at Happy Valley Road. Any potential conflicts with BART utilities would need to be identified and resolved prior to project approval.

Costs associated with a pedestrian and bicycle overcrossing at Happy Valley Road are presented in **Table 5-8**. The pedestrian/bicycle overcrossing is estimated at $1.2 million. Costs include the bridge structure, fill material, and retaining wall needed to bring the bridge span back to existing grades. The overcrossing would be constructed within Caltrans ROW.

Table 5-8: Cost Estimate for Pedestrian/Bicycle Overcrossing at Happy Valley Road

No.	Description	Quantity	Unit	Unit Price	Amount
1	Import Borrow	3,400	CY	$25	$85,000
2	Fine Grading	2,500	SF	$0.50	$1,250
3	3" Hot Mix Asphalt (Type A)	35	TON	$85	$2,975
4	6" Aggregate Base (Class 2)	35	CY	$45	$1,575
5	Railing	2,200	LF	$10	$22,000
6	Retaining Wall (Type 1)	2,140	SF	$100	$214,000
7	Pedestrian Overcrossing (80' Span)	1	LS	$250,000	$250,000
8	Lighting Allowance	1	LS	$25,000	$25,000
9	Landscaping and Irrigation at Pathway Entrance	300	SF	$20	$6,000
10	Minor Items *(10% of Construction Items)*	1	LS	$67,534	$67,534
11	Additions *(10% of Construction Items)*	1	LS	$67,534	$67,534
12	Mobilization *(10% of Total Construction Cost)*	1	LS	$82,541	$82,541
				SEGMENT 1 SUBTOTAL	**$825,400**
				25% SOFT COSTS[1]	**$206,350**
				25% CONTINGENCY	**$206,350**
				SEGMENT 1 TOTAL	**$1,238,100**

[1]*Soft costs include survey, design, permitting, and administration costs.*

LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

Figure 5-8: Happy Valley Road Bicycle and Pedestrian Overcrossing

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Figure 5-9: Photo Simulation of Happy Valley Road Overcrossing (At-Grade Improvements by Others)

5.5 Segment 2: BART to Oak Hill Road

Segment 2 extends approximately 0.2 miles from Happy Valley Creek in the west to Oak Hill Road in the east.

The preferred option for Segment 2 is a paved Class I bikeway/ADA-accessible pathway, with an at-grade crossings at Oak Hill Road. The eastern portion of the pathway would encroach into Caltrans SR 24 ROW to avoid the steep grade changes along this portion of the EBMUD Aqueduct ROW (see **Section 4.4.1** for additional detail). As proposed, this preferred option would cost approximately $2.7 million to build, including roadway crossing improvements.

Table 5-9 summarizes the planning-level costs of the preferred option for Segment 2 as well as the costs of other options that were considered. Detailed descriptions of the design options and preferred options, including the rationale for choosing each preferred option are described below.

Table 5-9: Cost Summary for Preferred and Other Considered Options for Segment 2 BART to Oak Hill Road

Preferred Option		Other Considered Options	
Description	*Cost*	*Description*	*Cost*
Class I Bikeway/ ADA-Accessible Pathway	$1,958,300	Unpaved Multi-Use Pathway	$47,900
Oak Hill Road Crossing Improvements	$721,200	Oak Hill Road Crossing Improvements	$721,200
Total Cost of Preferred Option	**$2,679,500**	**Total Cost of Other Considered Options**	**$769,100**

5.5.1 Pathway Design

Summary of Existing Conditions, Opportunities, and Constraints

Surrounding land uses include residential, office, and commercial to the south and SR 24 to the north. The SR 24 off-ramp, a 5-foot-wide sidewalk and retaining wall are located immediately north of the eastern half of Segment 2. Happy Valley Creek crosses the west end of Segment 2. A path along the creek connects the EBMUD Aqueduct ROW to Lafayette Circle, which connects with Mt. Diablo Boulevard.

Topography along Segment 2 creates a peak approximately midway along the segment (see *Chapter 4: Existing Conditions, Opportunities, and Constraints* for additional detail). The grade along the western portion of Segment 2 increases at approximately 12 percent. The slopes west of Oak Hill Road are approximately 4:1, or 25 percent. The top of the hill west of Oak Hill Road is approximately 55 feet above street level.

Design constraints through this Pathway Segment include steep grades along the entire length of the segment, particularly west of Oak Hill Road. This drop from the peak of the hill to Oak Hill Road represents a significant elevation change.

Roadway crossings within Segment 2 include Oak Hill Road. This crossing is described in detail in the following section.

Options Evaluated and Preferred Options

Two facility design standards were considered for this pathway segment: a paved Class I bikeway/ADA-accessible pathway and an unpaved multi-use pathway. As described in **Section 5.3**, the preferred option for the pathway design is the Class I bikeway/ADA-accessible pathway.

Unpaved Multi-Use Pathway Option

An unpaved multi-use pathway would follow the existing slope profile and would not be ADA-accessible. While an unpaved, non-ADA compliant pathway is estimated to cost about one-third the cost of a Class I bikeway/ADA-accessible pathway, an unpaved, non-ADA compliant pathway would have slopes up to 25 percent over the rise from BART to Oak Hill Road and would be so steep as to be used only by a few intrepid bicyclists. Further, this type of pathway would not meet one of the project's primary goals of providing access to a range of users and improving the ability of less experienced bicyclists to access BART and Downtown Lafayette. A non-ADA-but-bicycle accessible route is not recommended as the preferred option, due to the potential lack of grant funding opportunities and probable lower level of use.

Class I Bikeway/ADA-Accessible Pathway along SR 24 Off-Ramp Option

Figures 5-10 and **5-11** show the Class I bikeway/ADA-accessible pathway alignment. A Class I bikeway/ADA-accessible pathway alignment would require some switchbacks along the western portion of the EBMUD Aqueduct ROW, north of the existing Town Center Residential development. Due to topographic constraints, the eastern portion of the Class I bikeway/ADA-accessible pathway alignment encroaches into Caltrans SR 24 ROW. Implementation of the eastern portion of the pathway would improve the existing sidewalk along the south side of the SR 24 Oak Hill Road off-ramp to meet Class I bikeway/ADA-accessible pathway design standards, as shown in **Figures 5-10** through **5-11**. **Figure 5-12** shows the location where the pathway would transition from EBMUD ROW to Caltrans ROW. The SR 24 off-ramp would need to be realigned and shifted to the north in order to widen the existing 5-foot-wide sidewalk to 10 feet and meet Caltrans standards for travel lane and shoulder widths. Additionally, a retaining wall would be constructed parallel to SR 24, north of the off-ramp travel lanes and within Caltrans ROW. If this off-ramp is signalized, the turn pocket storage would be modified. As proposed, 300 feet of vehicular queuing space would be provided (see **Figure 5-11**). The new storage space would preclude any further widening of SR 24 to the south. This option would require a longitudinal encroachment because the pathway would be within the state ROW along the off-ramp. Crossing treatment options for Oak Hill Road are presented in **Section 5.9.5**.

Class I Bikeway/ADA-Accessible Pathway within EBMUD Aqueduct ROW Option

A pathway entirely within the EBMUD Aqueduct ROW would require several switchbacks west of Oak Hill Road in order to navigate the grade differential between the top of the hill and Oak Hill Road, and maintain an approximately eight percent running slope. This geometry would result in a circuitous pathway and would require gravity retaining walls and engineered fill. EBMUD Revocable License Agreement does not permit installation of permanent retaining walls or cutting into the existing slope.

BART Flyover Option

The BART Flyover option, which would extend the Happy Valley Road bicycle and pedestrian bridge over the BART station, spans portions of Pathway Segments 1 and 2. This option meets Caltrans Class I Bikeways standards and would require a similar level of effort for permitting as an at-grade alignment that encroaches into SR 24 ROW.

Routing the pathway along the BART parking lot sidewalk creates potential conflicts between pathway users and BART patrons, though these conflicts can be mitigated. The BART flyover option proposes a spur connection to the BART station, but avoids the user conflicts at BART by maintaining the pathway elevation and routing it over the BART station to connect with an existing sidewalk on the south side of the SR 24 Oak

Hill Road off-ramp, where it would follow the proposed alignment described above. This alignment also avoids grade changes along the western portion of Segment 2, reducing the need for switchbacks. Due to the slope of the embankment adjacent to SR 24, the BART flyover option would require extensive retaining wall work within Caltrans ROW to maintain ADA-accessible 5 percent grades. As it passes over the BART station, this pathway alignment would come within several feet of the SR 24 deck, perhaps requiring additional permitting.

The BART flyover option would add $1.9 million to the cost of the Happy Valley Road overcrossing (see **Table 5-12**) and is not recommended. Potential conflicts between pathway users and BART patrons adjacent the southern BART parking lot can by minimized through design (e.g. through widening the pathway at the parking lot level and providing adequate sight distances where the pathway meets the sidewalk along the parking lot).

Planning-Level Cost Estimate for Pathway Construction

Table 5-10 through **Table 5-12** present cost estimates for the two facility design standards within Pathway Segment 2 and the BART flyover option. As proposed, a multi-use pathway would cost approximately $47,900 to build. A Class I bikeway/ADA-accessible pathway and SR 24 off-ramp improvements would cost approximately $2.0 million. The BART flyover option is estimated to add $1.9 million to the Class I bikeway/ADA-accessible pathway along the SR 24 off-ramp option. Costs for the BART flyover option include the bridge structure, fill material, and retaining wall. Costs associated with crossing improvements at Oak Hill Road are presented separately.

Table 5-10: Segment 2 Cost Estimate for an Unpaved Multi-Use Pathway
(Not Including Oak Hill Road Crossing Improvements)

No.	Description	Quantity	Unit	Unit Price	Amount
1	Clear, Grub & Tree Removal	12700	SF	$0.50	$6,350
2	Grading	12700	SF	$0.75	$9,525
3	6" Aggregate Base (Class 2)	170	CY	$45.00	$7,650
4	Minor Items *(10% of Construction Items)*	1	LS	$2,614.00	$2,614
5	Additions *(10% of Construction Items)*	1	LS	$2,614.00	$2,614
6	Mobilization *(10% of Total Construction Cost)*	1	LS	$3,195.00	$3,195
				SEGMENT 2 SUBTOTAL	**$31,900**
				25% SOFT COSTS[1]	**$8,000**
				25% CONTINGENCY	**$8,000**
				SEGMENT 2 TOTAL	**$47,900**

[1] *Soft costs include survey, design, permitting, and administration costs.*

LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

Table 5-11: Segment 2 Cost Estimate for a Class I Bikeway/ADA-Accessible Pathway along the SR 24 Off-Ramp (without the BART Flyover)

(Not Including Oak Hill Road Crossing Improvements)

No.	Description	Quantity	Unit	Unit Price	Amount
Pathway Improvements					
1	Import Borrow	1,100	CY	$25	$27,500
2	Fine Grading	16,600	SF	$1	$8,300
3	3" Hot Mix Asphalt (Type A)	230	TON	$45	$10,350
4	6" Aggregate Base (Class 2)	220	CY	$85	$18,700
5	Railing	700	LF	$10	$7,000
6	Minor Items *(10% of Construction Items)*	1	LS	$7,984	$7,984
7	Additions *(10% of Construction Items)*	1	LS	$7,984	$7,984
8	Mobilization *(10% of Total Construction Cost)*	1	LS	$9,758	$9,758
				Pathway Improvements Subtotal	**$97,600**
Off-ramp Improvements					
9	Roadway Excavation	1,000	CY	$20	$20,000
10	Remove Base & Surfacing	6,500	SF	$1	$6,500
11	Remove Curb & Gutter	1,500	LF	$6	$9,000
12	Cold Plane Asphalt Concrete	21,000	SF	$2	$42,000
13	2" Hot Mix Asphalt Overlay (Type A)	260	TON	$85	$22,100
14	4" Hot Mix Asphalt (Type A)	225	TON	$85	$19,125
15	9" Aggregate Base (Class 2)	250	CY	$45	$11,250
16	Relocate Existing Drainage Facilities	1	LS	$50,000	$50,000
17	Retaining Wall (Type 1)	6,400	SF	$100	$640,000
18	Concrete Barrier (Type 60)	625	LF	$100	$62,500
19	Signage	1	LS	$5,000	$5,000
20	Striping	1	LS	$2,000	$2,000
21	Minor Items *(10% of Construction Items)*	1	LS	$98,831	$98,831
22	Additions *(10% of Construction Items)*	1	LS	$98,831	$98,831
23	Mobilization *(10% of Total Construction Cost)*	1	LS	$120,793	$120,793
				Ramp Improvements Subtotal	**$1,207,900**
				SEGMENT 2 SUBTOTAL	**$1,305,500**
				25% SOFT COSTS[1]	**$326,400**
				25% CONTINGENCY	**$326,400**
				SEGMENT 2 TOTAL	**$1,958,300**

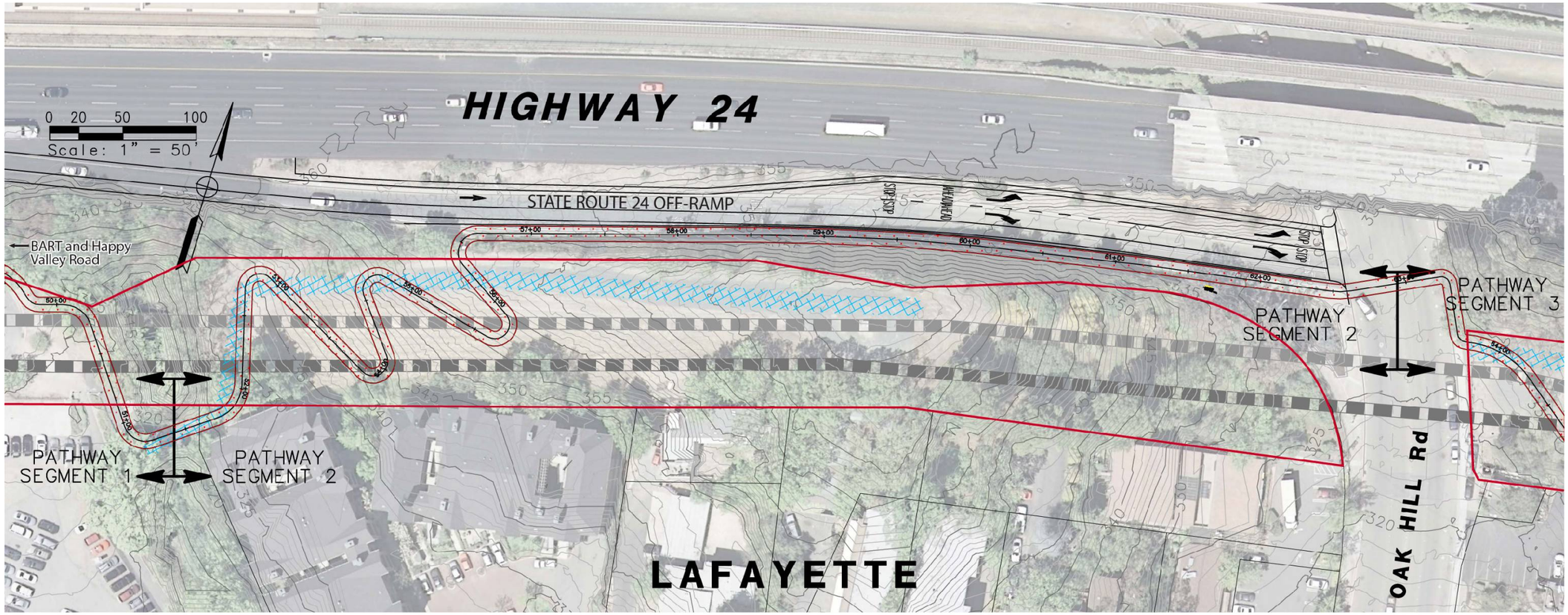
[1]*Soft costs include survey, design, permitting, and administration costs.*

LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

Table 5-12: Cost Estimate for BART Flyover

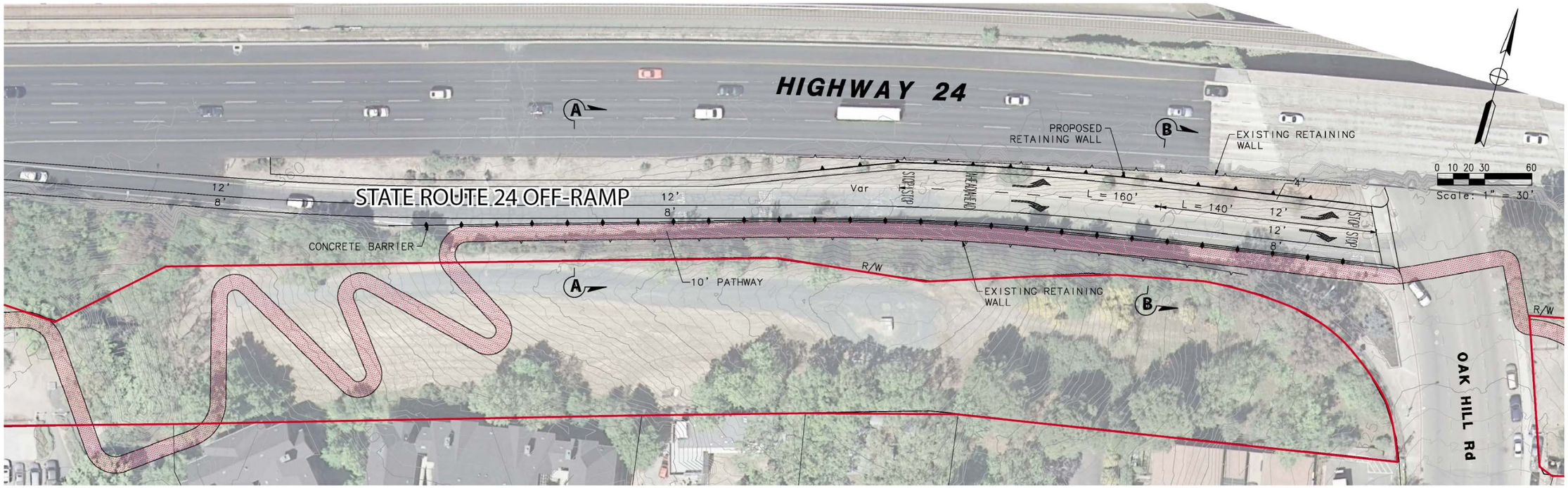
No.	Description	Quantity	Unit	Unit Price	Amount
1	Import Borrow	4,150	CY	25	$103,750
2	Fine Grading	11,900	SF	0.5	$5,950
3	3" Hot Mix Asphalt (Type A)	160	TON	85	$13,600
4	6" Aggregate Base (Class 2)	160	CY	45	$7,200
5	Retaining Wall (Type 1)	6,480	SF	100	$648,000
6	Pedestrian Overcrossing (50' Span)	1	LS	175,000	$175,000
7	Minor Items *(10% of Construction Items)*	1	LS	95,350	$95,350
8	Additions *(10% of Construction Items)*	1	LS	95,350	$95,350
9	Mobilization *(10% of Total Construction Cost)*	1	LS	127,134	$127,134
				BART FLYOVER SUBTOTAL	**$1,271,300**
				25% SOFT COSTS[1]	**$317,800**
				25% CONTINGENCY	**$317,800**
				BART FLYOVER TOTAL	**$1,906,900**

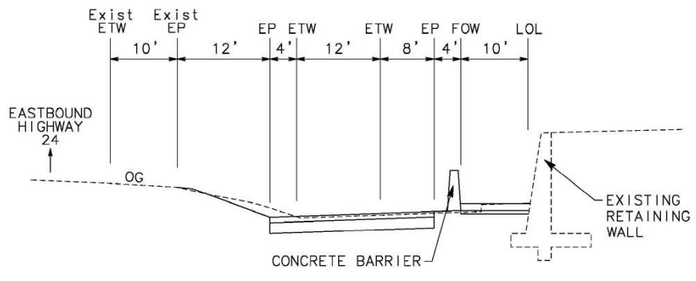
[1]*Soft costs include survey, design, permitting, and administration costs.*
LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum



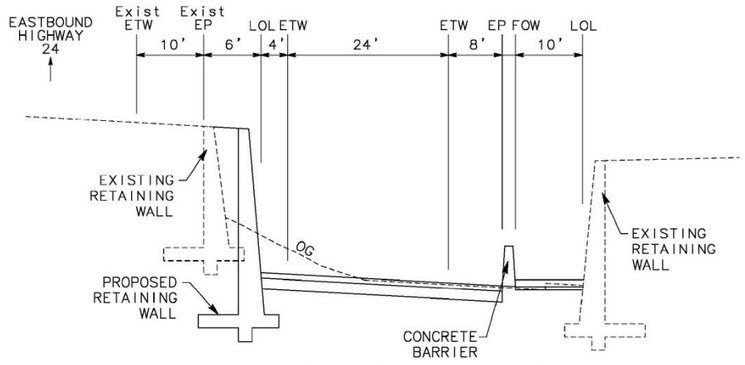
The final pathway alignment may vary from the conceptual alignment shown in this figure in order to accommodate EBMUD access requirements along the EBMUD Aqueduct ROW.

Figure 5-10: Pathway Segment 2 - Class I Bikeway/ADA-Accessible Pathway Alignment





PROPOSED SECTION A-A
NO SCALE
(looking east)



PROPOSED SECTION B-B
NO SCALE
(looking east)

Figure 5-11: Oak Hill Road Crossing Option 2 Along the State Route 24 Oak Hill Road Off-R

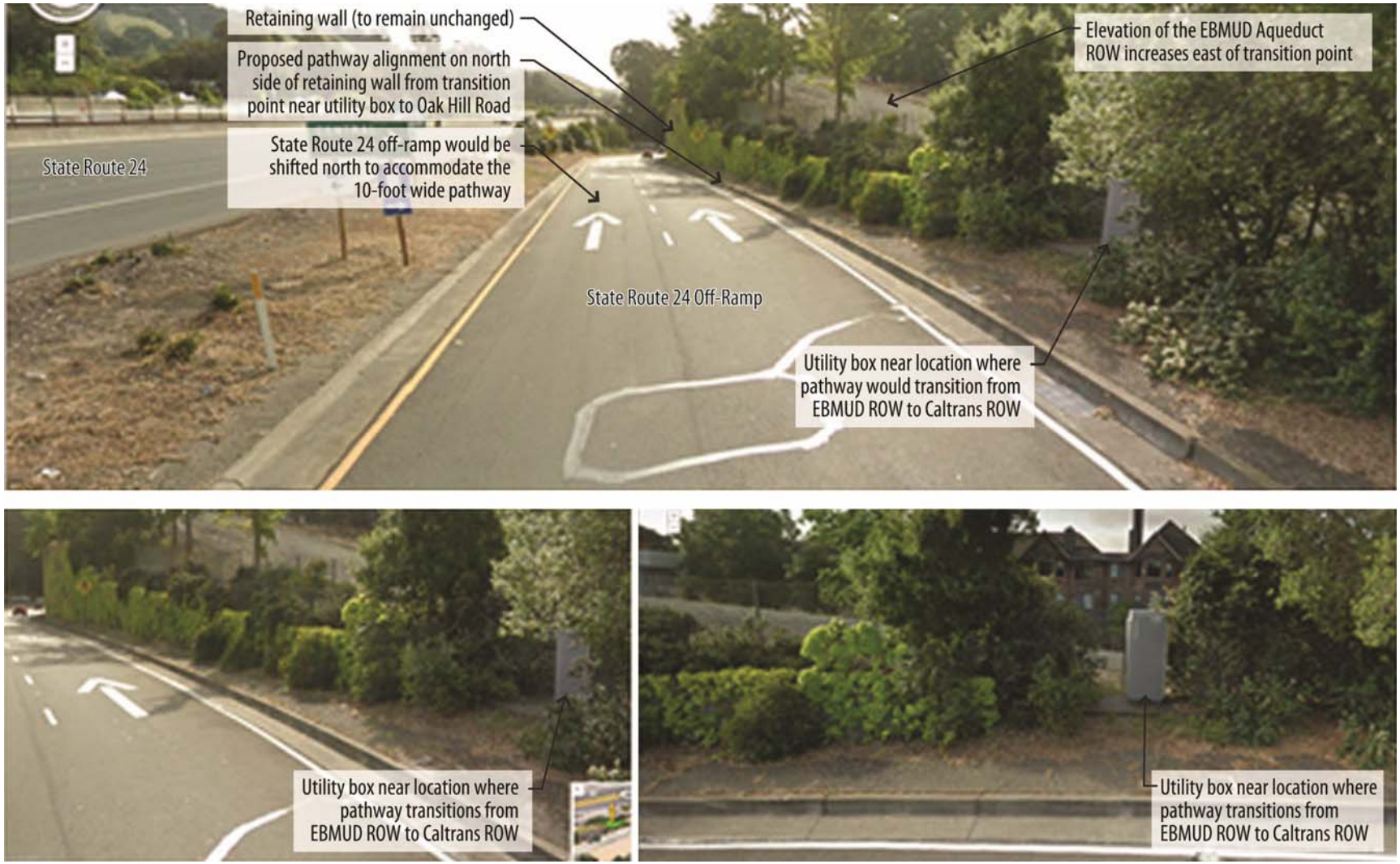


Figure 5-12: Transition point from EBMUD ROW to Caltrans ROW along the SR 24 eastbound off-ramp at Oak Hill Road

5.5.2 Oak Hill Road Crossing Options

Oak Hill Road is a four-lane collector with a posted speed limit of 25 mph, and provides access to multiple destinations, including the Lafayette BART station and commercial businesses in the Downtown area. Drivers accessing the Lafayette BART Station use Oak Hill Road because of the entrance to parking facilities and access to the SR 24 on-ramp and off-ramps. Oak Hill Road experiences high vehicle volumes throughout the day. The EBMUD Aqueduct crosses Oak Hill Road just south of the eastbound off-ramp. Sightlines at the existing crossing are limited. More detail is provided in *Chapter 4: Existing Conditions, Opportunities, and Constraints*.

The SR 24 eastbound off-ramp at Oak Hill Road (looking west)

Preferred Option

Three crossing options were considered for Oak Hill Road. The preferred option includes a traffic signal at the intersection of the eastbound SR 24 off ramp and Oak Hill Road, a median refuge island to protect crossing pedestrian and bicyclists, and modifications to Oak Hill Road. This preferred option is presented as Option 3 below, where additional conceptual design detail and preliminary traffic analysis is provided.

Additional traffic study is required to fully understand the potential roadway capacity and level of service impacts of signal control and lane reduction on Oak Hill Road. The general scope of the required future traffic analysis is detailed below in this section. If ultimately, the reconfiguration of Oak Hill Road presented in Option 3 will adversely affect levels of service, then Option 2 could be pursued.

Crossing Improvement Options Evaluated

The three crossing options considered were:

- Option 1: Mt. Diablo Boulevard crossing
- Option 2: Signalized crossing at Oak Hill Road/SR 24 eastbound off-ramp
- Option 3: Signalized crossing with median refuge and lane reduction on Oak Hill Road

Each option is discussed below. **Figure 5-13** shows a conceptual design for Options 2 and 3. **Figures 5-14** and **5-15** show existing and proposed cross sections along Oak Hill Road, north and south of SR 24. **Figure 5-16** shows a plan view of Option 3 at Oak Hill Road and the SR 24 off-ramp.

Crossing Option 1: Mt. Diablo Boulevard Crossing

The first crossing option would route pathway users south to cross at the Mt. Diablo Boulevard intersection. Existing sidewalks along Oak Hill Boulevard are 5 to 10 feet wide, which would be sufficient for pedestrians but not for bicyclists. In addition, two-way bicycle movement on the sidewalk would raise safety issues at driveways. There are no bicycle facilities on Oak Hill Road and routing bicyclists within the roadway would not be recommended due to high vehicle speeds and volumes.

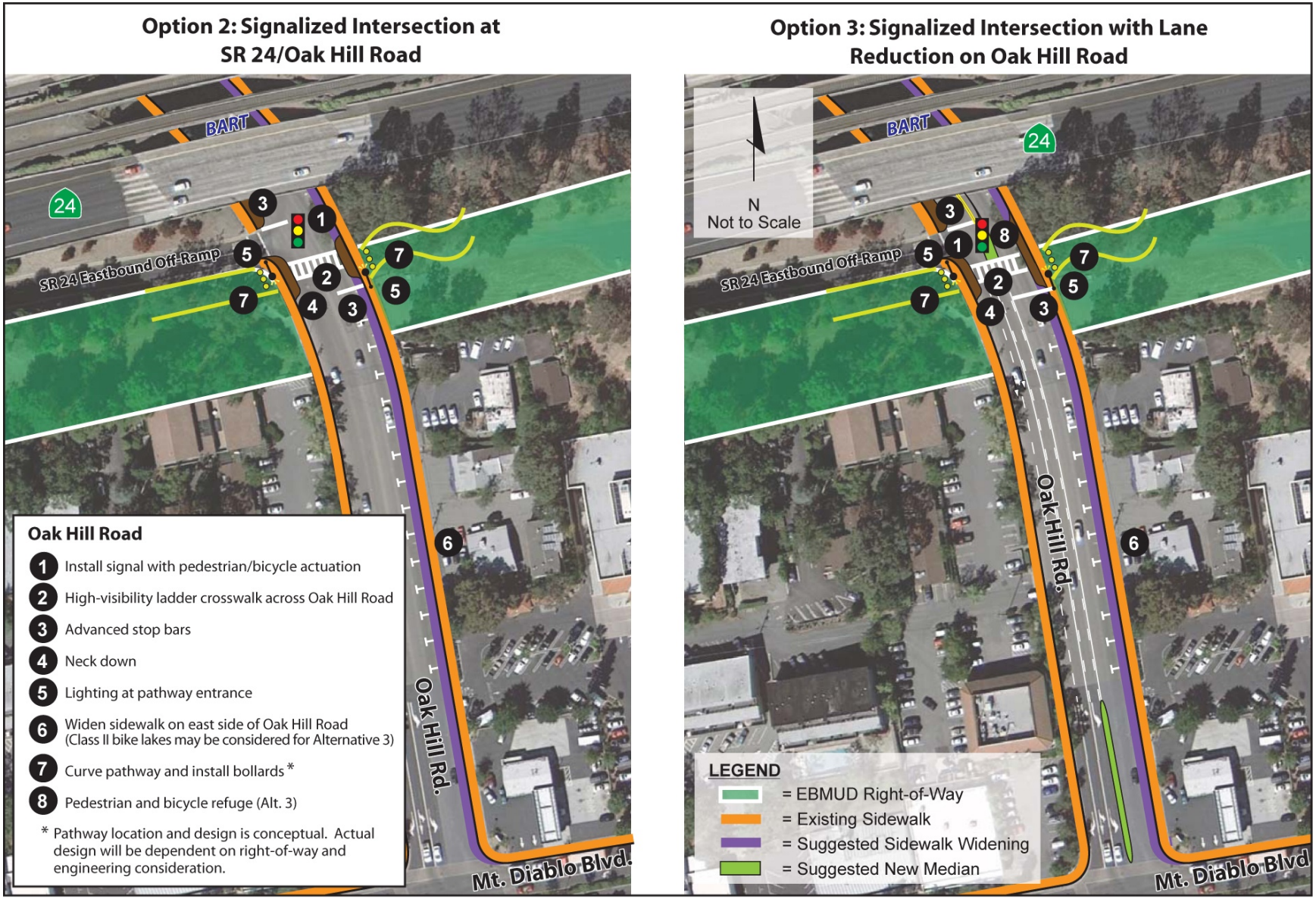


Figure 5-13: Oak Hill Road Crossing Improvements

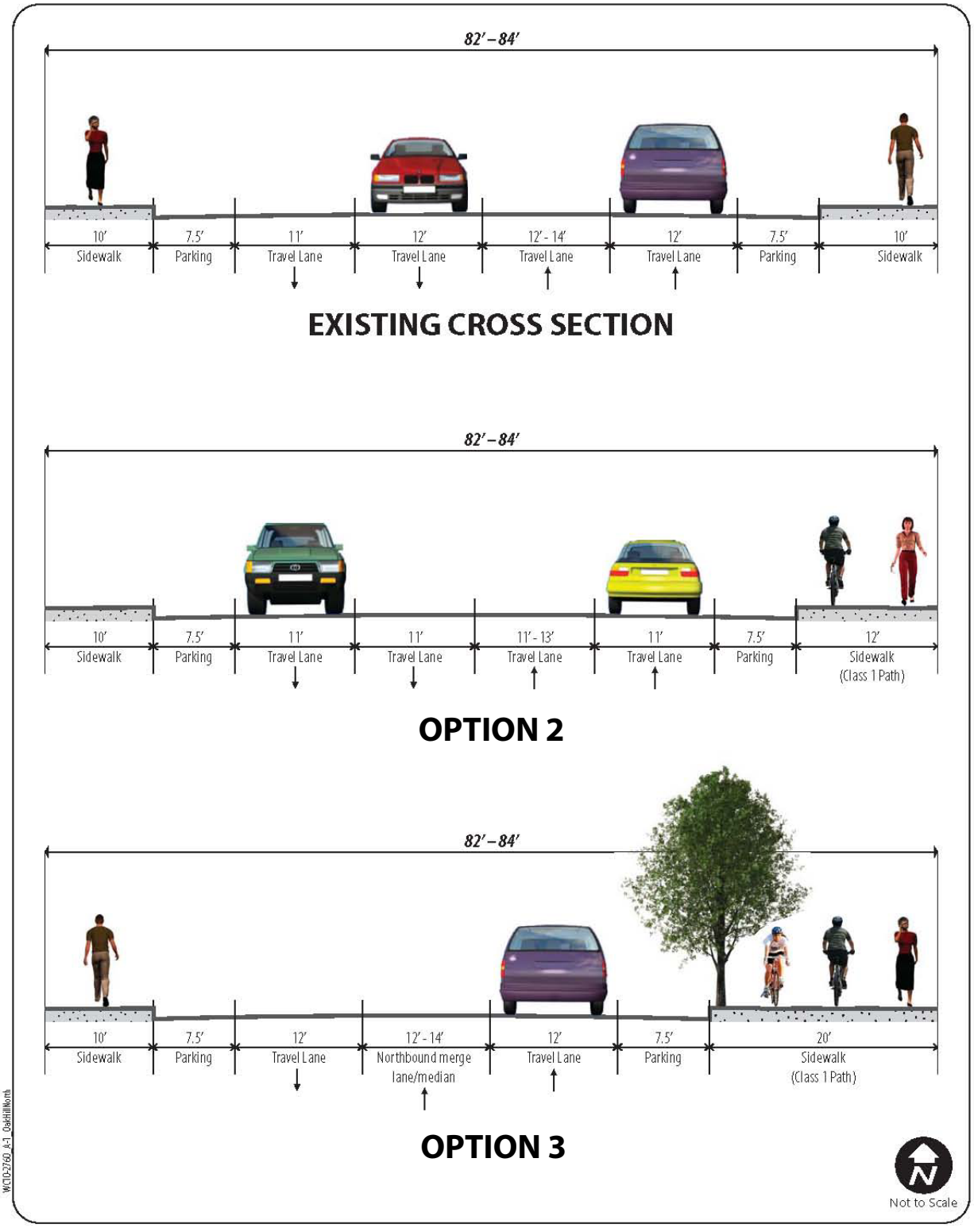


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Figure 5-14: Oak Hill Road North of SR 24: Existing and Proposed Cross Sections

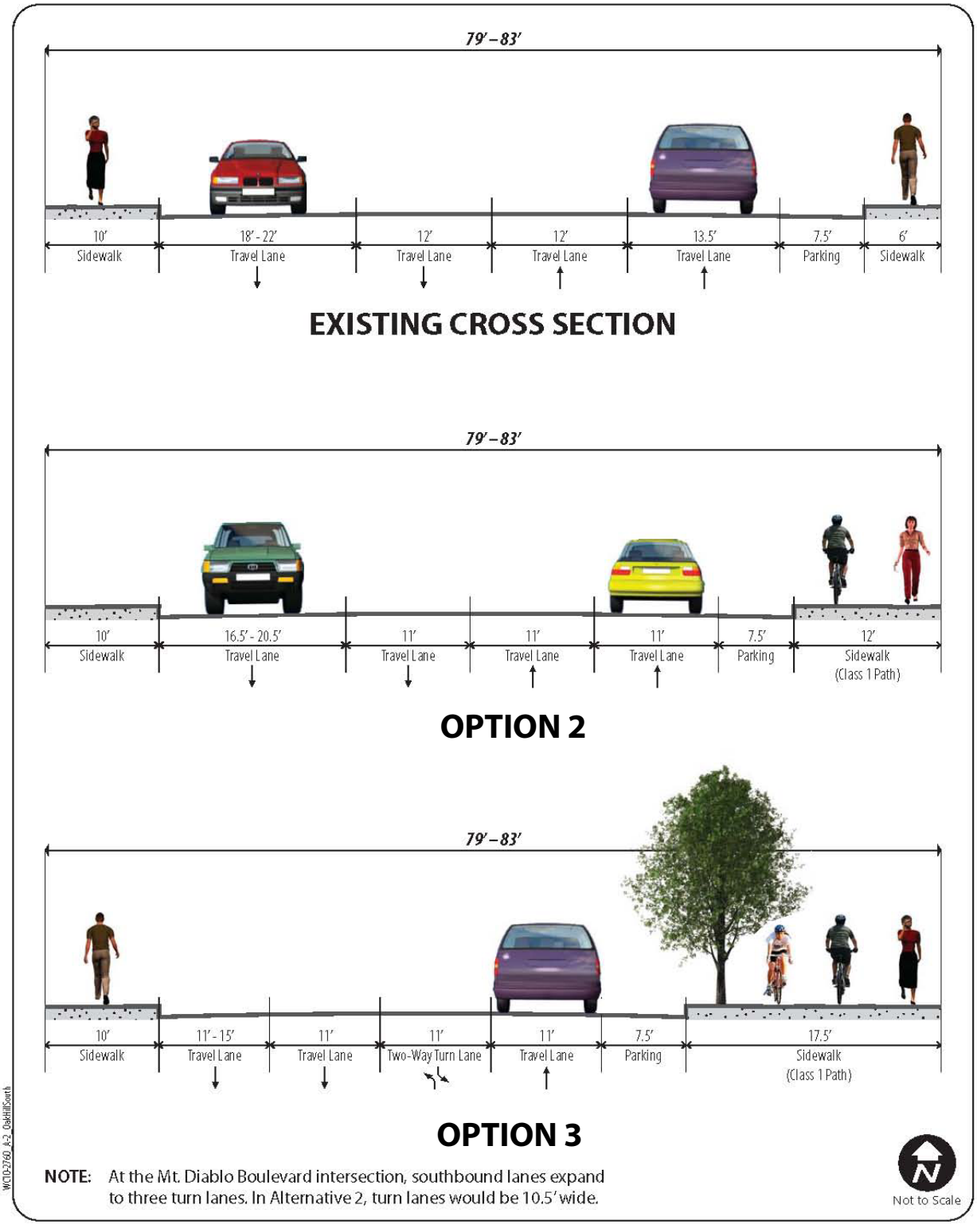

Figure 5-15: Oak Hill Road South of SR 24: Existing and Proposed Cross Sections

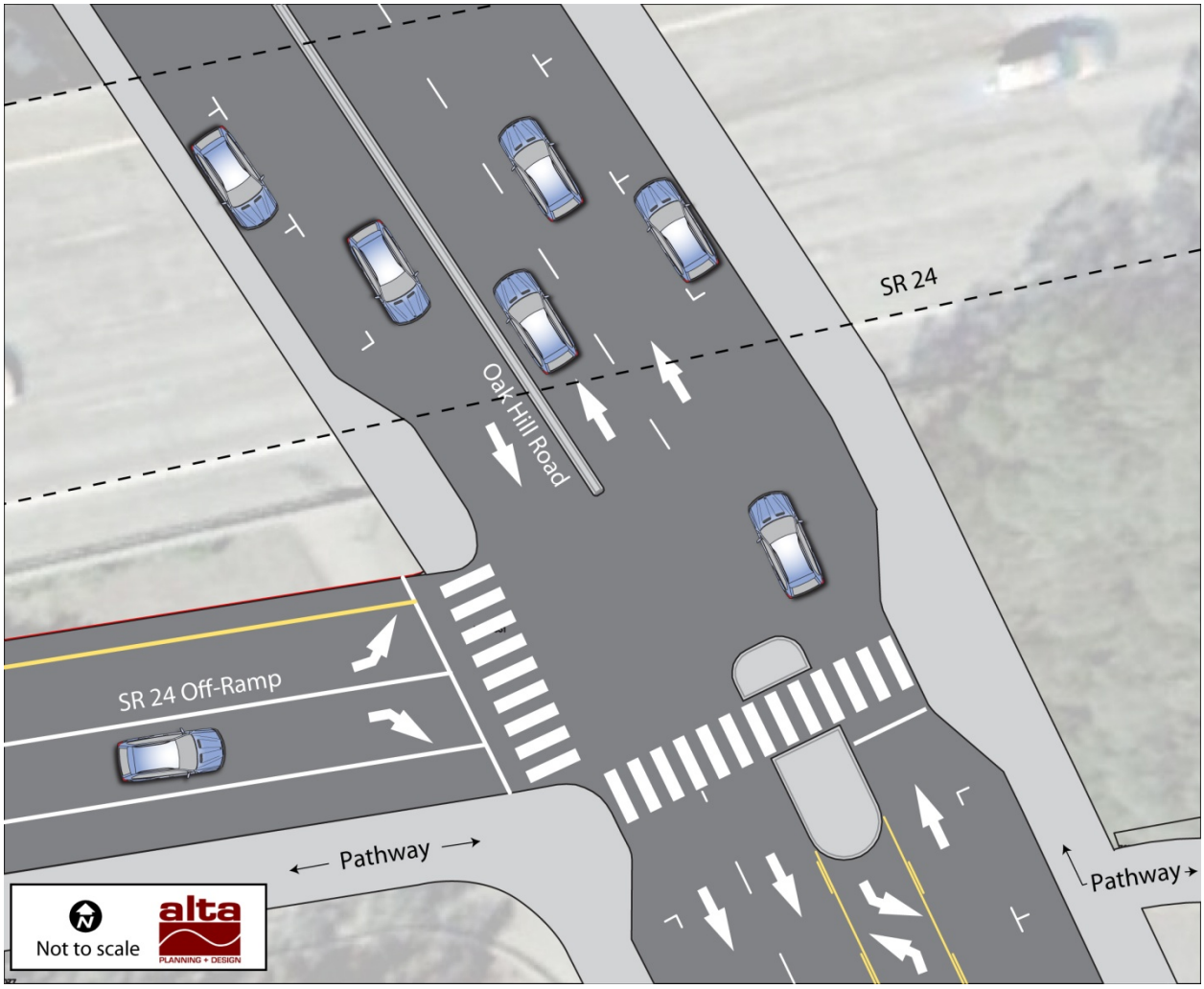

Figure 5-16: Plan View of Oak Hill Road at SR 24: Option 3

The additional travel distance for pedestrians would be approximately one-quarter of a mile, or five to six minutes of walking time. This increase in travel time would be a considerable deterrent to pathway use and could encourage mid-block crossings. Given the safety and access challenges associated with this option it is not recommended.

Crossing Option 2: Signalized Crossing at Oak Hill Road/SR 24 Eastbound Off-Ramp

A second crossing option would signalize the intersection of Oak Hill Road and the SR 24 eastbound off-ramp. Installing a signal at this location would have multiple benefits for all road users. Currently, the roadway configuration of Oak Hill Road between the Deer Hill Road and Mt. Diablo Boulevard intersections is different north and south of SR 24. Under this option, Oak Hill Road between these intersections would be reconfigured to improve pedestrian and bicycle access and safety (see **Figure 5-13** through **Figure 5-15**). The reconfiguration would involve narrowing the travel lanes and would not require additional ROW in order to widen the sidewalk. The Oak Hill Road/Deer Hill Road intersection and Oak Hill Road/Mt. Diablo Boulevard intersection lane configuration would remain unchanged. The following treatments are recommended for a pathway crossing at the Oak Hill Road/SR 24 off-ramp intersection:

1. **Install Signal** – The intersection currently operates with a side-street stop control. Signalizing this intersection with an actuated pedestrian/bicycle phase will improve the safety and traffic operations in the following ways:
    a. One of the proposed pathway alignments is within the Caltrans ROW and would run alongside the south side of the existing SR 24 eastbound off-ramp. A signal is recommended at the intersection of Oak Hill Road to accommodate pedestrian and bicycle crossings. Traffic signal poles should be located within Caltrans' or City of Lafayette's easement over the EBMUD Aqueduct ROW.
    b. A protected crossing phase for pathway users would provide the most direct access and reduce the potential for undesirable midblock crossings.
    c. The Draft Lafayette Downtown Specific Plan Environmental Impact Report (DSP Draft EIR) recommends installing a signal in order to mitigate future ramp queuing issues.
2. **Stripe a High-Visibility Ladder Crosswalk** across the west and south legs of the eastbound SR 24 off-ramp and Oak Hill Road. Locating the crosswalk at the off-ramp intersection would provide the following benefits:
    a. Maximize visibility and sightlines between pathway users and vehicles exiting SR 24. Specifically, if the proposed pathway alignment is routed adjacent to the off-ramp, providing a crossing at the intersection would maintain consistent sightlines along the full length of the ramp from the west approach, creating predictable conditions for the crossing.
    b. Vehicles turning right at the intersection would be moving at a slow speed because they would be accelerating from a complete stop when pathway users have a walk/bike signal.
    c. If the crosswalk is offset to the south, a leading pedestrian interval or a right-turn-on-red restriction should be considered to provide protection for pathway users crossing Oak Hill Road. This would potentially reduce the operational efficiency of the signalized off-ramp.

3. **Advanced Stop Bars** on the northbound and southbound approach indicate to drivers where to stop in advance of the crosswalk. Advanced stop bars are appropriate for signal-controlled crossings. This will help to reduce the number of vehicles encroaching on the pathway crossing.
4. **Install Curb Extensions/Neck-Down** at the crossing entrances to enhance safety by shortening the roadway exposure time for pathway users and to increase the visibility of pedestrians and bicyclists.
5. **Widen the Sidewalk** on the east side of Oak Hill Road between the proposed pathway and Mt. Diablo Boulevard to provide a direct connection to the retail destinations. Though the existing sidewalk widens south of the Safeway shopping center driveway, widening the entire sidewalk is recommended to ensure a consistent sidewalk line along the full length of the roadway. The sidewalk should be a minimum of 12 feet wide to accommodate two-way bicycle and pedestrian travel. Widening the sidewalk under and north of SR 24 is recommended to improve access between the pathway and Deer Hill Road. Widening the sidewalk under SR 24 would require narrowing or removing travel lanes. Widening the sidewalks north of SR 24 would require narrowing three travel lanes as shown in **Figures 5-14** and **5-15**. Two-way bicycle movements on the sidewalk would raise potential safety conflicts at driveways and should be designed for appropriately.

Crossing Option 3: Signalized Crossing with Median Refuge and Lane Reduction on Oak Hill

There are additional opportunities to enhance a pathway crossing at the SR 24 off-ramp/Oak Hill Road intersection. Reducing the number of lanes on Oak Hill Road from four lanes to either three or two lanes would provide space for an additional pedestrian and bicycle refuge area and reduce exposure to vehicle traffic, and could be done while maintaining the same lane configuration at the intersections. It could also provide space to widen the sidewalk on the east side of Oak Hill Road. While these enhancements would further improve the bicycle and pedestrian environment in this area, they are not necessary elements for the feasibility of the pathway. Under Option 3, the Oak Hill Road/Deer Hill Road intersection and Oak Hill Road/Mt. Diablo Boulevard intersection lane configuration would remain unchanged. **Figure 5-13** through **Figure 5-17** show a conceptual design for Option 3, which would narrow Oak Hill Road to two lanes at the potential pathway crossing location. With this modified roadway configuration, additional ROW would not be required in order to widen the sidewalk. This cross section and resultant travel lane configuration has not been tested for this roadway segment and is not recommended without further detailed traffic study.

South of the eastbound SR 24 off-ramp intersection, the proposed concept for Oak Hill Road would have a two-way center turn lane to accommodate auto vehicles accessing the grocery store, gas station, and other retail locations between Mt. Diablo Boulevard and the SR 24 off-ramp and two southbound through lanes. The southbound approach to Mt. Diablo Boulevard would expand back to three lanes to accommodate turning movements at Mt. Diablo Boulevard. Existing on-street parking would not be affected by this design option.

North of the eastbound SR 24 off-ramp intersection, the southbound approach on Oak Hill Road would be reduced to a single travel lane through the pathway crossing. The northbound approach would have one travel lane to accommodate vehicles turning left from the off-ramp and another northbound travel lane for through traffic on Oak Hill Road.

The ramp intersection was analyzed in simulation assuming signalization with a 20-second pedestrian actuated scramble phase for cumulative PM peak hour conditions. All pedestrians and bicyclists cross at the

same time, regardless of direction, while all motor vehicle movements are held. As shown in **Table 5-13**, the intersection would operate at an acceptable level of service (LOS) C. The intersection satisfies the urban peak hour signal warrant under existing conditions and would continue to satisfy the warrant under cumulative conditions. The *California Manual of Uniform Traffic Control Devices* presents eight signal warrants. Generally, meeting one of the signal warrants could justify signalization of an intersection.

Signalization of the SR 24 eastbound off-ramp intersection at Oak Hill Road would significantly reduce average delay and queuing at the ramp. Analysis results indicate that the 95th percentile ramp queue length extends to about 280 feet. Therefore, providing a minimum of 300 feet of storage for the right-turn and left-turn lanes after the single lane off-ramp would accommodate future 95th percentile queue lengths and minimize potential queuing issues at the eastbound off-ramp. For a summary of the downstream effects of signalization of this intersection, refer to Section 4.6.9, which summarizes the traffic analysis conducted for the DSP EIR.

Table 5-13: Oak Hill Road/SR 24 Eastbound Off-Ramp Cumulative PM Peak Hour Analysis

Intersection	Control	LOS[1]	Delay (s)[1]	SR 24 EB Off-Ramp Storage Length (ft)	SR 24 EB Off-Ramp 95th Percentile Queue (ft)
Oak Hill Road/SR 24 EB Off-Ramp	Signalized	C	27.0	1,050	280

Note: Volumes taken from the Cumulative No Project Scenario from the Lafayette Downtown Specific Plan EIR, and analyzed using SimTraffic

[1] *Signalized intersection level of service based on weighted average control delay per vehicle, according to the 2000 Highway Capacity Manual.*

Source: Fehr & Peers, 2011

Pathway Treatments

The following additional treatments are recommended to enhance pathway user and motorist safety:

1. **Install Lights at Pathway Entrance.** Adding lights at the pathway entrance will increase visibility at the pathway crossing.
2. **Install Bollards** at both pathway entrances and **Curve the Pathway** at the pathway entrance on the east side of Oak Hill Road to slow down bicyclists as they approach the roadway. Reducing bicyclist speeds are particularly important at this crossing due to limited sight distances on Oak Hill Road.

Oak Hill Road Crossing Planning-Level Cost Estimates

Planning-level construction cost estimates are presented in **Table 5-14**. The improvements are estimated at $633,100 to $721,200, depending on whether Option 2 or 3 is included. This estimate includes the cost of one traffic signal (totaling approximately $300,000), which is recommended in the DSP Draft EIR to accommodate future traffic along Oak Hill Road. The traffic signal may be needed to as a result of future traffic-generating development (and is not specific to a pathway along the EBMUD Aqueduct ROW); and, therefore, it may be partially or fully paid for with development fees.

Table 5-14: Cost Estimate for Oak Hill Road Crossing Improvements

No	Description	Quantity	Unit	Unit Price	Amount
Option 2					
1	Signal	1	LS	$200,000	$200,000
2	Ladder Crosswalk	700	LF	$7	$4,900
3	Advanced Signage	3	EA	$700	$2,100
4	Advanced Stop Bars	90	LF	$7	$630
5	Curb extensions/ Neck-Downs	1	LS	$25,000	$25,000
6	Widen Sidewalk	3,300	SF	$20	$66,000
7	Lights at Pathway Entrance	2	EA	$1,000	$2,000
8	Bollards	6	EA	$700	$4,200
9	Landscaping and Irrigation at Pathway Entrance	300	SF	$20	$6,000
10	Minor Items *(10% of Construction Items)*	1	LS	$34,537	$34,537
11	Additions *(10% of Construction Items)*	1	LS	$34,537	$34,537
12	Mobilization *(10% of Total Construction Cost)*	1	LS	$42,212	$42,212
				SUBTOTAL	**$422,100**
Option 3 (includes all items in Option 2)					
13	Vertical Median	300	LF	$22	$6,600
14	Median Concrete Surface	600	SF	$11	$6,600
15	Restriping Oak Hill Road	1,200	LF	$25	$30,000
16	Minor Items *(10% of Construction Items)*	1	LS	$4,800	$4,800
17	Additions *(10% of Construction Items)*	1	LS	$4,800	$4,800
18	Mobilization *(10% of Total Construction Cost)*	1	LS	$5,867	$5,867
				SUBTOTAL (includes all items listed in Option 2 & 3)	**$480,800**
				SUBTOTAL	**$422,100 - $480,800**
				25% SOFT COSTS[1]	**$105,500 - $120,200**
				25% CONTINGENCY	**$105,500 - $120,200**
				CROSSING IMPROVEMENTS TOTAL[2]	**$633,100 - $721,200**

[1] *Soft costs include survey, design, permitting, and administration costs.*

[1] *A range is presented to capture the two options.*

LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

Figure 5-17: Photo Simulation of Pathway Along the State Route 24 Oak Hill Road Off-Ramp
(Includes Oak Hill Road Crossing Option 3 Improvements)

5.6 Segment 3: Oak Hill Road to First Street

Segment 3 extends approximately 0.2 miles from Oak Hill Road in the west to First Street in the east.

The preferred option for Segment 3 is a paved Class I bikeway/ADA-accessible pathway, with an at-grade crossing at First Street. As proposed, the preferred option for Segment 3 would cost approximately $1.0 to $1.2 million to build, including roadway crossing improvements.

Table 5-15 summarizes the planning-level costs of the preferred option for Segment 3 and the costs of other options that were considered. Detailed descriptions of the design options and preferred options, including the rationally for choosing each preferred option are described below.

Table 5-15: Cost Summary for Preferred and Other Considered Options for Segment 3 Oak Hill Road to First Street

Preferred Option		Other Considered Options	
Description	*Cost*	*Description*	*Cost*
Class I Bikeway/ ADA-Accessible Pathway	$274,100	Unpaved Multi-Use Pathway	$59,800
First Street Crossing Improvements	$720,000 - $937,900	First Street Crossing Improvements	$720,000 - $937,900
Total Cost of Preferred Option	**$994,100 - $1,212,000**	**Total Cost of Other Considered Options**	**$779,800 - $997,700**

5.6.1 Pathway Design

Summary of Existing Conditions, Opportunities, and Constraints

Surrounding land uses include office and commercial space to the south and SR 24 to the north. The SR 24 on-ramp is located immediately north of the western portion of the EBMUD Aqueduct ROW.

Topography along Segment 3 varies and is illustrated and discussed in detail in *Chapter 4: Existing Conditions, Opportunities, and Constraints*. East of First Street, the topography creates a hill with slopes rising then falling at approximately 22 percent. East of this hill, the topography is relatively flat with slopes of approximately four percent.

Design constraints through this Pathway Segment include steep grades along the western portion of the segment, immediately east of Oak Hill Road.

Roadway crossings within Segment 3 include First Street. This crossing is described in detail in a following section.

Options Evaluated and Preferred Options

The two facility design standards considered for this pathway segment are a Class I bikeway/ADA-accessible pathway and a multi-use pathway. As shown in **Figure 5-18**, the Class I bikeway/ADA-accessible pathway alignment would require some switchbacks east of Oak Hill Road. A multi-use pathway would follow the existing slope profile.

As described in **Section 5.3**, the preferred option for the pathway design is the Class I bikeway/ ADA-accessible pathway.

Planning-Level Cost Estimate for Pathway Construction

Table 5-16 and Table 5-17 present cost estimates for the two facility design standards considered for Pathway Segment 3. As proposed, a multi-use pathway would cost approximately $59,800. A Class I bikeway/ADA-accessible pathway would cost approximately $274,100. Costs associated with roadway crossing improvements are presented in the following section.

Table 5-16: Segment 3 Cost Estimate for an Unpaved Multi-Use Pathway
(Not Including Roadway Crossing Improvements)

No.	Description	Quantity	Unit	Unit Price	Amount
Unpaved Multi-Use Pathway Improvements					
1	Clear, Grub & Tree Removal	15,900	SF	$0.50	$7,950
2	Grading	15,900	SF	$0.75	$11,925
3	6" Aggregate Base (Class 2)	210	CY	$45.00	$9,450
4	Minor Items *(10% of Construction Items)*	1	LS	$3,259.00	$3,259
5	Additions *(10% of Construction Items)*	1	LS	$3,259.00	$3,259
6	Mobilization *(10% of Total Construction Cost)*	1	LS	$3,983.00	$3,983
				SEGMENT 3 SUBTOTAL	**$39,800**
				25% SOFT COSTS[1]	**$10,000**
				25% CONTINGENCY	**$10,000**
				SEGMENT 2 TOTAL	**$59,800**

[1]*Soft costs include survey, design, permitting, and administration costs.*
LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

Table 5-17: Segment 3 Cost Estimate for a Class I Bikeway/ADA-Accessible Pathway
(Not Including Roadway Crossing Improvements)

No.	Description	Quantity	Unit	Unit Price	Amount
Pathway Improvements					
1	Import Borrow	2,800	CY	$25	$70,000
2	Fine Grading	21,900	SF	$1	$10,950
3	3" Hot Mix Asphalt (Type A)	300	TON	$85	$25,500
4	6" Aggregate Base (Class 2)	290	CY	$45	$13,050
5	Railing	1,500	LF	$10	$15,000
6	Minor Items *(10% of Construction Items)*	1	LS	$14,945	$14,945
7	Additions *(10% of Construction Items)*	1	LS	$14,945	$14,945
8	Mobilization *(10% of Total Construction Cost)*	1	LS	$18,266	$18,266
				SEGMENT 3 SUBTOTAL	**$182,700**
				25% SOFT COSTS[1]	**$45,700**
				25% CONTINGENCY	**$45,700**
				SEGMENT 3 TOTAL	**$274,100**

[1]*Soft costs include survey, design, permitting, and administration costs.*
LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

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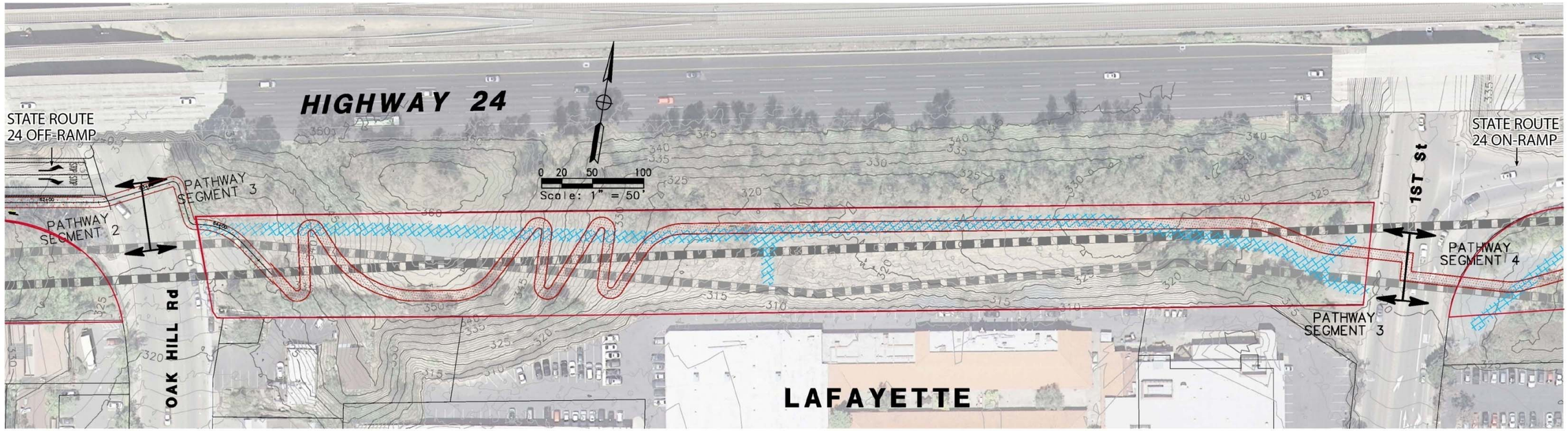

The final pathway alignment may vary from the conceptual alignment shown in this figure in order to accommodate EBMUD access requirements along the EBMUD Aqueduct ROW.

Figure 5-18: Pathway Segment 3 - Class I Bikeway/ ADA-Accessible Pathway Alignment

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5.6.2 First Street Crossing

First Street is a four-lane collector with a raised median and a posted speed limit of 25 mph. The collector provides direct access to the SR 24 eastbound on-ramp and experiences high vehicle volumes throughout the day. First Street also connects to Downtown Lafayette and has several driveways accessing commercial and retail areas. Pedestrians have been observed jaywalking across First Street between the office and commercial uses on opposite sides of the street.

Preferred Option

Four crossing options are considered. Options 3 and 4 presented in this section are the preferred options, with the final preferred alternative to be determined by the results of a detailed micro-simulation traffic analysis that considers all modes. In order to provide for a safe pedestrian and bicycle crossing of First Street, traffic signal control at the intersection of First Street, the eastbound SR24 on-ramp, and the EBMUD ROW is required, at a minimum. Given the complexity of signalizing this intersection, some options need to be preserved for further investigation in future studies.

The general scope for this required future traffic study is included below and in *Chapter 7: Phasing and Next Steps*. Options 3 and 4 each signalize the SR 24 on-ramp, but treat the half-signal at the Plaza driveway differently. Option 4 installs a signal and staggered pedestrian crossing at the SR 24 eastbound on-ramp and maintains the half-signal at the Plaza parking lot. Option 3 converts the half-signal at the Plaza driveway to a full signal and installs a signal and staggered crosswalk at the SR 24 on-ramp. The greater number of interventions required in Option 3 may cause an unacceptable level of traffic impact during peak commute and other peak demand periods.

Crossing Improvement Options Evaluated

The four options considered to enhance the safety and access for potential users accessing the pathway at First Street were:

- Option 1: Route pathway users south through the Mt. Diablo Boulevard intersection.
- Option 2: Fully signalize the Plaza parking lot entrance and provide a single pathway crossing at this location.
- Option 3: Signalize the SR 24 eastbound on-ramp and provide a pathway crossing and fully signalize the Plaza parking lot entrance to further improve pedestrian access across First Street.
- Option 4: Signalize the SR 24 eastbound on-ramp and provide a pathway crossing without altering the Plaza parking lot entrance signal.

Figure 5-19 shows the conceptual plans for Options 2, 3 and 4. **Figure 5-20** shows the conceptual plan for the First Street / SR 24 on-ramp intersection within Options 3 and 4. While there are several opportunities to improve bicycle and pedestrian access and safety on First Street, there are also some considerable limitations with each option, as discussed below.

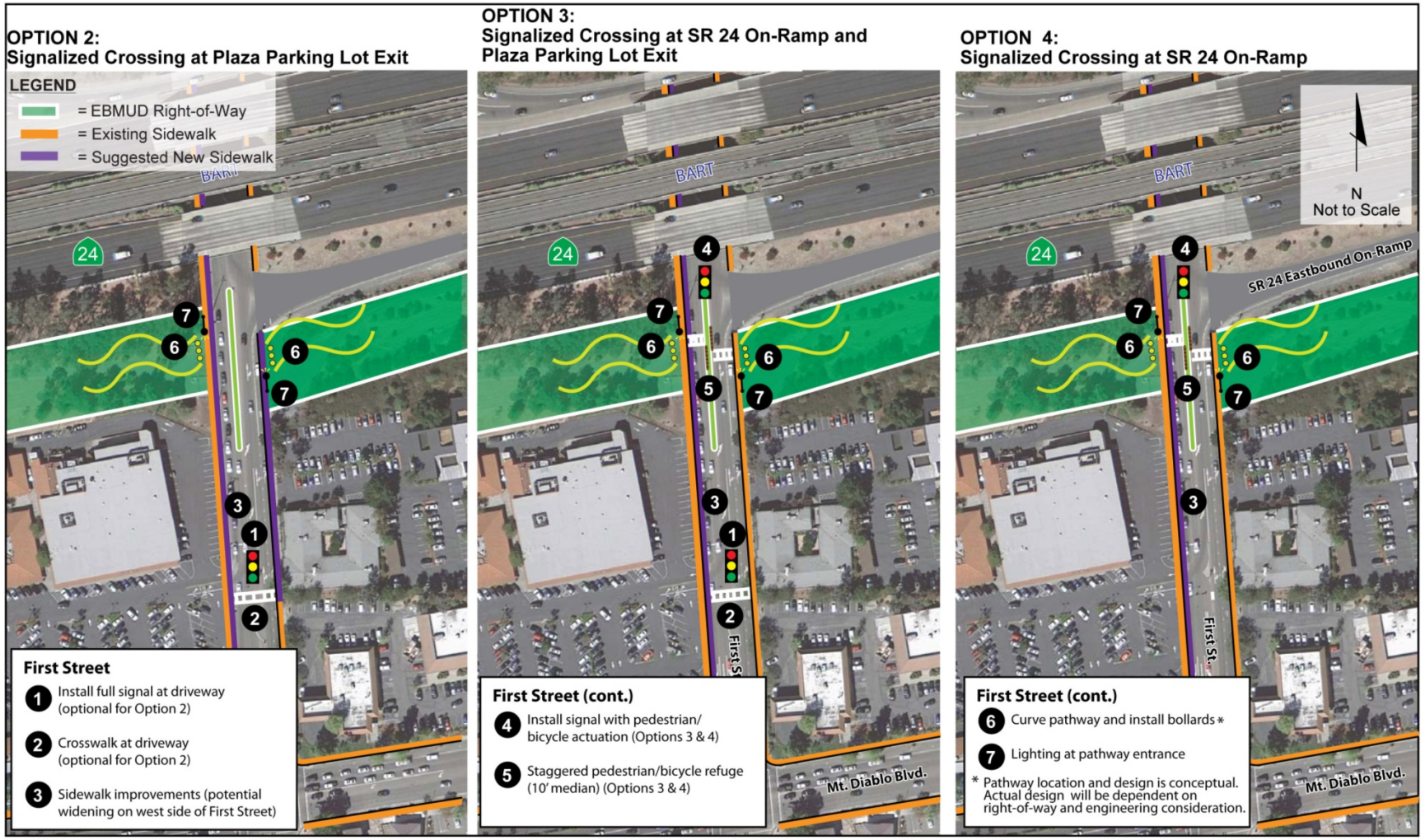


Figure 5-19: First Street Crossing Improvements: Options 2, 3 and 4

A pedestrian/bicycle overcrossing is not considered a viable crossing option at First Street. The topography at First Street would require a very long, and prohibitively expensive overcrossing. Furthermore, EBMUD does not allow construction of any permanent structure foundations (such as footings) that would be difficult to remove in the event of an unexpected emergency repair. The potential to encroach into Caltrans ROW to the north is limited by the presence of the SR 24 on-ramp. Additional considerations are shown in **Figure 5-21**.

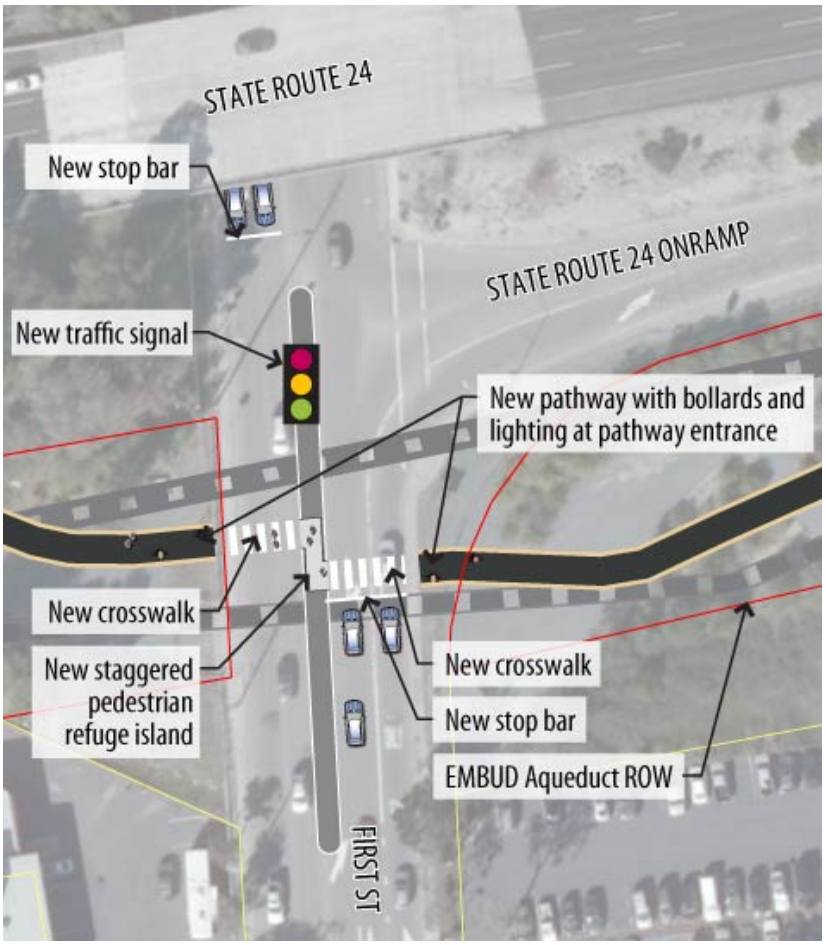


Figure 5-20: First Street/SR 24 On-Ramp intersection showing Crossing Options 3 and 4

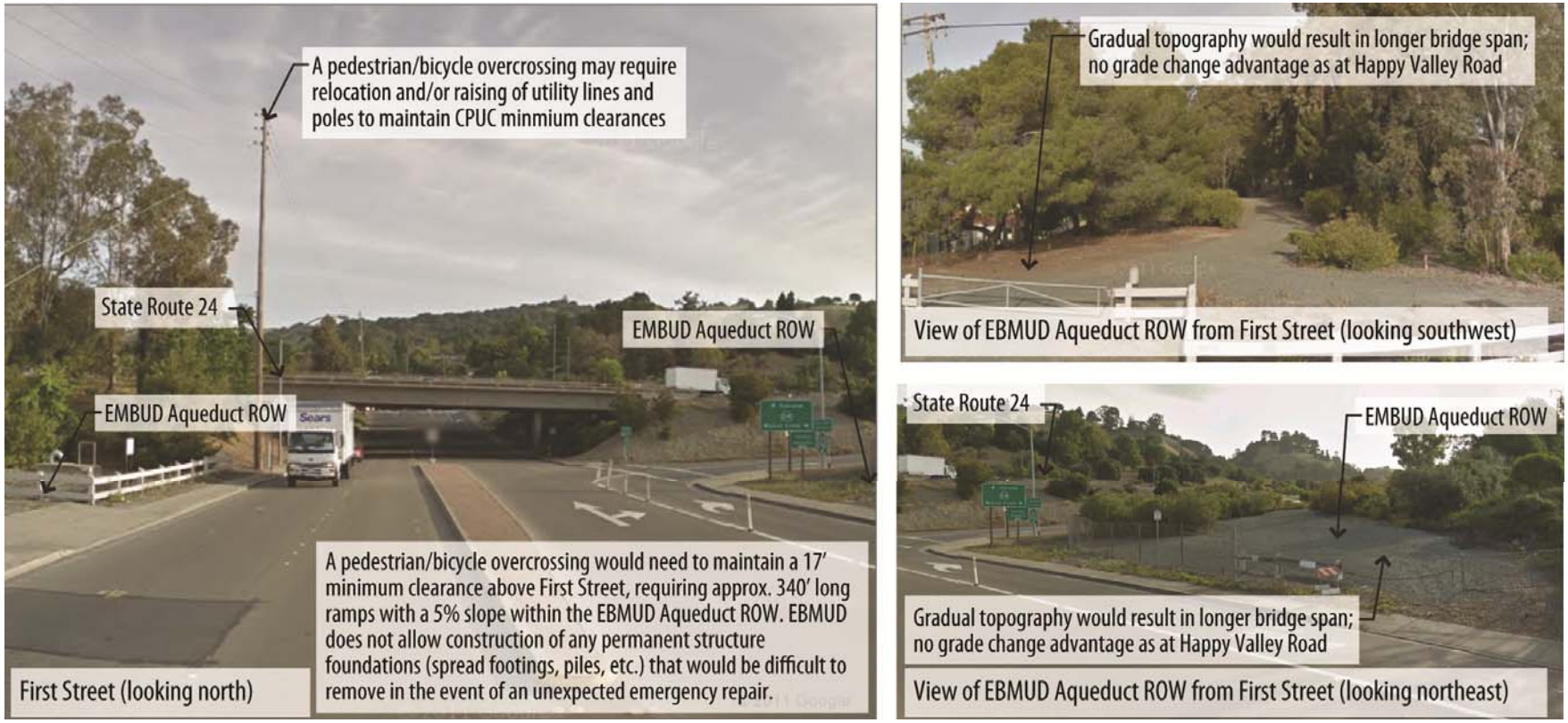


Figure 5-21: Constraints associated with construction of a Pedestrian/Bicycle Overcrossing at First Street

Crossing Option 1: Mt. Diablo Boulevard Crossing

Similar to Crossing Option 1 for Oak Hill Road, the first crossing option for First Street would route pathway users south to cross at the Mt. Diablo Boulevard intersection. Sidewalks along First Street are 5 to 10 feet wide, which would be sufficient for pedestrians but not for bicyclists. In addition, the sidewalk on the west side of First Street is constrained by utility poles and street trees within the pedestrian path of travel and a retaining wall at the future Whole Foods site. Though the sidewalk on the east side of First Street has fewer obstructions, the ROW is also constrained. In order to accommodate pathway users on the sidewalks, the street trees and utility poles should be removed and/or relocated, and the sidewalks should be widened to a minimum of 12 feet, ideally with a landscaped buffer. However, the First Street ROW is constrained, and widening the sidewalk would require either a lane narrowing, or cutting back the slope under SR 24 and potentially cantilevering the sidewalk over the Plaza Shopping Center parking lot. In addition, routing bicyclists on the sidewalks would present potential safety issues with pedestrians and drivers.

There are no bicycle facilities on First Street and routing bicyclists within the roadway is not recommended due to high vehicle speeds and volumes and the difficulty for northbound bicyclists traveling through the First Street/SR 24 on-ramp intersection. The current SR 24 on-ramp configuration of a dedicated right-turn and combined through/right-turn lane presents one of the most challenging designs for bicyclists and is not recommended for less experienced bicyclists. Given the ROW constraints and safety issues along First Street and particularly at the SR 24 eastbound on-ramp, bike lanes are not recommended in this location.

With this option, the additional travel distance for pedestrians and bicyclists would be approximately one quarter of a mile. The resultant increase in travel time would be a considerable deterrent to pathway use and could encourage undesirable mid-block crossings. Given the safety and access challenges associated with Option 1, it is not recommended.

Crossing Option 2: Signalized Pathway Crossing at the Plaza Parking Lot Exit

This option includes installation of a full signal at the Plaza Parking Lot, crossing, and sidewalk improvements as described below:

1. **Install a Full Signal at the Plaza parking lot** exit to provide for an actuated pedestrian crossing. Currently, the half signal accommodates vehicle turning movements out of the parking lot. The signal may be enhanced to provide a pedestrian connection to adjacent destinations. An in-depth discussion of the signal analysis is provided at the end of this section.
2. **Stripe a High-Visibility Ladder Crosswalk on the south side of the Plaza driveway** to provide access to the pathway and adjacent destinations. Locating the crosswalk on the south side would reduce potential conflicts with vehicles exiting the parking lot, heading northbound on First Street.
3. **Widen the Sidewalk on the West Side of First Street** between Deer Hill Road and Mt. Diablo Boulevard. Relocate the street trees and utility poles to provide a clear pedestrian and bicycle path of travel. In order to accommodate bicyclists, the sidewalk should be widened to a minimum of 12 feet. Both bicyclists and pedestrians traveling from the pathway to the library on the southeast corner of the Mt. Diablo Boulevard/First Street intersection would use the widened sidewalks and then cross at the signalized crosswalks on Mt. Diablo Boulevard.

4. **Widen the Sidewalk on the East Side of First Street** between the pathway and proposed crosswalk location to accommodate bicycles. A landscaped buffer is also preferred, but may not be feasible given the ROW constraints.

As discussed in Option 1, there are ROW constraints related to widening sidewalks on either side of First Street. To widen the west side sidewalk, travel lanes would be reduced from 12 to 11 feet. If the west side sidewalk is widened without narrowing or removing lanes, the sidewalk would need to be cantilevered into the Plaza Parking Lot and the slope would need to be dug out and regraded underneath SR 24. To widen the east side sidewalk, travel lanes would need to be further reduced to 10 feet, or widened eastward into the Caltrans and private parking lot ROW. However, if the east side sidewalk were widened further eastward, the building parcel at 1010 First Street would present a pinch point, and the sidewalk width would be limited in this location. A railing or other type of barrier along the outer edge of the sidewalk could be considered to protect bicyclists and pedestrians in the constrained section. The decision to widen the sidewalks on the west or east side of First Street should be made later in the design process, and consider costs and feasibility of ROW acquisition.

By widening the west side sidewalk to 12 feet and permitting two-way bicycle travel, the sidewalk effectively becomes a shared use path adjacent to the roadway, or a sidepath. Two-way sidepaths can introduce operational issues and potential safety problems. Specifically, potential conflicts at the Plaza Parking lot entrance and Deer Hill Road intersection may occur, where drivers may not anticipate two-way bicycle travel. At the Deer Hill Road intersection, clear directional information is needed if this type of design is used, as well as appropriate intersection design to enable bicyclists to safely cross to the other side of the roadway. Specific consideration should be given at the eastbound slip lane at the Deer Hill Road/ First Street intersection, where vehicles from the freeway and the future Whole Foods Parking lot will be turning at high speeds. At the Plaza Parking Lot entrance, signage should be used to indicate that bicyclists will be crossing the driveway entrance. However, signage alone will not remove all potential conflicts and additional design improvements should be considered to create predictable conditions at the driveway.

The AASHTO Guide for the Planning, Design, and Operation of Bicycle Facilities includes detailed guidelines for design considerations for sidepaths and should be consulted as part of any further consideration of sidepath design.

Although this option would provide a crossing at a desirable location for pedestrians accessing nearby destinations, pathway users would be routed away from the most direct crossing point. In addition, preliminary LOS analysis finds that full signalization would have a great impact on roadway operations (see **Table 5-18** and **Table 5-19**). This option is not recommended for these reasons.

Crossing Option 3: Signalized crossing at the SR 24 Eastbound On-Ramp with Full Signal at the Plaza Parking Lot Exit

The following treatments may be considered to provide a crossing at the Plaza parking lot exit and the SR 24 on-ramp:

1. **Install a Full Signal at the Plaza parking lot.** See Option 2 for a description.
2. **Stripe a High-Visibility Ladder Crosswalk on the south side of the Plaza driveway.** See Option 2 for a description.

3. **Install Signal at the SR 24 On-Ramp:** The First Street/SR 24 on-ramp intersection currently operates as a free intersection. Traffic signal poles should be located within Caltrans' or City of Lafayette's easement over the EBMUD Aqueduct ROW. Signalizing this intersection with an actuated pedestrian/bicycle phase would improve the safety and traffic operations in the following ways:

    a. A protected crossing phase for pathway users would provide the most direct east-west access and reduce the potential for undesirable mid-block crossings.

    b. The Draft DSP EIR recommends installing a signal in order to mitigate future queuing issues.

    Vehicles traveling southbound on First Street from Deer Hill Road have limited sight distance due to the freeway over-crossing and grade changes. Consideration should be given to signal placement at the on-ramp so that vehicles anticipate the signal with adequate stopping sight distance.

    An in-depth discussion of the signal analysis is provided at the end of this section.

4. **Stripe a High-Visibility Ladder Crosswalk** at the pathway entrance across First Street and across the SR 24 on-ramp. The crosswalk on First Street should be staggered to discourage pathway users from crossing against the signal (more information on staggered crosswalks and medians is provided in **Appendix C**.) Pathway users would have a green signal phase at the same time as southbound vehicles turning left onto SR 24.

    The proposed pathway would introduce new pedestrian activity to this intersection. The City should consider removing the pedestrian crossing across the SR 24 on-ramp, as the travel lane configuration and signal timing poses pedestrian safety issues. Pedestrians traveling north-south from Deer Hill Road should be routed to the west side of First Street.

5. **Install a Staggered Pedestrian/Bike Refuge Island** by widening the existing median to 10 feet wide to accommodate bicyclists. A staggered refuge island would allow for pathway users to wait within the refuge area if they cannot cross the entire street in one phase. The staggered refuge also slows speeds, thereby discouraging pathway users from darting across the intersection. Widening the median to 10 feet would require narrowing travel lanes from 12 feet to 11 feet.

6. **Widen the Sidewalk on the West Side of First Street.** See Option 2 for a description.

This option is recommended for further study.

Crossing Option 4: Signalized Crossing at the SR 24 Eastbound On-Ramp Only

With this option, the SR 24 eastbound on-ramp could be signalized with a pedestrian and bicycle crossing as described in Option 3, while the Plaza Parking Lot exit would remain as a half signal with no pedestrian crossing. The benefit of this option is that it would maintain free flowing northbound vehicle movements at the Plaza Parking Lot driveway and minimize vehicle delay and queuing back to the Mt. Diablo Boulevard intersection. The signal analysis for this option is discussed in a following section.

The following treatments may be considered to provide a crossing at the SR 24 on-ramp:

1. **Install Signal at the SR 24 On-Ramp.** See Option 3 for a description.

2. **Stripe a High-Visibility Ladder Crosswalk.** See Option 3 for a description.

3. **Install a Staggered Pedestrian/Bike Refuge Island.** See Option 3 for a description.
4. **Widen the Sidewalk on the West Side of First Street.** See Option 2 for a description.

This option provides fewer crossing options for pedestrians than Option 2. As pedestrians frequently cross mid-block at the Plaza Parking Lot exit and would most likely continue to do so in the future, improving pedestrian safety and access at this location should be a key consideration for encouraging walking trips in the area.

This option is recommended for further study.

Pathway Treatments

The following additional treatments along the pathway approaching First Street are recommended to enhance pathway user and motorist safety:

1. **Install Bollards** and **Curve the Pathway** at the pathway entrances to slow down bicyclists as they approach the roadway. Reducing bicyclist speeds are particularly important at this crossing due to limited sight distances.
2. **Install Lights at Pathway Entrance.** Adding lights at the pathway entrance will improve visibility of the pathway crossing.

Signal Analysis for First Street Options 2, 3, and 4

As part of this Study, intersection operations under Existing and Cumulative Conditions were modeled for three intersections along First Street (that is, the SR 24 on-ramp/ First Street, Plaza driveway/First Street and Mt. Diablo Boulevard/First Street intersections) under a No Project option and for Options 2, 3 and 4.[26] The No Project option represents conditions wherein the pathway project is not approved. Results of the analysis are summarized in **Table 5-18** and **Table 5-19**, respectively.

Existing Conditions

As shown in **Table 5-18**, under the No Project option all intersections are expected to operate at LOS D or better during the AM and PM peak hours, except the SR 24 eastbound on-ramp intersection, which operates at LOS F during the PM peak hour.[27] Similarly, under Option 2 all intersections are expected to operate at LOS D or better during the AM and PM peak hours, except the SR 24 eastbound on-ramp intersection, which operates at LOS F during the PM peak hour. Under Option 3, all intersections operate at LOS C or better during the AM and PM peak hours. Signalization of the eastbound on-ramp intersection at First Street significantly reduces average delay during the PM peak hour compared to unsignalized conditions.

[26] The analysis utilized data from the Cumulative No Project Scenario of the Lafayette Downtown Specific Plan EIR, Lafayette Circulation Commission and Whole Foods Proposal.

[27] Level of service (LOS) is a measure used by traffic engineers to determine the effectiveness of elements of transportation infrastructure. The Highway Capacity Manual defines LOS for signalized and unsignalized intersections as a function of the average vehicle control delay (see **Table 4-3** in *Chapter 4: Existing Conditions, Opportunities, and Constraints* for the delay periods associated with LOS A through F).

Under Option 4, all intersections operate at LOS D or better during the AM and PM peak hours. Similar to Option 2 and 3, signalization of the SR 24 eastbound on-ramp significantly reduces the average delay during the PM peak hour. Maintaining the half-signal at the Plaza Driveway instead of fully signalizing the intersection would also improve delays during the PM peak hour.

The First Street/SR 24 intersection satisfies the urban peak hour signal warrant under Existing Conditions and would continue to satisfy the warrant under Cumulative Conditions. The CA-MUTCD presents eight signal warrants. Generally, meeting one of the signal warrants could justify signalization of an intersection.

Cumulative Conditions

The Cumulative Condition traffic analysis builds on the DSP EIR analysis, which assumes a 20-year Plan horizon (2030). The No Project Cumulative Condition assumes that the projects identified in the DPS are fully built.

Under Cumulative Conditions, under the No Project option the Plaza driveway/First Street intersection is expected to operate at LOS A during the AM and PM peak hours; the Mt. Diablo Boulevard/First Street intersection and SR 24 eastbound on-ramp intersection would operate at LOS F during the PM peak hour. Signalization of the SR 24 eastbound on-ramp intersection would improve operations compared to unsignalized conditions. Signalization would also reduce the queue at the southbound left-turn lane by providing a protected left-turn phase. As shown in **Table 5-19**, the on-ramp intersection would operate at LOS C during the AM peak hour and LOS F during the PM peak hour for Options 2, 3, and 4.

Under Options 2 and 3, the northbound approach at the Plaza Driveway would become signal-controlled, resulting in queues that extend to the Mt. Diablo Boulevard intersection. Queuing at the signal-controlled northbound approach of the Plaza Driveway would impact access from the eastbound left-turn lanes at the Mt. Diablo Boulevard/First Street intersection, thus increasing the delay at this location. Therefore, under Cumulative Conditions, Options 2 and 3 would increase the average delay for the Mt. Diablo Boulevard/First Street intersection.

Under Option 4, the intersection control at the Plaza Driveway would remain a half-signal with free through movements on the northbound approach. Under this option, queues would be reduced on the northbound approach from Mt. Diablo Boulevard. However, the eastbound left-turn approach at the Mt. Diablo Boulevard/First Street intersection would continue to queue because of high left-turn volumes. During the AM Peak hour, Option 4 improves the delay compared to the No Project and other options at the intersection of Mt. Diablo Boulevard and First Street. Overall, Option 4 would have the least vehicle delay compared to Options 2 and 3, particularly during the AM peak hour at the Mt Diablo Boulevard/First Street intersection.

Recommendations

There are competing needs for pedestrian, bicycle and auto vehicle access along First Street. Ultimately, any pedestrian or bicycle improvements along First Street need to be considered in the context that vehicle demand is heavy throughout the day, traffic operations are complex, and that ROW constraints limit the options for pathway connections. Given these limitations, and for the purposes of this feasibility study, Options 3 and 4 are the preferred options for pedestrian and bicyclist mobility, access and safety and should be considered for further study. As shown in **Table 5-18** and **Table 5-19**, Option 4 would result in less vehicle delay compared to Option 3, particularly during the AM peak hour at the Mt. Diablo Boulevard/First Street intersection.

Options 1 and 2 are not recommended due to the increase in travel time necessary to cross at Mt. Diablo Boulevard and the Plaza driveway. Additional travel time would be a considerable deterrent to pathway use and could encourage undesirable mid-block crossings and require the City to address constraints associated with widening the sidewalks along both sides of First Street to accommodate both pedestrians and bicyclists.

Prior to making a final recommendation, the traffic operations analysis for both options should be further refined and expanded to fully address the issues discussed in this section, particularly downstream traffic impacts and synchronization with other signals. In addition to analyzing vehicle traffic operations, a multimodal simulation could also help to evaluate bicycle, pedestrian and transit operations, as well as how these modes interact and affect one another. The transportation analysis should address weekday conditions during the AM commute, morning and afternoon bell times, and PM commute. The detailed analysis should include the intersections of First Street, Moraga Road, Oak Hill Road, and Deer Hill Road. Data collection for these models would include intersection turn counts, GPS travel time studies, and queue counts. The work would also include public outreach focused on traffic flow operations to establish the final preferred option.

Table 5-18: First Street Traffic Analysis Under Existing Conditions

Intersection	Peak Hour	No Project			Option 2: Full Signal at Plaza Parking Lot Exit			Option 3: Full Signal at Plaza Parking Lot Exit & SR 24 On-ramp			Option 4: Half Signal at Plaza Parking Lot Exit & Full Signal at SR 24 On-Ramp		
		Control	LOS[1]	Delay (s)[1]	Control	LOS[1]	Delay (s)[1]	Control	LOS[1]	Delay (s)[1]	Control	LOS[1]	Delay (s)[1]
SR 24 EB On-Ramp & First Street	AM	Unsignalized	A (A)	4.3 (7.4)	Unsignalized	A (B)	5.5 (11.1)	Signalized	B	15.9	Signalized	B	12.3
	PM		**F (F)**[2]	106.6 (190.8)		**F (F)**[2]	72.9 (128.2)		C	29.9		D	37.7
Plaza Driveway & First Street	AM	Half-Signal	A	7.9	Signalized	B	15.4	Signalized	B	11.5	Half-Signal	A	10.0
	PM		A	9.1		B	13.6		A	8.6		A	7.7
Mt. Diablo Boulevard & First Street	AM	Signalized	C	28.8	Signalized	D	41	Signalized	C	29.8	Signalized	C	28.6
	PM		D	35.4		D	41.9		C	34.2		D	35.6

Note: Existing data from the Cumulative No Project Scenario of Lafayette, Downtown Specific Plan EIR, Lafayette Circulation Commission, Whole Foods Proposal, and analyzed using SimTraffic.

Note: Parentheses indicate the approach with the lowest level of service and longest delay (SB approach on First Street) for an unsignalized intersection.

[1] Signalized intersection level of service based on weighted average control delay per vehicle, side-street stop intersection level of service based on weighted average control delay per vehicle and worst approach control delay per vehicle, according to the 2000 Highway Capacity Manual.

[2] LOS F is primarily a result of the southbound left-turn movement, which also affects southbound through movements as the left-turn pocket cannot accommodate the full vehicle queue and spills back into the through lanes.

Source: Fehr & Peers, 2011

Table 5-19: First Street Traffic Analysis Under Cumulative Conditions

Intersection	Peak Hour	No Project			Option 2: Full Signal at Plaza Parking Lot Exit			Option 3: Full Signal at Plaza Parking Lot Exit & SR 24 On-ramp			Option 4: Half Signal at Plaza Parking Lot Exit & Full Signal at SR 24 On-Ramp		
		Control	LOS[1]	Delay (s)[1]	Control	LOS[1]	Delay (s)[1]	Control	LOS[1]	Delay (s)[1]	Control	LOS[1]	Delay (s)[1]
SR 24 EB On-Ramp & First Street	AM	Unsignalized	B (D)	13.1 (26.0)	Unsignalized	B (C)	11.6 (19.1)	Signalized	C	30.2	Signalized	C	22.8
	PM		**F (F)**	>200 (>200)		F (F)	>200 (>200)		**F**	>200		**F**	>200
Plaza Driveway & First Street	AM	Half-Signal	A	9.4	Signalized	C	20.4	Signalized	B	14.8	Half-Signal	B	12.4
	PM		A	8.4		B	14.6		B	15.5		A	9.2
Mt. Diablo Boulevard & First Street	AM	Signalized	D	51.2	Signalized	**F**	>200	Signalized	**F**	89.5	Signalized	D	40.4
	PM		**F**	>200		**F**	>200		**F**	>200		**F**	>200

Note: Existing data from the Cumulative No Project Scenario of Lafayette, Downtown Specific Plan EIR, Lafayette Circulation Commission, Whole Foods Proposal, and analyzed using SimTraffic.

[1] Signalized intersection level of service based on weighted average control delay per vehicle, side-street stop intersection level of service based on weighted average control delay per vehicle and worst approach control delay per vehicle, according to the 2000 Highway Capacity Manual.

Source: Fehr & Peers, 2011

First Street Planning-Level Cost Estimates

Planning-level construction cost estimates are presented in **Table 5-20**. The improvements are estimated at $528,100 to $937,900, depending on whether Crossing Option 2, 3, or 4 is included. This estimate includes the cost of one traffic signal (totaling approximately $300,000), which is recommended in the DSP Draft EIR to accommodate future traffic along First Street. The traffic signal may be needed to as a result of future traffic-generating development (and is not specific to a pathway along the EBMUD Aqueduct ROW), and, therefore, it may be partially or fully paid for with development fees.

Table 5-20: Cost Estimate for the First Street Crossing Improvements

No.	Description	Quantity	Unit	Unit Price	Amount
First Street					
Option 2: Full Signal at Plaza Parking Lot entrance					
1	Signal upgrade at shopping center driveway	1	LS	$100,000	$100,000
2	Ladder Crosswalk	350	LF	$20	$7,000
3	Sidewalk Improvements (east side only, cost of west side included #22 below)	1,500	SF	$20	$30,000
4	Minor Items *(10% of Construction Items)*	1	LS	$15,223	$15,223
5	Additions *(10% of Construction Items)*	1	LS	$15,223	$15,223
6	Mobilization *(10% of Total Construction Cost)*	1	LS	$18,606	$18,606
				SUBTOTAL	**$186,100**
Option 3: Full signal at the SR 24 on-ramp with Full Signal at Plaza Parking Lot entrance					
7	SR 24 Ramp Signal	1	LS	$200,000	$200,000
8	Signal upgrade at shopping center driveway	1	LS	$100,000	$100,000
9	Ladder Crosswalk	920	LF	$20	$18,400
Pedestrian/Bike Refuge Island					
10	Vertical Median	400	LF	$20	$8,000
11	Concrete Surface	1,180	SF	$10	$11,800
12	Minor Items *(10% of Construction Items)*	1	LS	$37,578	$37,578
13	Additions *(10% of Construction Items)*	1	LS	$37,578	$37,578
14	Mobilization *(10% of Total Construction Cost)*	1	LS	$45,929	$45,929
				SUBTOTAL	**$459,300**
Option 4: Full signal at the SR 24 on-ramp and half-signal at the Plaza Parking Lot entrance					
15	SR 24 Ramp Signal	1	LS	$200,000	$200,000
16	Ladder Crosswalk	570	LF	$20	$11,400

Table 5-20: Cost Estimate for the First Street Crossing Improvements (continued)

No.	Description	Quantity	Unit	Unit Price	Amount
Pedestrian Island Refuge					
17	Vertical Median	400	LF	$20	$8,000
18	Concrete Surface	1,180	SF	$10	$11,800
19	Minor Items *(10% of Construction Items)*	1	LS	$25,689	$25,689
20	Additions *(10% of Construction Items)*	1	LS	$25,689	$25,689
21	Mobilization *(10% of Total Construction Cost)*	1	LS	$31,398	$31,398
				SUBTOTAL	**$314,000**
Pedestrian & Bicycle Improvements along First Street					
22	Widen Sidewalk (west side only)	5,500 (approx.)	SF	$20	$110,000
23	Minor Items *(10% of Construction Items)*	1	LS	$12.22	$12,223
24	Additions *(10% of Construction Items)*	1	LS	$12.22	$12,223
25	Mobilization *(10% of Total Construction Cost)*	1	LS	$14,939	$14,939
				SUBTOTAL	**$149,400**
Pathway Treatments					
26	Bollards	6	EA	$700	$4,200
27	Lights at Pathway Entrance	2	EA	$1,000	$2,000
28	Landscaping and Irrigation at Pathway Entrance	300	SF	$20	$6,000
29	Minor Items *(10% of Construction Items)*	1	LS	$1,356	$1,356
30	Additions *(10% of Construction Items)*	1	LS	$1,356	$1,356
31	Mobilization *(10% of Total Construction Cost)*	1	LS	$1,657	$1,657
				SUBTOTAL	**$16,600**
				OPTION 2 TOTAL	**$352,100**
				OPTION 3 TOTAL	**$625,300**
				OPTION 4 TOTAL	**$480,000**
				SUBTOTAL	**$352,100 - $625,300**
				25% SOFT COSTS[1]	**$88,000 - $156,300**
				25% CONTINGENCY	**$88,000 - $156,300**
				CROSSING IMPROVEMENTS TOTAL[2]	**$528,100 - $937,900**

[1] *Soft costs include survey, design, permitting, and administration costs.*

[1] *A range is presented to capture the three options.*

LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

5.7 Segment 4: First Street to Brown Avenue

Segment 4 extends approximately 0.3 miles from First Street in the west to Brown Avenue in the east.

The preferred option for Segment 4 is a paved Class I bikeway/ADA-accessible pathway. The pathway would connect with Brown Avenue and the existing EBRPD trail and City trail located at the east end of the Pathway Study Area. This Segment does not include roadway crossings. As proposed, this preferred option would cost approximately $246,000 to build.

Table 5-21 summarizes the planning-level costs of the preferred option for Segment 4 as well as the costs of other options that were considered. Detailed descriptions of the design options and preferred options, including the rationale for choosing each preferred option are described below.

Table 5-21: Cost Summary for Preferred and Other Considered Options for Segment 4 First Street to Brown Avenue

Preferred Option		Other Considered Options	
Description	*Cost*	*Description*	*Cost*
Class I Bikeway/ ADA-Accessible Pathway	$246,000	Unpaved Multi-Use Pathway	$90,500
Total Cost of Preferred Option	**$246,000**	**Total Cost of Other Considered Options**	**$90,500**

5.7.1 Pathway Design

Summary of Existing Conditions, Opportunities, and Constraints

Surrounding land uses include residential, office, and commercial uses. The EBMUD Aqueduct ROW crosses under SR 24 just west of Brown Avenue. The eastern end of the Pathway Segment connects with an unpaved EBRPD trail that continues north under SR 24 to Briones Regional Park and an unpaved City trail that continues south to Mt. Diablo Boulevard and the Lafayette-Moraga Trail.

Topography along the segment varies, and is illustrated and described in detail in *Chapter 4: Existing Conditions, Opportunities, and Constraints*. The topography rises and falls to create two hills: one east of First Street and the second east of Second Street. Grades along these hills vary from approximately 10 to 19 percent.

Design constraints along this Pathway Segment include waterlogged soil.

Options Evaluated and Preferred Option

The two facility design standards considered for this Pathway Segment are a Class I bikeway/ADA-accessible pathway and an unpaved multi-use pathway. As shown in **Figure 5-22**, the Class I bikeway/ADA-accessible pathway alignment would require some switchbacks in middle of the pathway segment. An unpaved multi-use pathway would follow the existing slope profile.

As described in **Section 5.3**, the preferred option for the pathway design is the Class I bikeway/ADA-accessible pathway.

Planning-Level Cost Estimate for Pathway Construction

Table 5-22 and **Table 5-23** present cost estimates for the two facility design standards within Pathway Segment 4. As proposed, an unpaved multi-use pathway would cost approximately $90,500 to build. A Class I bikeway/ADA-accessible pathway would cost approximately $246,000.

Table 5-22: Segment 4 Cost Estimate for an Unpaved Multi-Use Pathway

No.	Description	Quantity	Unit	Unit Price	Amount
Unpaved Multi-Use Pathway Improvements					
1	Clear, Grub & Tree Removal	24,000	SF	$0.50	$12,000
2	Grading	24,000	SF	$0.75	$18,000
3	6" Aggregate Base (Class 2)	320	CY	$45.00	$14,400
4	Minor Items *(10% of Construction Items)*	1	LS	$4,934.00	$4,934
5	Additions *(10% of Construction Items)*	1	LS	$4,934.00	$4,934
6	Mobilization *(10% of Total Construction Cost)*	1	LS	$6,030.00	$6,030
				SEGMENT 4 SUBTOTAL	**$60,300**
				25% SOFT COSTS[1]	**$15,100**
				25% CONTINGENCY	**$15,100**
				SEGMENT 4 TOTAL	**$90,500**

[1]*Soft costs include survey, design, permitting, and administration costs.*

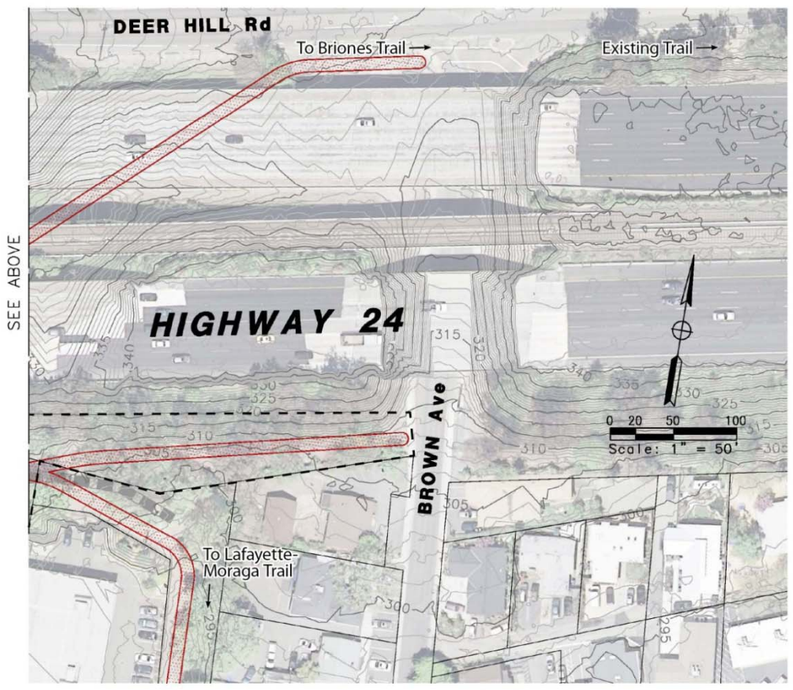
LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum

Table 5-23: Segment 4 Cost Estimate for a Class I Bikeway/ ADA-Accessible Pathway

No.	Description	Quantity	Unit	Unit Price	Amount
Pathway Improvements					
1	Import Borrow	1,500	CY	$25	$37,500
2	Fine Grading	27,200	SF	$1	$13,600
3	3" Hot Mix Asphalt (Type A)	370	TON	$85	$31,450
4	6" Aggregate Base (Class 2)	360	CY	$45	$16,200
5	Railing	2,200	LF	$10	$22,000
6	Minor Items *(10% of Construction Items)*	1	LS	$13,417	$13,417
7	Additions *(10% of Construction Items)*	1	LS	$13,417	$13,417
8	Mobilization *(10% of Total Construction Cost)*	1	LS	$16,399	$16,399
				SEGMENT 4 SUBTOTAL	**$164,000**
				25% SOFT COSTS[1]	**$41,000**
				25% CONTINGENCY	**$41,000**
				SEGMENT 4 TOTAL	**$246,000**

[1]*Soft costs include survey, design, permitting, and administration costs*

LF = Linear Foot - EA = Each - SF = Square Foot - LS = Lump Sum



The final pathway alignment may vary from the conceptual alignment shown in this figure in order to accommodate EBMUD access requirements along the EBMUD Aqueduct ROW.

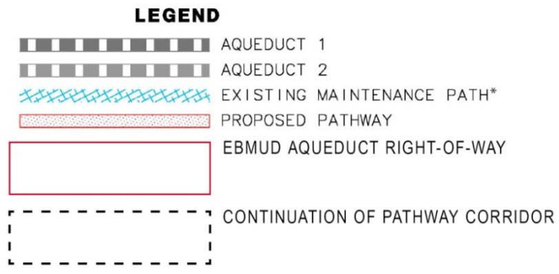


Figure 5-22: Pathway Segment 4 - Class I Bikeway/ ADA-Accessible Pathway Alignment

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6. Funding and Maintenance Strategy and Benefit-Cost Analysis

This chapter summarizes cost estimates and potential funding sources for construction, maintenance, and operations of the preferred options for a pedestrian and bicycle pathway along the EBMUD Aqueduct ROW. Cost estimates are planning level, and subject to change.

A benefit cost analysis follows the cost estimates. The analysis considers the return on the City's investment over the 30-year life of the proposed pathway, and is based on local data and utilizes conservative estimates of benefits.

The chapter concludes with a description of possible funding sources for construction and maintenance of the pathway. Funding for construction of the pathway will most likely come from grant sources, while funding for maintenance and operations will require local funding sources.

6.1 Construction Cost Estimates

Cost estimates shown in **Table 6-1** are given in 2010 dollars, and are based on a planning-level review of the preferred options. Estimates include planning, design, permitting, administration, and contingency costs. The cost estimate developed for this Study are quite inclusive and include the cost of some elements which may be fully or partially funded and constructed by others (e.g. the traffic signals at the SR 24 off-ramp on Oak Hill Road and at the SR 24 on-ramp on First Street). See *Chapter 5: Options Evaluation and Preferred Options* for a description of the preferred options and detailed cost estimates. The cost of constructing the preferred options is $6.0 to $6.2 million for a Class I bikeway/ADA-accessible pathway. As presented in the Chapter 5 segment cost estimate tables, the construction cost estimates include a 25 percent markup to account for soft costs (e.g. survey design, permitting, and administrative costs) and a 25 percent contingency mark-up.

Table 6-1: Summary of Construction Cost Estimates for the Preferred Options

Preferred Options		Notes
Segment 1		
Segment 1 Class I Bikeway/ ADA-Accessible Pathway[†]	$372,100	
Risa Road Crossing Improvements	$144,400 - $148,300	
Private Drive Crossing Improvements	$67,800	
Dolores Drive Crossing Improvements	$249,000	
Happy Valley Road Pedestrian and Bicycle Bridge	$1,238,100	Bicycle-pedestrian overcrossing
Segment 2		
Segment 2 Class I Bikeway/ ADA-Accessible Pathway	$1,958,300	Via SR 24 eastbound off-ramp
Oak Hill Road Crossing Improvements	$721,200	
Segment 3		
Segment 3 Class I Bikeway/ ADA-Accessible Pathway	$274,100	
First Street Crossing Improvements	$720,000 - $937,900	
Segment 4		
Segment 4 Class I Bikeway/ ADA-Accessible Pathway	$246,000	
Total Cost of Preferred Option	**$5,991,000 - $6,212,800**	

[†]*Class I bikeway/ADA-accessible pathway is a paved path with a 10 to 12-foot wide width, suitable for use by bicyclists and pedestrians. As designed, it meets ADA requirements.*

The planning-level cost estimates are roughly consistent with actual construction costs for similar projects in the area. The St. Stephen's Trail in Orinda, for instance, is a mile-long paved Class I bikeway/ADA-accessible pathway that parallels SR 24 and cost approximately $1.8 million to construct.[28] The St. Stephen's Trail is built along gradually climbing topography and follows a relatively straight alignment. The trail connects Davis Road and St. Stephen's Drive without additional roadway crossings. Treat Avenue Bicycle and Pedestrian Bridge on Iron Horse Trail cost $13.4 million (2011 dollars), required a decade to plan and design, and receives approximately 1,300 users per day.[29] Alameda County Transportation Commission's draft costs for the Pedestrian and Bicycle Master Plan updates estimate $1.2 million per mile for construction of Class I multi-use paths, based on a review of paths constructed in the Bay Area since 2006.

By comparison, the proposed Class I bikeway/ADA-accessible pathway along the EBMUD Aqueduct ROW would be approximately 1.5 linear miles, including switchbacks. Averaging costs between Pathway Segments, a pathway meeting a Class I bikeway/ADA-accessible pathway design standard and located along the EBMUD Aqueduct ROW would cost approximately $4 million per mile.

[28] The St. Stephen's pedestrian and bicycle trail begins at Bates Boulevard and Davis Drive and runs along the east-bound lanes of SR 24 to St. Stephen's Drive. The approximately one-mile long, paved trail connects Orinda to the Lafayette Reservoir. St. Stephen's Trail was constructed in 1997. No structures were needed. Costs have been adjusted to year 2011 dollars, using the online tool at http://data.bls.gov/cgi-bin/cpicalc.pl.

[29] Cost estimate is based on fact sheet from Contra Costa Transportation Authority's 2008 Strategic Plan, escalated from 2008 dollars.

The higher cost of Class I bikeway/ADA-accessible pathway along the EBMUD Aqueduct ROW and Caltrans ROW is likely due to the inclusion of a pedestrian/bicycle overcrossing; retaining walls, earthwork, and switchbacks necessary to navigate the steep topography and maintain a maximum 8.3 percent slope along the pathway; and roadway crossing improvements at multiple roadways. Additionally, the pathway cost estimates include utility requirements associated with traffic signals and pathway lighting, and potentially special EBMUD design requirements. The pathway cost estimates likely include more extensive project development costs than the St. Stephen's Trail due to multi-agency (EBMUD and Caltrans) involvement. The Treat Avenue Bicycle and Pedestrian Bridge is perhaps the fairer comparison of the two as it is a more recent project and one that accommodated complex vehicle traffic and utility challenges.

6.2 Maintenance and Operations Requirements and Costs

Maintaining pathways to a high standard is important for a variety of reasons: safety, liability, universal access, attracting and maintaining high use levels by all desired modes, and protecting the public investment. The City of Lafayette has a duty to protect the public welfare by maintaining facilities to a level that reduces potential safety hazards, including repairing damage on paths that may pose a hazard. Additionally, the City of Lafayette is required to follow maintenance responsibilities outlined in the Revocable Landscaping License between the City and EBMUD (2003) (see **Section 4.2.3** for a description of this agreement), the details of which are summarized in this section. Allowing hazardous conditions to exist along a path or sidewalk exposes the City to potential lawsuits. The City of Lafayette is required by federal law to maintain public facilities so that they are accessible to people with disabilities. A well-maintained pathway, with smooth surfaces, well-kept vegetation, and up-to-date signage will attract and sustain use. Regular preventative maintenance on a pathway (e.g. periodic overlays) can extend the lifetime of the existing facility and delay the need for more expensive repairs.

Local residents and stakeholder agencies have likewise expressed a desire and specific legal requirements that any pedestrian and bicycle facility developed along the EBMUD Aqueduct ROW is maintained to a high standard.

At this time, hours of operation have not been identified for the pathway. If the project moves forward, the City will consider establishing hours of use that accommodate peak hour BART ridership.

6.2.1 Maintenance and Operations Requirements

The Revocable Landscaping License between the City of Lafayette and EBMUD outlines maintenance responsibilities for both the City and EBMUD. The agreement includes specific maintenance tasks and a proposed schedule. **Table 6-2** lists these requirements. EBMUD is responsible for maintaining unlandscaped portions of the Aqueduct ROW to Fire Marshal standards, while the City of Lafayette is responsible for maintaining improvements to the ROW, including landscaping and pathway.

In the event that the ROW or improvements are disturbed during construction or repair of EBMUD facilities, EBMUD shall restore the ground surface to its pre-existing grade and make best efforts to limit damage to the landscaping, including bicycle and pedestrian trails.[30]

[30] Section A-3 of the EBMUD Revocable Landscaping License Agreement defines EBMUD responsibilities in the event of damage, and the introduction to the Agreement defines "landscaping" to include trees, shrubs, lawn, decorative gravel, other nonpermanent landscaping material, public pedestrian and bicycle trails, and irrigation systems, including minor grading for drainage.

The Agreement permits the City of Lafayette to restore and repair damage and collect reimbursement from EBMUD. Reimbursement costs for restoration and repair shall not exceed 50 cents per square foot for sprinkler replacement, 50 cents per square foot for grading and plant replacement, and $2.50 per square foot for reconstruction of paved pathway or non-permanent hardscape. These reimbursement costs have not been updated since the agreement was drafted in 2003.

The maintenance requirements outlined in the EBMUD Revocable Landscaping License are comprehensive, and will require significant City resources to meet. If the City decides to pursue construction of the EBMUD Aqueduct Pathway, it is likely that the City and EBMUD will update the Revocable Landscaping License agreement to reflect more appropriate maintenance requirements. For example, construction of a pathway along the EBMUD Aqueduct ROW may require increasing the frequency of maintaining tree canopy from an as-needed basis to a higher level.

Ultimately, maintenance requirements and costs will be driven by the final design and operations of the pathway, and may increase or decrease from those presented in this Study. In some cases, maintenance requirements may impact the final design. For example, if switchbacks along the pathway limit the ability to disc vegetation near the switchbacks, it is recommended the City consider alternate means to disc or install landscaping at the impacted areas to meet Fire Marshal standards. If the City decides to pursue the pathway, the City should consider impacts to maintenance while preparing the final design.

Table 6-2: Maintenance Requirements Required by EBMUD Revocable Landscaping License Agreement

Maintenance Requirements	Class I Pathway (Paved)	Recreational Trail (Unpaved)	Schedule
Pavement Repair and Sweeping Inspect/Sweep	•		Weekly – April thru November Bi-Weekly – December thru March
Weed Abatement on ROW and Along/Around Fence Lines, Trails and Structures Mow or disc	•	•	Two Times (Minimum) – Yearly One Time – April and May One Time – July and August A third mow/disc cycle may be required in some areas to comply with fire marshal standards
Fences and Gates at Street Crossings and Drainages	•	•	One Time (Minimum) – Yearly Or as needed for public safety
Drainage Control and Maintenance of Culverts	•	•	One Time (Minimum) – September-October (prior to rainy season) One Time (Minimum) – April-June (to repair winter damage)
Patrolling and Policing Patrol entire length of trail in License limits Policing	•	•	Weekly (Minimum) – All Year As necessary to control vandalism, graffiti and homeless activities on the right-of-way
Litter/Debris Removal	•	•	Monthly (Minimum) – At least one sweep of the entire right-of-way As needed for dumping activities (as part of patrol duties)
Landscape Pruning and Dead Materials Removal	•	•	One Time (Minimum) – April-May One Time (Minimum) – September-October (before the rainy season)
Graffiti Removal – Trail Pavement, Fences and Signs	•	•	Monthly (Minimum) As it appears
Signage	•	•	As needed to assure public safety Within one week of reported damage

***Note: Maintenance responsibility and requirements apply only to portions of the right-of-way where the City has made improvements according to plan(s) approved by EBMUD.*
To assist the City in maintaining the right-of-way, EBMUD will remove graffiti and repair vandalism to its facilities and respond to property owners and trail users and provide referral to City's maintenance department
Source: Revocable Landscaping License between EBMUD and the City of Lafayette (2003)

Other maintenance requirements not included in the EBMUD Revocable Landscaping License agreement are listed in Table 6-3.

Table 6-3: Other Maintenance Requirements

Maintenance Requirements	Class I Pathway (Paved)	Recreational Trail (Unpaved)	Schedule
Slurry Seal	●		Every 10 to 15 years
AC Overlay	●		Every 15 years
Reconstruction	●		Every 30 years
Regrading / Compaction		●	
Lighting repair and maintenance	●		Annually
Restriping	●		3 to 5 years
Site furnishings, replace damaged components	●	●	As needed
Signal maintenance	●	●	3 to 5 years
In-pavement beacons maintenance	●	●	3 to 5 years
Costs of providing electricity	●		Ongoing
Costs of irrigating landscaping	●		Ongoing

6.2.2 Safety and Security

Properly designed and managed, the proposed EBMUD Aqueduct Pathway would provide a reasonable level of safety and security. In order to maximize safety and functionality for users, and to minimize liability exposure for the City of Lafayette and other property owners, the pathway design shall meet all mandatory and advisory standards as identified by Caltrans in the Highway Design Manual, CAMUTCD and the Americans with Disabilities Act (ADA) where feasible and appropriate. Where the need for design exceptions is identified and required, the detailed documentation required to obtain approval for the design exception must be translated into effective safety and security measures. For example, a design exception to standard grades to provide for a steeper than standard running slope should be accompanied by other pathway design features to mitigate high speeds and the design should not rely on warning signage alone to mitigate safety concerns. In addition, the EBMUD Revocable Landscaping License Agreement maintenance requirements include patrolling and policing as necessary to control vandalism, graffiti and homeless activities on the ROW. A Class I bikeway/ADA-accessible pathway would be accessible to bicycle patrol, if bicycle patrolling is initiated.

Creating a comfortable pathway environment goes beyond law enforcement officers and should involve the entire community. The most effective and most visible deterrent to illegal activity on any pathway is the presence of law-abiding pathway users.[31] As a general pattern, introducing community-friendly, law abiding use on the pathway ROW will discourage undesired uses. Getting as many "eyes on the corridor" as possible is a key deterrent to illegal or undesirable activity on the pathway. There are several components to accomplishing effective community involvement in pathway safety, including providing access to the pathway, providing good visibility to the pathway from neighboring properties, and providing a high level of maintenance.

[31] Rails-to-Trails Conservancy. "Trail-Trails and Safe Communities: The Experience on 372 Trails." January 1998.

Homeland Security

The EBMUD Aqueduct's primary function is to provide uninterrupted water conveyance for EBMUD's East Bay customer base, thereby introducing additional safety and security concerns including Homeland Security issues. Federal law defines "critical infrastructure" as "systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters."[32] The EBMUD Aqueduct is considered a Critical Infrastructure Key Resource, and as such Federal law requires it to be protected and secured from terrorist attacks. The EBMUD Manager of Security and Emergency Preparedness has indicated that the proposed EBMUD Aqueduct Pathway would not be a cause for concern related to Homeland Security issues.[33] He did have suggestions for improving general security along the proposed pathway. Specifically, he requested that any design enhance the visibility of the pathway to deter unwanted activities, and requested installation of a fence along Happy Valley Creek to deter people from walking across the exposed Aqueducts. He indicated that EBMUD has a precedent for working with communities to transform unused EBMUD ROW into formalized recreational amenities, and sees this formalization as beneficial to security.

6.2.3 Maintenance and Operations Costs

Costs for maintenance and operations vary significantly depending on the level of services provided. Maintenance of a recreational trail is less costly than for a paved pathway. Cost estimates provided here are conservative and intended to provide a maximum cost that the City could expect for maintenance of the pathway.

The City's Public Works Technician estimates annual maintenance cost of a 1.5-mile paved pathway to be $38,000, based on the maintenance requirements outlined in the EBMUD Revocable Landscaping License Agreement. Including traffic signal maintenance, lighting, and irrigation, the annual maintenance cost would be $50,925 in 2010 dollars. Note that these costs are conservative, and would likely be reduced pending renegotiation of the maintenance requirements in the EBMUD Revocable Landscaping License Agreement.[34] Therefore, it is likely the actual maintenance costs for a pathway along the EBMUD Aqueduct ROW will be less than those estimated in **Table 6-4**.

Over its 30-year lifetime the path would require an additional $76,000 to $111,000 for long-term maintenance (i.e., slurry-sealing and asphalt overlay). The City should maintain a reserve account for these long-term maintenance costs, either with a large one-time deposit in the first year of the project, or with smaller annual contributions over 20 or 30 years. If the City chooses to contribute annually to a reserve fund to pay for long-term maintenance, annual contributions would be between approximately $4,700 and $5,200 in 2010 dollars. Over the 30-year lifetime of the pathway, annual and long-term maintenance costs would be approximately $898,000 to $1.2 million, which includes annual contributions to a reserve fund to pay for long-term maintenance. Table 6-4 summarizes the maximum estimated maintenance costs.

[32] 101 6(e) of the USA Patriot Act of 2001 (42 U.S.C. 5195c (e))
[33] Phone call with Steve Frew, Manager of Security and Emergency Preparedness, January 25, 2011.
[34] By comparison, EBRPD estimates maintenance and operations costs for a mile of trail at $25,000 annually. This cost includes police patrol, vegetation management, litter pickup and a contribution to a reserve fund for eventual pathway replacement.

Table 6-4: Maximum Estimated Maintenance Costs

Item	Cost (2011 Dollars)	Notes
Annual Maintenance Costs		
Maintenance Required by EBMUD Revocable Licensing agreement	$38,000 annually[†]	
Traffic signal maintenance and operations	$2,525 annually[‡]	Traffic signal maintenance and operations costs are estimated at $1,500 to $2,525 annually, depending on the chosen First Street Option.
Lighting at pathway entrances and along bicycle/pedestrian bridge	$9,400 annually[€]	Annual electrical costs of $170/light fixture plus $99 annual repair and maintenance per light.
Landscape irrigation	$1,000 annually[£]	
Average Annual Maintenance Costs	*$50,925*	
Long-Term Maintenance Costs		
Slurry seal	Year 10: $42,000[†] Year 25: $42,000[†]	
AC Overlay	Year 15: $87,000[†]	
Average Annual Long-Term Maintenance Costs	*$4,700 to $5,200*	Assumes annual contribution to reserve fund. Cost range reflects discount rates of 5% and 2.5%.
Reconstruction of Pathway		
Reconstruction	Year 30: $3,150,000	Total cost of replacement.
Average Annual Reconstruction Costs	*$86,800 to $95,400*	Assumes annual contribution to reserve fund. Cost range reflects discount rates of 5% and 2.5%. Estimates are conservative.
Total Cost Over Lifetime of Pathway		
5% discount rate	$42,700 $86,800 $898,100 $2,300,000	Annual Costs for Annual and Long-Term Maintenance Annual Costs for Reconstruction of Pathway Total Cost Over 30-Year Lifetime (No Reconstruction) Total Cost Over 30-Year Lifetime (Reconstruction)
2.5% discount rate	$43,200 $95,400 $1,203,300 $3,249,000	Annual Costs for Annual and Long-Term Maintenance Annual Costs for Reconstruction of Pathway Total Cost Over 30-Year Lifetime (No Reconstruction) Total Cost Over 30-Year Lifetime (Reconstruction)

[†] *Costs provided by David Turhune, City's Public Works Technician, Feb 11, 2011.*

[‡] *Traffic Signal Maintenance and Design Survey, DKS Associates, estimates operations and maintenance costs per incandescent signal at $2,670 in 1997 dollars. Cost adjusted for inflation, and modified to account for 75% lower maintenance and operations costs of LED lights.*

[€] *Costs provided by Donna Fehan, City of Lafayette, July 25, 2010.*

[£] *Irrigation needs assume approximately 2,000 sf of landscaping, water consumption of approximately 194,700 gallons per year and the EBMUD water rate of $3.11 per 100 cubic feet of water. Water consumption based on A. Vickers, Handbook of Water Use and Conservation (2002) water consumption rate for turf.*

The anticipated lifespan of the pathway is 30 years, at which time the pathway may require replacement. Eventual pathway replacement in year 30 is estimated to cost between $1.4 million and $2.0 million in 2010 dollars, assuming the City chooses to contribute annually to a reserve fund to pay for eventual reconstruction of the pathway. Annual contributions would be between $86,900 and $95,300 in 2010 dollars. Replacement of the pathway includes the cost of replacement of all features of the pathway (i.e., retaining walls, signals, the pathway itself, etc.). Given the long-term maintenance that is recommended (e.g. slurry sealing and AC overlay), it is likely that the pathway features will not require replacement, and may just require repair. As such, this is a conservative estimate of the needs for replacement.

Annual cost estimates are higher than actual costs incurred by other agencies in the Bay Area, and reflect the higher maintenance requirements required by EBMUD. An update to the EBMUD Revocable Landscaping License Agreement may reduce maintenance costs. Additionally, though it is a best practice, not all agencies contribute to a reserve fund to pay for long-term maintenance and eventual replacement of pathways. Contribution to the reserve fund triples the annual cost estimates.

EBRPD estimates maintenance and operations costs for a mile of trail at $25,000 annually.[35] This cost includes police patrol, vegetation management, litter pickup and a contribution to a reserve fund for eventual pathway replacement.

City of San Jose estimates $12,500 per mile per year for operations and maintenance of a paved pathway and $6,025 per mile per year for operations and maintenance of an unpaved recreational trail, and $12,050 per acre for maintaining landscaping adjacent to trails.[36] Trail rangers are $2,000 per mile per year.

The City of South Lake Tahoe and the Ski Run Business Improvement District maintain a two-mile landscaped and lighted path. Maintenance requirements are close to those for the proposed EBMUD Aqueduct Pathway, and costs for maintenance are closer. Maintenance includes maintaining 48 pedestrian lighting heads, electric bills for the lighting, water bills, mowing and fertilizing landscaping, and maintaining the multi-use path. It costs $29,700 to $30,700 annually to maintain the landscaping and path.[37]

6.3 Benefit-Cost Analysis

A benefit-cost analysis is a valuable tool for analyzing the merits of this project to the City of Lafayette and the overall San Francisco Bay Area transportation network. Over the years that a pathway has been considered for the EBMUD Aqueduct ROW, many stakeholders in this project have requested a benefit-cost analysis; these parties include the general public, City of Lafayette elected and appointed officials, as well as Technical Advisory Group and Citizen Advisory Committee members for this project. The most relevant benefit-cost analysis tool applicable to this project is the National Academy of Sciences Transportation Research Board, *National Cooperative Highway Research Program Report 552: Guidelines for Analysis of Investments in Bicycle Facilities* (NCHRP Report 552) (2006).

[35] Email correspondence with Jim Townsend, Manager, Trails Development Program, EBRPD, January 13, 2011.
[36] Email correspondence with Yves Zsutty, Acting Division Manager, Department of Parks, Recreation & Neighborhood Services, City of San Jose, January 18, 2011.
[37] Phone call with Gary Moore, Director, Parks and Recreation Department, South Lake Tahoe, July 27, 2009. Costs have been adjusted for inflation.

This tool was recently applied by the East Bay Regional Park District in an analysis of the projects included in their TIGER II grant application to FHWA for which the agency was awarded approximately $10 Million and is the standard benefit-cost analysis methodology for bicycle facilities. To account for extrapolating data, the analysis includes low, medium and high usage scenarios. Significant research went into developing the methodology used and while it may not be perfect, it is the best available.

The following categories of benefits are considered:

- Mobility benefits
- Health benefits
- Recreation benefits; and,
- Reduced auto use benefits.

Note that this benefit-cost analysis does not include other benefits that have been linked to pathways, including increased patronage at nearby businesses and increased property values. These benefits are difficult to estimate, but studies have shown that home prices near pathways tend to be higher than home prices farther from pathways[38, 39,40] and bicycle and pedestrian facilities can lead to increased spending by consumers.[41]

6.3.1 Methodology

The benefit-cost analysis presented in the NCHRP report first estimates the number of new bicyclists that will result from constructing the EBMUD Aqueduct pathway, and then applies benefit values to those new users to estimate a monetary benefit resulting from new users.

Estimating Use

The NCHRP report presents a sketch planning model that can be used to estimate bicycling demand in local areas. The sketch plan is derived from an analysis of bicycle demand research and high-quality, nationally consistent data (e.g. U.S. Census, National Household Travel Survey). Based on this research, the sketch plan uses bicycle commuting as a leading indicator for other types of bicycling in a community. The model estimates the number of bicyclists by:

1. Using U.S. Census or local data to establish the number of residents within 1600 meters, 800 meters and 400 meters of the proposed facility
2. Using U.S. Census data to calculate the number of adults and number of commuters within each buffer

[38] Karadeniz, D. (2008). The Impact of the Little Miami Scenic Trail on Single Family Residential Property Values. Unpublished master's thesis, University of Cincinnati. Retrieved November 4, 2011 from http://atfiles.org/files/pdf/LittleMiamiPropValue.pdf
[39] Lindsey, G., J. Man, S. Payton, & K. Dickson. (2004). Property Values, Recreation Values, and Urban Greenways. Journal of Park and Recreation Administration, 22(3), 69-90.
[40] Los Angeles County Metropolitan Transportation Authority. (2007). Bicycle Paths: Safety Concerns and Property Values. Retrieved November 4, 2011, from: http://www.greenway.org/pdf/la_bikepath_safety.pdf
[41] Center for International Public Management, Inc. for the Florida Dept. of Environmental Protection, Office of Greenways and Trails. (1998). Thinking Green: A Guide to the Benefits and Costs of Greenways and Trails. Retrieved November 4, 2011, from: http://www.dep.state.fl.us/gwt/community/refguide/pdf/thinkgreen.pdf

3. Using the U.S. Census bicycle commute mode share to calculate the number of adult commuter bicyclists
4. Applying low, medium, and high ratios between commuter bicyclists and all adult bicyclists to estimate the existing number of adult bicyclists on a given day. Ratios are derived from the aforementioned analysis of research.
5. Applying multipliers, based on proximity to the proposed facility, to calculate the number of bicyclists who would be induced to ride if a facility was built. Multipliers are derived from the aforementioned analysis of research.

Regarding pedestrian usage, the pathway will create a more direct pedestrian connection between BART and several of the densest residential clusters in Lafayette, decreasing walk time and increasing convenience and safety, all of which are important factors in a person's decision to walk to transit. In addition, the NCRHP method is based on several standard growth rate factors that take time to materialize; while these rates may not reflect current conditions, over time Lafayette may well increase its Downtown residential density more than the standard rates assume.

Calculating Benefits

The benefit-cost analysis presented in this study relies on local data whenever available, and conservatively estimates the number of bicyclists and pedestrians that would use the proposed pathway. Estimated numbers of existing and new bicyclists are based on local Lafayette data drawn from the 2008 American Community Survey and GIS mapping. The methodology used by the NCHRP Report 552 considers only the benefits for bicycle commuters and adult cyclists. The benefits for pedestrians are also substantial and are likely a sizeable fraction of the benefits calculated for cyclists. The BART Station Profile data for the Lafayette BART Station (2008) show that while only 2 percent of BART passengers access this station by bicycle, 12 percent access this station by walking.[42] To include the benefits for pedestrians in this benefit-cost analysis, it is conservatively estimated that twice as many pedestrians will use the proposed pathway as bicyclists.

The NCHRP report relies on a review and analysis of relevant literature to estimate the benefits of proposed facilities. The total annual benefits are determined by summing the mobility, health, recreation, and reduced auto use benefits anticipated to result from implementation of the pathway. The benefit category monetary values are determined based on research review as identified by NCHRP Report 552 and summarized here:

- The mobility benefit quantitatively evaluates individual preferences for different cycling environments. Mobility benefits are based on analysis of stated preference research. The mobility benefit for each existing and new cyclist of riding on an off-street bicycle trail, compared to riding on a street with parked cars is $4.08/trip, with 2 trips per day 5 days per week 50 weeks per year.
- The annual health benefits is derived from multiplying $128, the annual per capita cost savings from physical activity, by the number of new cyclists. Benefits are based on a literature review of the cost savings of increased physical activity, and represent the median value of benefits presented in ten studies.

[42] *2008 BART Station Profile Study*, BART Marketing and Research Department. Downloaded from http://www.bart.gov/docs/StationProfileStudy/2008StationProfileReport_web.pdf

- The annual recreation benefit for new adult cyclists, excluding new bicycle commuters, is calculated at $10/day times 365 days. Benefits are based on a literature review of numerous studies, which found that the typical monetary value of an hour of outdoor recreational activity is $10.
- The reduced auto use benefit is based on an average 6-mile roundtrip commute distance and $0.13/per mile, the NCHRP Report 552 value for urban areas. Benefits are based on the review of several reports that discuss benefits of reduced auto use associated with increased bicycling. Benefits include the value of reduced congestion, reduced air pollution, and user cost savings.

In calculating the benefit-cost ratio of a project in which benefits and costs are expected to be distributed over several years, it is important to consider the change in value of money over time. This is commonly done by calculating the net present value (NPV) of a project over the lifetime of that project. If the NPV is positive, then a project will produce benefits over its lifetime. If the NPV is negative, then a project will cost more than the benefits it produces over its lifetime.

The NPV is calculated as the sum of the present values (PVs) of the benefits and costs for each year of the project. To calculate the PV for a given year, one sums the benefits and costs for that year and discounts it back to the first year of the project using a discount rate. The discount rate can be defined a variety of ways. For this benefit-cost analysis, it is defined as the opportunity cost of the initial investment, or the interest rate that the capital needed for the project could return if invested in an alternative venture.[43] This benefit-cost analysis also uses a low and a high discount rate to account for the uncertainty in the actual discount rate. A lower discount rate makes it more likely that a project will see a positive net benefit.

The benefit-cost ratio weighs the anticipated annual benefits of the pathway against the estimated construction and maintenance costs for the pathway. The estimated construction cost for the preferred options is $6.0 to $6.2 million, as identified in **Table 6-1**. For benefit-cost analyses, construction costs incurred from 2012 to 2017 and annual maintenance and operating costs over 30 years are adjusted to net present value (NPV). The benefit-cost analysis includes the cost of total pathway reconstruction in addition to maintenance expenses. Annual benefits (2010 dollars) were calculated based on high estimates, best estimates and low estimates for the number of bicycle commuters that would use the EBMUD Aqueduct Pathway, following the NCHRP Report 552 methodology for both 5 percent and 2.5 percent discount rates.

[43] To give an example of discounting, given a discount rate of 7 percent, $5,000 in benefits received ten years from now has the same value as $2,542 in benefits received now. In other words, if one was to invest $2,542 now with interest rates at 7 percent, in ten years, that money would be worth $5,000.

Projected Existing and New Bicyclists and Pedestrians

Table 6-5 shows the estimated number of commuting and adult cyclists under existing conditions and Table 6-6 shows the estimated number of new cyclists resulting from the pathway. These estimates are based on local Census and BART ridership data, and are conservative. Under existing conditions, the "best estimate" projection of bicycle commuters and daily adult cyclists using the corridor is 109 cyclists. The "best estimate" for the number of new bicycle commuters and daily adult cyclists attributed to the pathway is 144 cyclists, which would double the estimated existing daily ridership along the corridor to 285. Using the methodology identified above, a conservative "best estimate" of the number of new pedestrians attributed to the pathway is 288 pedestrians (two times the number of anticipated new bicyclists). Comparison of these usage estimates to those produced by other pathway demand models, for example the National Bicycle and Pedestrian Documentation Project demand model, confirms that they are conservative.

Table 6-5: Daily Bicycle Commuters and Daily Adult Cyclists Under Existing Conditions

Category	Assumption		
Population within approximately one mile (1,600 meters) of the pathway alignment[†]	15,650		
Percentage of Commuters	47.37%		
Percentage of Adults	76.09%		
Category	**High Estimate**	**Best Estimate**	**Low Estimate**
Bicycle Commuters[‡]	40	32	25
Daily Adult Cycling Percentages[€]	2.24%	0.91%	0.33%
Daily Adult Cyclists[£]	266	109	39

[†] Population based on the 2008 American Community Survey and GIS mapping.
[‡] Calculated as the product of population and the commuting cyclist's percentage of population.
[€] Calculated using the NCHRP Report 552 equations on Page 38:

- *High estimate is 0.6% plus 3 times the high estimate bicycle commute percentage.*
- *Best estimate is 0.4% plus 1.2 times the best estimate bicycle commute percentage.*
- *Low Estimate is the low estimate bicycle commute rate.*

[£] Daily Adult Cyclists are calculated as the product of the population, percentage of adults and daily adult cycling percentages.

Table 6-6: New Daily Bicycle Commuters, Daily Adult Cyclists, and Daily Pedestrians Attributed to the Pathway

Category	High Estimate	Best Estimate	Low Estimate
New Bicycle Commuters[‡]	30	23	18
New Daily Adult Cyclists[‡]	514	121	15
Pedestrians[†]	1,088	288	66

[‡] Per the NCHRP Report 522, Page 39, the numbers of new bicycle commuters and new daily adult cyclists are estimated to be 1.93, 1.11 and 0.39 times the current values for distances of 400 meters, 800 meters, and 1,600 meters from the pathway, respectively. The sum is presented here. These values are in addition to the existing bicycle commuters.
[†] Assumes twice as many pedestrians will use the proposed pathway as bicyclists.

6.3.2 Findings

The last row in **Table 6-7** shows Total Annual Benefits for both bicyclists and pedestrians. The "best estimate" annual benefits are more than $1.7 million. This estimate represents the sum of the estimated mobility, health, recreational, and reduced auto use benefits.

Table 6-7: Benefit-Cost Analysis; Total Annual Benefits for Pedestrian and Bicyclists

Category	High Estimate	Best Estimate	Low Estimate
Mobility Benefits: Bicycle Only	$145,174	$113,956	$88,196
Health Benefits: Bicycle Only	$70,406	$18,677	$24,389
Recreation Benefits: Bicycle Only	$1,897,178	$445,855	$56,803
Reduced Auto Use Benefits: Bicycle Only	$5,903	$4,634	$3,586
Total Annual Benefit: Bicycle Only	$2,118,661	$583,123	$172,974
Total Annual Benefits: Bicycle and Pedestrian *Assumes twice as many pedestrians use path as bicyclists.*	$6,355,984	$1,749,368	$518,922

Table 6-8 shows the NPV benefit-cost results over the 30-year lifetime of the pathway. The benefit-cost ratio is determined by dividing the estimated benefits of the pathway in dollars by the estimated costs in dollars. A benefit-cost ratio higher than one means the project has more benefits than costs over its lifetime. A benefit-cost ratio of one means benefits and costs are equal. A benefit-cost ratio less than one means the project costs outweigh the benefits.

For the 5 percent and 2.5 percent real discount rates, the best estimate benefit-cost ratios are 2.66 and 3.28, respectively. Thus, the environmental, economic, public health, and social benefits the community would experience as a result of the pathway exceed the cost of the pathway by three times. The "low" estimates are extremely conservative and greatly underestimate the actual benefits. In this case the benefit-cost ratios for the 5 percent and 2.5 percent discount rates are 0.79 and 0.97, respectively. Under this scenario, the cost of constructing and maintaining the pathway would be very close to or more than the benefits. Using the "high" estimates, the benefit-cost ratios for the 5 percent and 2.5 percent discount rates are 9.67 and 11.93, respectively.

Though the benefit-cost estimates are less than one for the low estimate, this analysis is very conservative and does not include documented benefits of pathways such as such as higher property values adjacent to a pathway, increased economic activity generated by pathway users, and increased quality of life. Additionally, the benefit-cost analysis includes the cost of total pathway reconstruction in addition to maintenance expenses; however, given the recommended long-term maintenance, it is likely that many of these features may just require repair and not replacement. As such, the benefit-cost analysis is very conservative. If pathway reconstruction were not included in the estimated costs, the analysis would likely indicate a more favorable ratio of benefits to costs. It is likely that the actual benefits received from the pathway will exceed the costs over its lifetime. Given very conservative maintenance costs and benefits, as well as the intangible benefits that have not been captured by the benefit analysis, this Study recommends the City pursue construction of the EMBUD Aqueduct Pathway.

Table 6-8: Net Present Value Benefit-Cost Results

Benefit-Cost Analysis	Net Present Value of Benefits	Net Present Value of Construction and Maintenance Costs	Benefit-Cost Ratio	Do Benefits Outweigh Costs?
Benefits with 5% discount rate				
High Estimate	$71,402,610	$7,385,529	9.67	**Y**
Best Estimate	**$19,652,259**	**$7,385,529**	**2.66**	**Y**
Low Estimate	$5,829,529	$7,385,529	0.79	N
Benefits with 2.5% discount rate				
High Estimate	$105,726,547	$8,862,655	11.93	**Y**
Best Estimate	**$29,099,294**	**$8,862,655**	**3.28**	**Y**
Low Estimate	$8,631,842	$8,862,655	0.97	Probably

The project costs shown in **Table 6-8** include the NPV of annual maintenance and operating costs, as required for benefit-cost analysis. Total project costs are higher for the 2.5 percent discount rate case than for the 5 percent discount case because the lower discount rate results in less discounting of construction costs and annual maintenance costs in later years.

The above benefit-cost results are based on conservative, lower-bound data inputs and assumptions and there are additional categories of benefits which have not been considered in the above analysis because of the difficulty in quantifying them. Additional benefits include increased economic vitality of communities, increased property values, improved quality of life, and more social equity. The actual benefit-cost ratios are likely substantially higher than those shown above in **Table 6-8** because:

- The Census data on bicycle commuters probably substantially underestimate the actual percentages of bicycle commuters. In Contra Costa County a substantial number of bicycle commuters commute to BART or Amtrak commuter rail stations. These bicycle commuters are probably counted under "transit" rather than "bicycle." BART data indicate that 53 bicyclists access the Lafayette BART station on an average weekday (two percent of BART riders from home origins).[44]
- Because of Lafayette's dry temperate climate, with relatively few rainy days, cycling is a 12-month per year activity and the percentages of adult cyclists are likely underestimated by the NCHRP's national estimates, which include many areas with severe winters and/or many more rainy days.
- The proposed trail projects fill "gaps" in the City of Lafayette bicycle and pedestrian network, creating direct links to a major transit stop as well as local and regional shopping destinations. Filling the gaps will likely have a multiplier effect with much greater usage of the new trail segments than would be the case if the new trails were isolated trails.

[44] 2008 BART Station Profile Study

- The Lafayette Priority Development Area (PDA) and future housing developments near BART will likely increase the population near the pathway, and, thereby, the number of pathway users.
- Annual maintenance costs for the pathway may be reduced through renegotiation of the EBMUD Revocable Landscaping License Agreement.

6.4 Funding Sources

6.4.1 Funding Sources for Construction

If the City of Lafayette decides to pursue the proposed pedestrian and bicycle pathway, the City will most likely rely on grants for construction. Maximum grant awards for bicycle and pedestrian projects tend to be low—ranging from $250,000 to approximately $1,000,000—so pathway construction would need to be phased and potentially multiple grant sources used to fund a segment.

Several factors will affect the availability of grant funds to construct the proposed pathway segments. Eligibility requirements vary by grant source, but typically pathways must show a commute benefit to be eligible. While a recreational trail is less expensive to construct than an ADA-compliant pathway or Class I multi-use path, funding sources for recreational pathways are limited. Administrative costs also vary by grant source, with some grants permitting a portion of the award to be used for administration. **Appendix D** outlines potential sources for grant funding for construction of the proposed EBMUD Aqueduct pathway.

In addition to grant sources, there are two possible local sources for construction funding, the Lamorinda Transportation Development Fee and conditioning pathway construction to new development.

Lamorinda Transportation Development Fee

In 1998, the City of Lafayette entered into a Joint Powers Agreement with the cities of Orinda and Moraga to establish a transportation development fee that funds design and construction of transportation projects that mitigate traffic impacts generated by new development. Projects that can be funded by the fee are listed on an Expenditure Plan and must be shown to a) have a reasonable relationship (nexus) to the traffic generated by the new development and b) have regional benefits. If a study shows that there is a nexus between the proposed EBMUD Aqueduct Pathway and new development, the City of Lafayette may wish to add the pathway to the Expenditure Plan. Since the proposed pathway provides access to BART, it is likely that it could be shown to have a nexus, and provide regional benefits.

Conditioning Pathway Construction to New Development

There is precedent for the City to require developers to construct or fund frontage improvements as a condition of development. If a there is a nexus between a proposed development and the EBMUD Aqueduct pathway, the City may wish to consider requiring construction of the pathway as a condition of development.

6.4.2 Local Tax Revenue Sources for Maintenance and Operations

The proposed pathway will create significant infrastructure and to add to the City's maintenance inventory and safety and security operations. Funding for these programs should be secured before the City decides to proceed with the proposed pathway. As grant funding is generally not available for on-going costs of maintenance and safety and security operations, the City of Lafayette will need to identify local revenues to fund these activities.

Existing local revenue sources are currently over-subscribed, and it is unlikely that additional maintenance and operations costs could be funded with existing revenue streams. There are several options that the City may wish to consider to raise funding for maintenance and operations of the proposed EBMUD Aqueduct Pathway.[45]

Option 1. Modify the Core Area Landscape and Lighting District

The City of Lafayette established the Core Area Landscape and Lighting District in 1979 to fund ongoing maintenance of landscaping and lighting amenities within the downtown area. Eligible amenities include median and parkway landscaping, street lighting and decorative lighting in some areas, ornamental and hardscape amenities, trees and a park site within the district. The services associated with these improvements include labor, materials, equipment, utilities, related incidental expenses and reserve funds to provide for the proper maintenance of these improvements. Funds may only be spent on amenities identified by the District.

The proposed pathway along the EBMUD Aqueduct ROW falls within the assessment district and, in the event of any future increases or modifications to this assessment, could receive funding for maintenance and operations.

Property owners (both business and residential) are assessed between $120 to $5,280 annually, with an average assessment of $348. Total annual income from the assessment district is $158,489. Assessments are calculated annually, based on the anticipated costs for services, and are proportionately spread to the parcels based on the benefits received by each parcel using a formula that calculates each parcel's land use, acreage, residential units, and frontage on Mt. Diablo Boulevard. The assessment is not indexed to inflation.

Currently, the revenue generated by the assessment district does not pay for existing services, and the City has made the difference up from the general fund.[46] The assessment has not been increased since 1994, when State Proposition 218 passed, requiring a vote of affected property owners, rather than council action, to approve any new or increased assessment before it could be levied. The City's last effort to modify the assessment district (in 2007) did not receive sufficient votes by affected property owners to pass.

Option 2: Establish a Business Improvement District

The City of Lafayette does not currently have a business improvement district (BID), but supports the formation of one, if there is support from local businesses. With recent cuts in City funding to downtown beautification efforts and events, the Chamber of Commerce and City are discussing ways of raising funds, including the formation of a BID.[47] Maintenance of the proposed EBMUD Aqueduct pathway could be funded through a BID, provided the pathway provides benefits to the business owners and downtown area. The Chamber of Commerce has historically not supported the formation of a BID, and so this option may not be likely.

[45] Phone interview; Tracy Robinson, Administrative Services Director, City of Lafayette, January 12, 2011.
[46] The City currently pays about $100,000 annually to maintain existing levels of service in the assessment district, and the costs are increasing. (Phone call with Tracy Robinson, Administrative Services Director, City of Lafayette, January 12, 2011.)
[47] In December 2010, Lafayette City Council approved $500,000 in budget cuts, $80,000 of which affected downtown beautification and events such as the Christmas twinkle lights, banners, and Art and Wine Festival. (Phone call with Tracy Robinson, Administrative Services Director, City of Lafayette, January 12, 2011.)

Option 3: Establish a Business License Requirement

Lafayette does not currently require businesses to apply for a business license. If the City were to establish a business license program, funds would most likely be directed to the General Fund, and a portion could be allocated to maintenance of the proposed EBMUD Aqueduct pathway. The costs of administering a business license program may not warrant establishing this tax. The Chamber of Commerce has historically not supported the formation of a business license tax, and so this option may not be likely.

Option 4: Adjacent Property Owner Maintenance Requirements

In many cities, property owners are required to pay for maintenance of sidewalks and other public infrastructure fronting their property. The City may wish to consider requiring adjacent property owners to maintain the pathway and associated landscaping. This is most easily achieved where the pathway is immediately adjacent to the existing or proposed buildings and provides direct benefit to users of those buildings. Under the existing EBMUD Landscaping Licensing Agreement, if the City issues a sub-license to an adjacent property owner, the City is ultimately responsible for maintenance if the property owner fails to comply.

Option 5: Private Foundation Funding

Local private foundations may be willing to support ongoing pathway maintenance and operations by endowing a fund for that purpose. Annual maintenance costs are estimated at between maintenance costs would average approximately $72,700 to $103,100 annually, in 2010 dollars. Assuming a 3 percent inflation rate, reinvestment to equal inflation, and an annual rate of return of 5 percent, an endowment of $2,000,000 would provide for approximately $40,000 annually for maintenance.[48]

Option 6: Business Sponsorship

Businesses could provide for some maintenance funding as part of a formal adopt-a-pathway program, or as part of a less formal sponsorship program. In return for sponsorship, businesses would be recognized on pathway signage, maps, and City correspondence with the public about the pathway. Sponsorship programs may not bring in enough revenue to support administration of the program, so careful analysis should be conducted before the City decides to pursue such a program.

Option 7: Shared Maintenance Agreement with EBMUD or EBRPD

EBMUD currently maintains the EBMUD Aqueduct right-of-way. While EBMUD cannot make improvements or perform maintenance for the benefit of other local governments, if a pathway were constructed, potential areas of overlap should be identified to improve efficiency. If found to be workable, then the City and EBMUD may wish to develop a shared maintenance approach, the details of which would be specified in a new Revocable Landscaping Licensing Agreement. Similarly, since the pathway provides connections to the regional trail system maintained by East Bay Regional Parks District, the City should discuss maintenance-sharing possibilities with EBRPD. Given that both agencies have clearly indicated that they will not provide maintenance services for an improved pathway along the EBMUD Aqueduct, it is likely that this option is not viable.

[48] Calculations and assumptions based on Ford Foundation's Endowment Calculator: http://survey.grantcraft.org/catalog/guides/endowments/endow_worksheet2.html

6.4.3 Non-Revenue Sources for Maintenance and Operations

Volunteer Pathway Patrol and Maintenance

Volunteer pathway patrols are used by several agencies, including the East Bay Regional Park District. These patrols remind users of rules and regulations and serve as a "presence" on the pathways and are limited to litter pick up and vegetation management. Professional maintenance staff is required for crack sealing, repaving, and graffiti removal and disposing of trash and plant matter. The City could combine a volunteer trail patrol with a hotline number for volunteers to report pathway maintenance issues, thereby improving City response time. This project is not a likely candidate to develop a strong volunteer core in the short-term given existing Park and Recreation Committee interest in and commitment to maintaining existing park and open space facilities.

Commercial/Residential Neighborhood Block Watch

A commercial or neighborhood block watch can effectively address safety and security concerns along the proposed pathway. The City of Lafayette's has an established Neighborhood Watch Program, in which neighbors partner with each other and the police to address issues of concern.

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7. Phasing Plan and Next Steps

7.1 Phasing Plan

This section provides a draft framework for phased implementation of a pedestrian and bicycle pathway along EBMUD Aqueduct ROW. The project segments established in *Chapter 5: Options Evaluation and Preferred Options* and presented in **Figure 5-2** are presented here in terms of their recommended implementation phasing. Pathway Segments 1 through 4 provide independent utility and can each be implemented as stand-alone projects, thus the segment definitions are preserved here for consistency and continuity. The recommended implementation phasing is as follows and is discussed in further detail below:

- Phase 1: Risa Road to BART (Segment 1)
- Phase 2: BART to Oak Hill Road (Segment 2) and Oak Hill Road Crossing
- Phase 3: Oak Hill Road to Brown Avenue (Segments 3 and 4) and First Street Crossing

Prior to implementing Phase 2 and Phase 3, the prior completed phase should be evaluated to determine if cost-benefit assumptions continue to hold. At that point, a determination can be made whether to pursue the subsequent phase.

Table 7-1, on the next page, presents construction, annual maintenance, annual contribution for long-term maintenance, and annual contribution for eventual pathway replacement cost estimates by phase. Costs for maintenance and eventual pathway reconstruction are discounted to 2010 dollars. Maintenance costs differentiate between annual and long-term (i.e., slurry-sealing and asphalt overlay) maintenance costs. The table also identifies optional contributions to a reserve fund for eventual pathway replacement at year 30. Given the overall cost and complexity of implementing this pathway project it is critical that the first phase of implementation serve multiple benefits for the City of Lafayette, partner agency stakeholders, and local and regional users of the multi-modal transportation network.

Table 7-1 Cost Estimates by Phase

Phase		Estimated Cost
1*	Segment 1: Risa Road to BART	$372,100
	Risa Road crossing	$144,400 to $148,300
	Private Drive crossing	$67,800
	Dolores Drive crossing	$249,000
	Happy Valley Road crossing	$1,238,100
	Construction Subtotal	**$2,071,400 to $2,075,300**
	Annual Maintenance**	$27,200
	Annual Contribution for Long-Term Maintenance*** (Slurry seal and AC overlay)	$2,300 to $2,500
	Annual Contribution for Reconstruction of Pathway at 30 Years*** (Optional)	$41,600 to $45,600
	Phase 1 Construction, Annual Maintenance, and Annual Contributions Total	**$2,142,500 to $2,150,600**
2	Oak Hill Road crossing (Option 3)	$721,200
	Segment 2: BART to Oak Hill Road	$1,958,300
	Construction Subtotal	**$2,679,500**
	Annual Maintenance**	$6,400
	Annual Contribution for Long-Term Maintenance*** (Slurry seal and AC overlay)	$600 to $700
	Annual Contribution for Reconstruction of Pathway at 30 Years*** (Optional)	$11,200 to $12,300
	Phase 2 Construction, Annual Maintenance, and Annual Contributions Total	**$2,697,700 to $2,698,900**
3	First Street crossing (Options 3 and 4)	$720,000 to $937,900
	Segment 3: Oak Hill Road to First Street	$274,100
	Segment 4: First Street to Brown Avenue	$246,000
	Construction Subtotal	**$1,240,100 to $1,458,000**
	Annual Maintenance**	$17,300
	Annual Contribution for Long-Term Maintenance*** (Slurry seal and AC overlay)	$1,900 to $2,000
	Annual Contribution for Reconstruction of Pathway at 30 Years*** (Optional)	$34,100 to $37,400
	Phase 3 Construction, Annual Maintenance, and Annual Contributions Total	**$1,293,400 to $1,514,700**
	Pathway Subtotal Construction	**$5,991,000 to 6,212,800**
	Pathway Subtotal Annual Maintenance**	**$50,900**
	Pathway Subtotal Annual Contribution for Long-Term Maintenance***	**$4,800 to $5,200**
	Pathway Subtotal Annual Contribution for Reconstruction of Pathway at 30 Years* (Optional)**	**$86,900 to $95,300**
	Total Construction, Annual Maintenance, and Annual Contributions (Including Reconstruction)***	**$6,133,600 to $6,364,200**

** Initiate further traffic analysis of recommended Oak Hill Road and First Street improvements.*

*** 2010 Dollars*

**** Low value assumes 2.5% discount rate. High value assumes 5% discount rate.*

Numbers may not sum due to rounding.

7.1.1 Phase 1: Risa Road to BART (Segment 1)

Phase 1 provides the connection from BART to the western project boundary at the Risa Road, the western Downtown neighborhoods, the Veteran's Memorial Building, the Lafayette Reservoir sidewalk path and the Walter Costa Trail. This segment provides independent utility, was identified by the TAG the CAC and members of the public as the segment with the highest potential use, and is eligible for transportation-related construction funds. Several pathway sections of this segment may be developed in conjunction with new development, and will likely be the first sections of pathway to be constructed. The Woodbury Condominium project provides a precedent as to how the pathway and associated landscape improvements may be required as a part of adjacent development projects. With the exception of the bridge over Happy Valley Road, the design and permitting for this segment are straightforward: topography is relatively flat and the majority of the segment is located entirely within EBMUD ROW. Construction of the bridge over Happy Valley Road requires coordination and approvals from Caltrans, EBMUD and BART. As outlined in *Chapter 5, Options Evaluation and Preferred Options*, there are civil engineering, design and ROW challenges associated with construction of the bridge over Happy Valley Road in the Caltrans SR 24 ROW. Most significantly, the bridge design must not place a structural load over the Aqueduct in the EBMUD ROW.

Following establishment of agreements and obtaining Caltrans encroachment permits for the Happy Valley Road bicycle and pedestrian bridge, the City of Lafayette should begin the process of securing agreements and obtaining permits for the required signal controls and lane modifications at Oak Hill Road and First Street. If possible, simultaneously seeking approval from Caltrans for all three encroachment areas may minimize staff time and facilitate timely implementation.

During Phase 1, the City would also initiate additional traffic analysis to determine the feasibility of proposed improvements along First Street and Oak Hill Road, and conduct environmental analysis. The scope of the traffic analysis is discussed below under **Section 7.2**.

7.1.2 Phase 2: BART to Oak Hill Road (Segment 2) and Oak Hill Road Crossing

Phase 2 continues the pathway from BART to Oak Hill Road, providing connections between the station and employment and services in Downtown Lafayette, including access to the Safeway shopping center, and shops and services along Mount Diablo Boulevard. This phase includes widening the sidewalk on the east side of Oak Hill Road between Mt. Diablo Boulevard and Deer Hill Road, which will improve bicycle and pedestrian access to downtown.

Segment 2 from BART to Oak Hill Road requires Caltrans coordination and approval, as outlined in *Chapter 5: Options Evaluation and Preferred Options*, and can be initiated as recommended above in Phase 1. This segment would be pursued through a cooperative agreement and through a formal Caltrans project development procedures process to be defined. Once the Oak Hill Road signal is approved, the design for the pathway can be finalized. The basic geometric and civil engineering design outlined in *Chapter 5: Options Evaluation and Preferred Options* and would be refined through additional technical studies and design development prior to development of design documents and construction. The horizontal and vertical layout of this segment avoids impacts to EBMUD's Aqueduct pipeline and private parcels located south of the Aqueduct with use rights over the EBMUD ROW.

Improving the intersections at Oak Hill Road and First Street is critical to the overall functionality and success of the remaining three pathway segments.

Community members and TAG members identified creation of safe crossings at these streets as critical elements for the pathway. Because the need for signal control at these intersections was identified in the DSP Draft EIR and in this pathway feasibility study, there are clear efficiencies and benefits to integrating the interrelated pedestrian, bicycle and auto circulation needs.

Given the greater community concerns and the uncertainty of potential downstream traffic effects with signalizing First Street, it is recommended that signalization of that intersection be implemented in Phase 3 rather than Phase 2. During Phase 2, the City should conduct community outreach and any necessary additional traffic analysis to identify the preferred option for the First Street crossing.

7.1.3 Phase 3: First Street to Brown Avenue (Segments 3 and 4)

This phase includes Segment 3: Oak Hill Road to First Street and Segment 4: First Street to Brown Avenue, as well as improvements to the First Street crossing. With additional traffic analysis and public outreach completed, the City will be well-positioned to complete signal designs and secure Caltrans permits for the First Street crossing.

Segment 3 from Oak Hill Road to First Street and Segment 4 from First Street to Brown Avenue can be constructed under agreement with EBMUD and without structural requirements that would negatively impact the Aqueduct. These segments are entirely within the EBMUD ROW and do not require Caltrans coordination and approval.

7.2 Next Steps

7.2.1 Overview

This Feasibility and Options Study for the EBMUD Aqueduct Pathway is the first in a series of steps that are required prior to design and construction of the proposed pathway. This feasibility and options study identified several issues that will require additional analysis and work to address. This section describes these issues.

Additional Public Outreach

Individual meetings with potentially impacted private property owners and managers should be conducted during subsequent phases of planning and design development. Public outreach conducted during the Study identified numerous stakeholders who should be involved in future plans for pathway development.

Environmental Review

If City Council decides to pursue implementation of the pathway, environmental review would be required at such point when the City would be bound to implementing some form of the project, such as executing a new license agreement or completion of the design phase. Costs associated with environmental review are included in the 25 percent soft costs (survey, design, permitting, and administration) applied to construction costs.

Conduct Additional Traffic Analysis

First Street and Oak Hill Road require additional traffic analysis to determine the feasibility of proposed improvements. In order to analyze the signal controlled crossings at Oak Hill Road and First Street it is necessary to simulate a network that includes the following intersections:

- Mt. Diablo Boulevard/Moraga Road
- Mt. Diablo Boulevard/1st Street
- Mt. Diablo Boulevard/Oak Hill Road
- Deer Hill Road/1st Street
- Deer Hill Road/Oak Hill Road
- SR 24 Off-Ramp/EBMUD ROW/Oak Hill Road (Ped/Bike Crossing)
- SR 24 On-Ramp/EBMUD ROW/1st Street (Ped/Bike Crossing)

This simulated network will permit detailed analysis of the proposed signal locations, signal timing, lane configurations and varying auto, pedestrian and bicyclist volumes at different peak periods. Based on the signal configuration, crossing locations and layout, and lane configurations for First Street and Oak Hill Road, this analysis would accurately demonstrate queuing impacts, level of service for autos on the network, potential impacts to Caltrans operations, and crossing delay for pedestrians and bicyclists under different scenarios. The specific scenarios for analysis will be determined as part of the additional traffic analysis, but should include concerns brought up during this feasibility study, including: queuing impacts of proposed signals at Oak Hill Road and First Street on SR 24 ramps and Deer Hill Road; evaluation of "No Turn on Red" sign at Oak Hill Road/ SR 24 off-ramp; and downstream impacts of the proposed signals on all intersections listed above.

The scope of work for this analysis would include limited additional data gathering, creation of the simulated network, discussion and agreement on the specific scenarios for analysis, agreement on peak periods for analysis, model runs, model validation, and reporting and review with City staff, Caltrans and local commissions and City Council.

Technical Studies, Design Development and Preliminary Engineering

Various technical studies will be required to advance the conceptual designs presented in this feasibility study. Additional information related to soils and geotechnical issues, additional detailed review of EBMUD Aqueduct as-built drawings and potholing to determine the depth of soil cover over aqueducts, and ultimately CEQA/NEPA environmental clearance focused on topics with potentially significant impacts will be required to support the design development, permitting and property agreements. Preliminary engineering will further develop the design of the pathway and roadway crossings, refine cost estimates and prepare for the final design of the project. Additional discussions with EBMUD, EBMUD's review and approval of the pathway design, and issuance of an encroachment permit for construction within EBMUD's ROW will be needed during future planning and design phases. Caltrans Coordination and Permits

This project will require substantial coordination with Caltrans including but not limited to design coordination, design exceptions approvals, ROW agreements, and encroachment permits.

In order to facilitate the required coordination between the City of Lafayette and Caltrans, this study recommends that subsequent phases of project planning and design development follow the Caltrans documentation process outlined in the Project Development Procedures Manual pursuant to a Project Initiation Document, Project Report/Project Study Report potentially followed by a Project Approval/ Environmental Analysis document. The appropriate format and precise scope of this effort should be determined in consultation with Caltrans District 4 staff and would be initiated in Phase I, recommended above. This procedure would identify all required technical studies, permits and approvals required to implement the project.

Revise EBMUD Revocable Landscaping License Agreement

The City and EBMUD should review and revise the Revocable Landscaping License agreement to clarify maintenance responsibilities and requirements. The City's maintenance requirements outlined in the current Revocable Landscaping License agreement are not practical and will require significant City resources to meet. Additionally, the reimbursement rates contained in the agreement have not been revised in many years, and should be updated to reflect current costs. The maintenance requirements and associated costs are described in *Chapter 6: Funding and Maintenance Strategy and Benefit-Cost Analysis.* Some of the private property owner concerns discussed in Section 4.8.1 will need to be addressed in the revised Revocable Landscaping License between EBMUD and the City. These include, but are not limited to: fencing, pathway patrols, access treatments, aesthetic impacts, pathway operating hours, and pathway lighting.

Secure Operations and Maintenance Funding

The City of Lafayette should identify a funding source for operations and maintenance activities prior to construction of the pathway. *Chapter 6, Funding and Maintenance Strategy and Benefit-Cost Analysis* provides cost estimates for maintenance, and funding strategies the City may wish to pursue. If the City and/or Police Department decided to initiate patrols or other safety-related programs along the pathway, operations funding for these activities should also be secured. Since the costs of maintenance and operations are tied to the final design of the pathway this step must come after designs have been finalized and the EBMUD Revocable Landscaping License Agreement is renegotiated.

Identify Construction Funding

The level of funding available for the planning, design, and construction phases of projects varies but in general the largest fund sources are available for projects that are considered "Shovel-Ready" with environmental planning and design work complete so that a project can be immediately made available for construction bidding. As discussed in *Chapter 6: Funding and Maintenance Strategy and Benefit-Cost Analysis* maximum grant awards for bicycle and pedestrian projects tend to be low so pathway construction would need to be phased and potentially multiple grant sources used to fund a segment.

7.2.2 Near-Term, Mid-Term, and Long-Term Next Steps

The Lafayette City Council accepted the Final Feasibility and Options Study for the EBMUD Aqueduct Pathway at its meeting on February 13, 2012. The Council also agreed to the following next step actions:

Near-Term Next Steps:

- Continue to determine the feasibility of installing the traffic signals as discussed in the Final Study. This involves monitoring the outcome of the City's Downtown Specific Plan process and its consideration of the two traffic signals at Oak Hill Road and SR 24 off-ramp and at First Street and the SR 24 on-ramp as mitigation measures.
- Pursue opportunities for implementation of the pathway via the development review process. As there are several active development applications in the vicinity of the pathway, staff may need to begin re-negotiating the existing use license with EBMUD regarding maintenance responsibilities associated with the pathway in the EBMUD's ROW. The City would re-negotiate the license along this section of the EBMUD ROW only as a first step, and wait on the future phases until such time when they become more imminent.

Near- to Mid-Term Next Steps:

- Depending on the outcome of decision to include the two traffic signals in the Downtown Specific Plan, seek grants for additional traffic analysis as appropriate.
- Depending on the outcome of the additional traffic analysis or as appropriate, pursue funding and implementation of design, engineering, and environmental work for the pathway.
- Pursue funding opportunities for construction of the pathway.

Long-Term Next Steps:

- Evaluate and consider whether to complete the entire pathway alignment over the long-term upon completion of Phase 1 or any usable segment when actual use and cost experience would then be available.

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Appendix A. Existing Plan Summary

This appendix reviews planning and policy documents relevant to a Pedestrian and Bicycle Pathway along sections of East Bay Municipal District's (EBMUD) Aqueduct right-of-way (ROW). The overview examines plans and policies from the City of Lafayette, Contra Costa County, as well as from regional entities like the Association of Bay Area Governments (ABAG), Bay Area Rapid Transit (BART) and the East Bay utility and park districts which have lands adjacent to the EBMUD Aqueduct (ROW).

The purpose of this review is twofold: (1) to document existing goals, policies and programs that give support or guidance to the pathway currently being studied and (2) to ensure consistency between this study and previously adopted City, County and Regional planning documents which could affect implementation of a new walking and bicycling pathway through downtown Lafayette.

A.1 City of Lafayette Plans and Policies

A.1.1 General Plan (2002)

The City of Lafayette's General Plan provides a set of directives and guidelines regarding future development in Lafayette. One of the themes of the General Plan is to maintain a network of bicycle and pedestrian paths between schools, commercial centers, parks and cultural centers in and around the City. The Circulation Element of the General Plan states that, in general, traffic signals will be designed to "favor pedestrians and bicyclists." The two exceptions to this rule are at the highly congested Lafayette "Y" —the intersection of Moraga Road, Mt. Diablo Boulevard, Oak Hill Road and First Street—and Mt. Diablo Boulevard. Traffic signals at these two locations will be designed to "balance the needs of vehicular traffic and pedestrians" (p.II-1, Circulation Chapter, Lafayette General Plan). The Circulation element specifically recommends providing effective alternatives to the private automobile, including bikeway facilities.

In addition, the Lafayette General Plan includes goals and policies that complement the development of an effective pedestrian and bicycle network. These include Goal C-1 to "Develop a safe and efficient circulation system that respects Lafayette's quality of life and community character" and Goal C-4 to "Coordinate land use and circulation planning" and Program C-8.2.6 to "utilize grant funding and other means, as appropriate, to acquire rights-of-way needed for a comprehensive bike route system..."

A.1.2 Downtown Lafayette Specific Plan (Revised Draft 2009)

The following description is based on the current draft version of the DSP. The DSP may change based on work undertaken by the Planning Commission and ultimately the City Council prior to adoption. This section will be updated upon adoption of the DSP.

The Downtown Lafayette Specific Plan (DSP) was prepared by the City in September of 2009 to guide all future development in the downtown area of Lafayette and has not yet been adopted. If the DSP is adopted, the General Plan will be amended concurrently to ensure consistency with the DSP. The downtown area includes 297-acres bound roughly by SR 24 and the BART line to the north, St. Mary's and Moraga Roads to the south, Risa Road to the west, and Pleasant Hill Road to the east. Approximately one-third of the pathway alignment under study is located within this planning district. The other two-thirds abut the DSP area on the south. The lead element of the Downtown Specific Plan is sustainability. The plan recognizes the requirement

to reduce greenhouse gas emissions as outlined in recent state climate legislation (AB 32 and SB 375) and envisions a more compact development pattern that shortens travel distances and allows more people to travel by foot, by bike, or by public transit. The Specific Plan builds on guidelines in the General Plan and includes new policies, programs, and goals related to bicycle and pedestrian planning in the downtown area. The most relevant sections of the DSP to this feasibility study are Circulation, Sustainability, Natural Resources and Downtown Character.

Circulation Section

The Circulation section of the DSP focuses on managing traffic congestion and improving pedestrian and bicycle facilities so that travel within, and to, the downtown area is safe and easy. Goals 2, 3, and 6 specifically address walking and bicycling in the area surrounding the EBMUD Aqueduct (ROW):

- **Goal 2:** Ensure a continuous and accessible pedestrian network.
- **Goal 3:** Develop a network and facilities to serve bicycle trips to, from, and within the downtown.
- **Goal 6**: Manage downtown circulation to maximize personal mobility, recognizing that maximizing opportunities for walking, biking, taking transit, and parking in the right location when driving will mitigate traffic congestion and preserve the downtown's small town character.

Other Relevant Sections and Programs

- **Natural Resources:** Program NR-1.2.2. Develop off-street pedestrian walkways in the creek corridors to provide pedestrian linkages with Mt. Diablo Boulevard and other downtown streets.
- **Downtown Districts**: Program DD-1.6.3. Improve the appearance and pedestrian orientation of Oak Hill Road and First Street as direct entrances into the downtown from SR 24.
- **Downtown Districts**: Program DD-1.6.4. Improve pedestrian access to the BART station through better signing and improvements to Happy Valley Road walkways.

A.1.3 Downtown Specific Plan Draft and Final Environmental Impact Reports (2010)

A Draft and Final Environmental Impact Reports (Draft and Final EIRs) were prepared to evaluate potential environmental impacts of the DSP. The Draft and Final EIRs identify significant impacts related to air quality, population and housing, and traffic and transportation. According to the Draft EIR Report Summary, full build-out of the DSP in the year 2030 would result in up to 1,765 new housing units and increase Lafayette's population by up to 4,589 residents. It is important to note that the Draft EIR assumed a high rate of redevelopment to ensure that environmental impacts were not underestimated and that, "given the historic rate of growth in Lafayette, the high cost of land, and irregular parcel sizes in the [DSP] Area, it is unlikely that the build-out numbers would be fully realized" (DSP Final EIR p. 3-6). The Draft EIR concludes the DSP has the potential to cause more vehicle trips in the downtown and surrounding areas, which could result in higher levels of traffic congestion at intersections and roadways bordering the Pathway Study Area.

Previously noted goals and programs in the DSP relating to a pathway along the EBMUD(ROW) could partly mitigate the extent of these impacts if they are implemented (and vehicle trips are reduced). Additional examples of programs in the DSP that could help mitigate certain impacts include:

- **Program C-1.2.1**. Work with school administrators and parents to develop options for school commuting, including carpooling, walk and bike-pooling, employee parking, and satellite drop-off and pick-up locations.
- **Program C-2.3.2**. Develop off-street pedestrian walkways to provide pedestrian linkages with Mt. Diablo Boulevard and other downtown streets, including walkways along the creek corridors.
- **Program C-3.1.3**. Develop connections between properties and streets and to shorten pedestrian and bicycle travel by considering internal pathways through new development sites and connections to adjacent developments.

A.1.4 BART Block Specific Plan (1986)

This plan, adopted in 1986, has guided development around the BART station and, in particular, the Town Center redevelopment with a focus on creating a downtown retail area mixed with commercial, residential and transportation uses. The design standards are aimed to preserve views of the hills (while still allowing height above 35-feet in some cases) and create a pedestrian-friendly environment.

A.1.5 Redevelopment Plan (1994)

The Redevelopment Plan lays the legal and policy framework for the activities of the Lafayette Redevelopment Agency and the redevelopment of Downtown Lafayette. The goals of the Redevelopment Plan are to encourage the revitalization of downtown and it is designed to be consistent and coexist with the goals and the policies of the General Plan.

A.1.6 Master Walkways Plan (updated 2008)

The Lafayette Master Walkways Plan (adopted in 1999 and updated in 2008) guides the Circulation Commission and staff in providing Lafayette with a system of walkways that will improve the safety and efficiency of walking along roads well traveled by pedestrians and motorists. Trail and bikeway planning and installation are specifically not governed by the Master Walkways Plan. However, the plan does require that walkways that coexist with bikeways should have a minimum width of 8 feet. This eight-foot width meets Caltrans minimum width for a two-way bicycle path.

A.1.7 Bikeways Master Plan (2006)

The Lafayette Bikeways Master Plan (adopted in 2006) was prepared by the City to facilitate safe and efficient bicycle travel within Lafayette and between Lafayette and other regional bicycling destinations. The plan is a guide for planning future bike lanes, routes, paths, parking and other bicycle facilities throughout the City. The plan includes a master list of priority projects, including the EBMUD Aqueduct/Caltrans (ROW) trail. This pathway is categorized as an extremely important component of the comprehensive bicycle network, but it is listed as a longer-term, lower-priority project within the context of the overall Bikeways Master Plan.

A.1.8 Trails Master Plan (2006)

The Trails Master Plan addresses General Plan's goal "to provide an attractive system of parks, trails, and recreation facilities throughout the city." The document lists two trails within the downtown planning district: the Shield Block Creek Trail and the Lamorinda Trail Loop. The EBMUD Aqueduct/Caltrans (ROW) trail was removed with the approval of the Parks, Trails & Recreation Commission in 2005 with the

recommendation to the Circulation Commission that it be added to Circulation Plan. An Aqueduct pathway would provide a linkage (and a potential upgrade) to the downtown section of the Lamorinda Trail Loop. A pathway would also enhance pedestrian and bicycle access to other trails and open space areas adjacent to downtown Lafayette.

A.1.9 Park Master Plan Background Report (2009)

The Background Report prepared in 2009 is the first phase in the creation of a Parks and Recreation Facilities Master Plan for Lafayette. The overall objective is to create an action plan for providing the park facilities needed to serve the citizens of Lafayette according to goals and policies established in the General Plan. The pathway along the EBMUD (ROW) under study has the potential to help connect the Lafayette Reservoir Recreation Area and the Briones Regional Park by serving bicyclists and pedestrians within the downtown commercial and residential areas.

A.1.10 Downtown Street Improvement Master Plan (1988)

The City of Lafayette adopted its current Downtown Street Improvement Plan in 1988. The Downtown Improvement Plan is intended to guide developers and staff in making improvements to street frontage in the downtown area of Lafayette. Primarily intended for improvement of the pedestrian experience, the Plan includes design guidelines and physical improvements to streets, sidewalks, landscaping, and crossings.

A.1.11 Traffic Calming Guidebook (2003)

In 2003 the City of Lafayette published a Traffic Calming Guidebook. The guidebook outlines various techniques to calm traffic by way of public education, stricter enforcement, and innovative engineering techniques. Many solutions rely on educational messages on signs and bumper stickers that promote safe and respectful driving. In general, the Traffic Calming program relies on citizens and community groups working together to identify their traffic problems, and provides a public forum for review and prioritization of all traffic calming requests.

A.1.12 Zoning Ordinance and Municipal Code

Bicycles are addressed within Lafayette Municipal Code's Title 8 Public Welfare, Morals and Society, in *Chapter 8-2, Bicycles.* This chapter was last updated in 1972, and should be revised to reference current Caltrans bikeway definitions and to reflect State Code regarding operation of bicycles. The Lafayette Municipal Code allows bicycles to ride on the sidewalk; requires all residents of Lafayette to register their bicycle with the Contra Costa Sheriff's Department for a dollar fee; restricts cyclists from locking their bicycles to parking meters; and does not permit cyclists to exit a bicycle lane except at intersections, when making a permitted U-turn or when turning right into a driveway or roadway.

A.2 County of Contra Costa Plans and Policies

A.2.1 Contra Costa Countywide Bicycle and Pedestrian Master Plan (updated 2009)

The Contra Costa Transportation Authority (CCTA) Countywide Bicycle and Pedestrian Master Plan was adopted in 2003 and updated in 2009. The Countywide plan encourages improved links to transit,

development of safety and education programs, completion of regional connections, and collaboration between local agencies and citizens to build a countywide network of bicycle and pedestrian facilities.

The CCTA Comprehensive Transportation Project List contains 32 bicycle and pedestrian projects within Lafayette. This list is part of Appendix E of the Countywide Plan's 2009 update (a pathway project along the EMBUD Aqueduct is included on the list).

In the 2003 Master Plan, two of the seventeen priority bicycle projects identified had segments within Lafayette: the SR 24 Bikeway project and the Lamorinda Linkages project. The SR 24 Bikeway consists of 6.7 miles of on- and off-street bicycle facilities paralleling SR 24 in Orinda, Lafayette, and Walnut Creek (County project #553). The Lamorinda linkages recommendations consist of 3.9 miles of bike routes within Lafayette, Orinda and Moraga. The Countywide Plan also supports efforts to connect the Lafayette-Moraga Trail to the Iron Horse Trail in Walnut Creek.

A.3 Regional Plans and Policies

A.3.1 BART Bicycle Access and Parking Plan (August 2002)

The BART Bicycle Access and Parking Plan outlines strategies to enhance and improve bicycle access to BART. The BART Bicycle Access and Parking Plan consists of two volumes: Volume 1 presents a systemwide approach to planning for bicycle access and parking in the BART system. Volume 2 is being developed in stages and will include site-specific bicycle access and parking plans for each station. A bicycle access and parking plan has not yet been created for the Lafayette station. Lafayette is listed as one of 18 stations with a High Parking Improvement Priority rating, which was assigned to stations with either: 1) no Class 1 and Class 2 bicycle parking available, or 2) with a wait list for bicycle lockers which is greater than half of the actual locker supply.

A.3.2 BART Station Profile Study (2008)

As stated in the 2008 BART Station Profile Study, parking at the Lafayette BART Station consists of 1,526 spaces, including 380 monthly permit spaces and the 1,146 daily fee spaces. In addition, 122 bicycle spaces are provided at the station. Approximately 3,270 BART riders enter the station on an average weekday, 2,658 of which come from home. According to the study, 84 percent of Lafayette station BART riders drove from their home to the station, 12 percent walked, 2 percent bicycled and one percent each took transit or rode a motorcycle/moped.

A.3.3 EBMUD Trails

EBMUD owns and manages the 915-acre Lafayette Reservoir Recreation Area, including the multi-use trail that surrounds the Reservoir. The entire recreation area is within Lafayette's city limits. The EBMUD Aqueduct (ROW) runs from this reservoir, through downtown Lafayette, and then heads northeast toward Pleasant Hill Road and the Acalanes High School. EBMUD permits bicycles on the Lakeside Trail and other roads within the park on limited days at limited times. Bicycles are not permitted on any other EBMUD trails.

A.3.4 East Bay Regional Parks District Master (EBRPD) Plan (1997)

Adopted in 1997, the East Bay Regional Park District's Master Plan outlines goals and policies consistent with the District's vision of its future. EBRPD's Mission Statement includes the goal of the continued provision of

trails. EBRPD's parks are home to over 1,000 miles of existing trails, and EBRPD reports that trail use is on the rise. EBRPD aims to expand its system of trails linking parklands with major population centers.

Briones Regional Park (482 acres of which are within Lafayette's city limits) can be accessed via a trail from Brown Avenue, which is the eastern boundary of the Pathway Study Area. The Lafayette-Moraga Trail, a 7.65-mile linear park, managed by EBRPD begins at a staging area at Olympic Boulevard and Pleasant Hill Road, travels northwest toward the intersection of 4th Street and Moraga Boulevard, then southeast and southwest to EBMUD's Valle Vista staging area at the outskirts of Moraga. From the 4th Street/Moraga Boulevard intersection, 0.66 miles of trails connect the Lafayette-Moraga Trail with the EBMUD Aqueduct (ROW).

A.3.5 ABAG Priority Development Area (PDA)

The Association of Bay Area Governments (ABAG) has designated downtown Lafayette as a Priority Development Area (PDA). Regional planning agencies are committed to offering technical assistance, planning grants, and capital funding for local governments undertaking PDA transportation and land-use development projects. Downtown Lafayette was selected due to its proximity to the BART station and the community's plans to develop more housing units in the area.

Appendix B. Property Ownership

Table B-1: Property Ownership (As of April 2010)

Study Area	APN	Owner	Square Feet	Acreage
1	241020011	LAFAYETTE OFFICE PARTNERS LLC	189,083	4.34
1	241010002	CONTRA COSTA JEWISH COMM CTR	2,652	0.06
1	241010024	THE WOODBURY LLC	28,219	0.65
1	241010031	DAVIDSON HARVEY D TRE	15,005	0.34
1	241010049	CONTRA COSTA COUNTY	47,184	1.08
1	241010046	TEMPLE ISAIAH OF CCC	466,547	10.71
1	241020017	TROOPER INVESTMENT LP	9,623	0.22
1	241010040	THE WOODBURY LLC	33,173	0.76
1	241010033	THE WOODBURY LLC	29,003	0.67
1	241010034	THE WOODBURY LLC	16,520	0.38
1	241020016	ASGHARY AHMAD	5,364	0.12
1	241020018	LEAL RAYMOND J & ANGELINA TRE	96,929	2.23
1,2	241020004	BERRIEN RICHARD C TRE	54,806	1.26
1,2	241020015	PIACENTE FRANK A & BETTE J TRE	8,471	0.19
2	241020008	RODRIGUEZ RAFAEL & MARINA TRE	32,981	0.76
2	243060015	MOORE BRIAN E TRE	4,108	0.09
2	241020014	MOOERS STEPHANIE TRE	12,675	0.29
2	241020013	GORDON PLAZA LLC	51,752	1.19
2	241020005	GORDON PLAZA LLC	6,482	0.15
2	243060014	MOORE BRIAN E TRE	6,828	0.16
2	243060020	HEGENBERGER LAND INC	55,104	1.27
2	243060002	MEINBRESS ROBERT & P TRE	12,137	0.28
2	243060019	MEINBRESS ROBERT & P TRE	17,444	0.40
2	243050012	BEDAYN RICHARD R & MARY-JO TRE	9,146	0.21
2,3	243050013	AT&T[1]	55,753	1.28
3	243030041	WELLSPRING DEVELOPMENT	17,578	0.40
3	243040035	LAFAYETTE RESIDENTIAL PARTNERS	64,637	1.48
3	243020011	MATHEWSON ROBERT C III TRE	976	0.02
3	243040037	BAY GLEN LIMITED PARTNERSHIP	61,604	1.41
3	243030023	SAGE RAYMOND W TRE	5,378	0.12
3	243030030	HEATON ROBERT L & HILMA M TRE	10,065	0.23
3,4	243020039	BRUZZONE JOAN E TRE	172,921	3.97
3,4	243020010	BRUZZONE JOAN E TRE	20,408	0.47
4	243020014	BRUZZONE JOAN E TRE	19,781	0.45

Table B-1: Property Ownership (As of April 2010) (continued)

Study Area	APN	Owner	Square Feet	Acreage
4	243020036	BRUZZONE JOAN E TRE	76,818	1.76
4	243011XXX	State of California[1]	14,519	0.33
4	243011054	HPF GLB CORPORATE TERRACE LLC	169,694	3.90
4,5	243011041	LAPLAYA APARTMENTS	37,032	0.85
4,5	243011049	LAPLAYA APARTMENTS	22,028	0.51
5	233040034	JOHNSON & L H CLARK PRTNRSHP	103,371	2.37
5	233040XXX	State of California[1]	24,565	0.56
5	233040XXX	State of California[1]	2,279	0.05

Source: Contra Costa County Assessor's Office GIS Data, April 2010

[1] Contra Costa County Assessor's Office staff, phone conversation on November 9, 2010

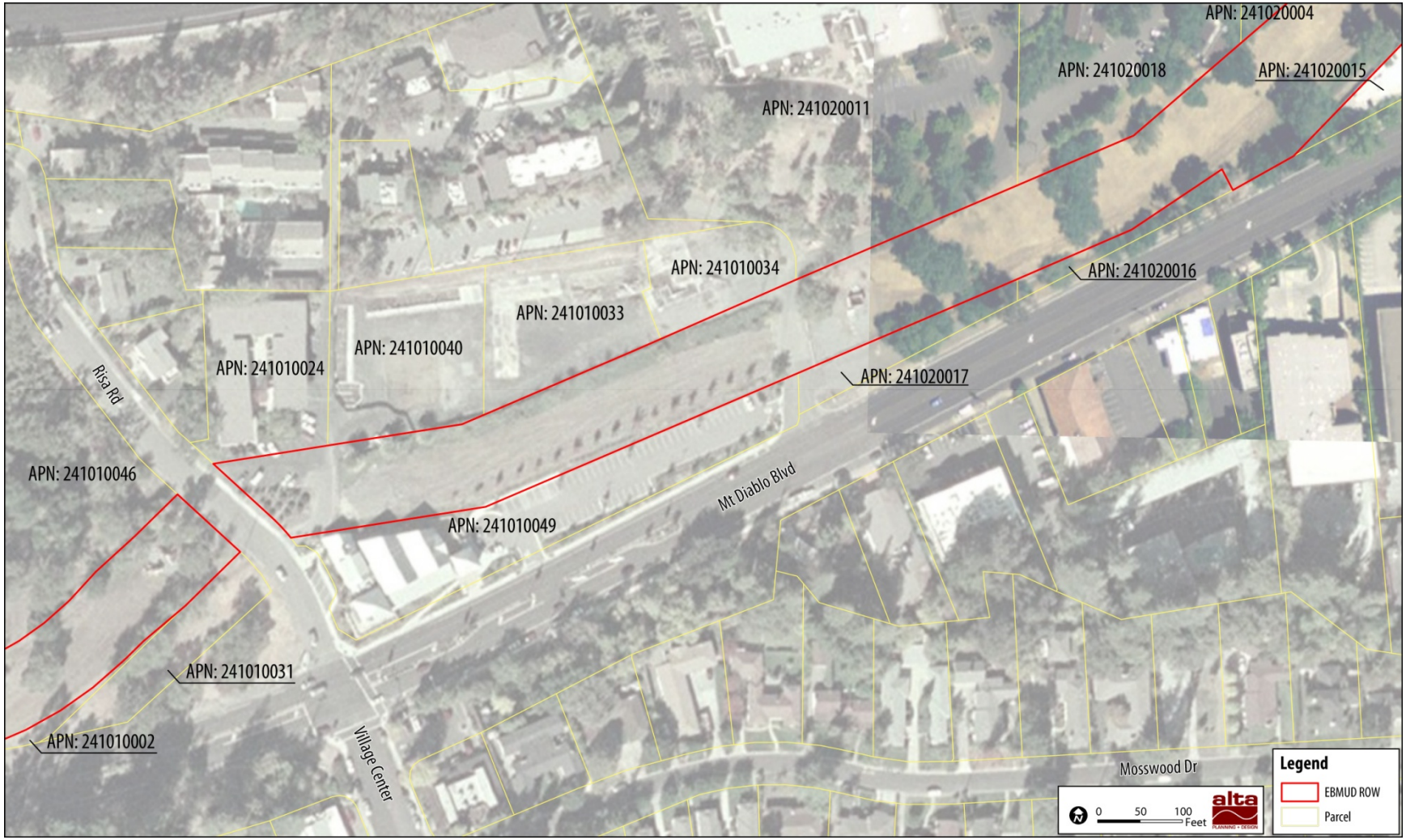

Figure B-1: Study Area 1 Property Ownership (As of April 2010)

Figure B-2: Study Area 2 Property Ownership (As of April 2010)

Figure B-3: Study Area 3 Property Ownership (As of April 2010)

Figure B-4: Study Area 4 Property Ownership (As of April 2010)

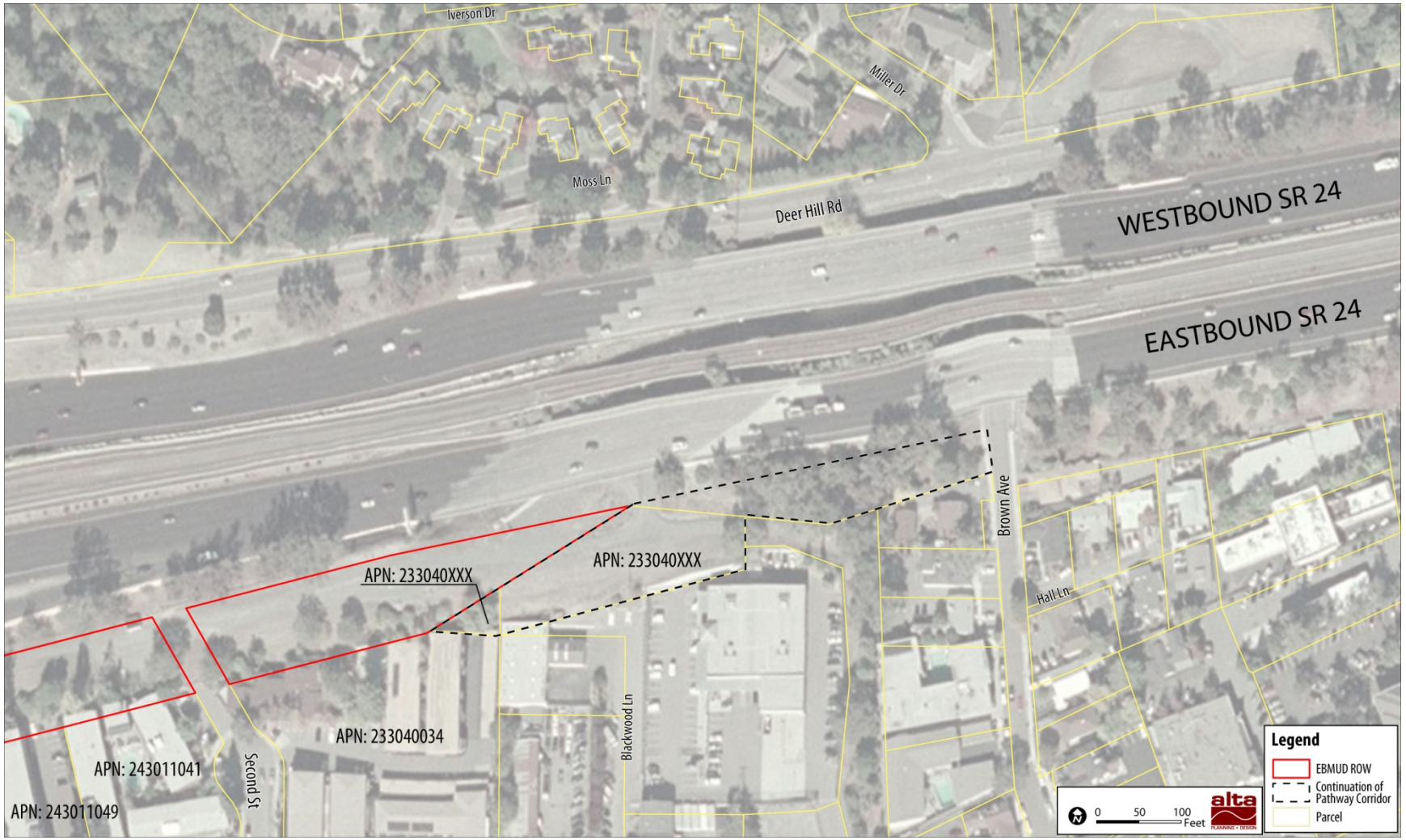

Figure B-5: Study Area 5 Property Ownership (As of April 2010)

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Appendix C. Roadway Improvement Measures

Table C-1 describes the menu of potential crossing treatments along a pathway through the EBMUD Aqueduct ROW.

Table C-1: Roadway Improvement Measures for Pathway Crossings

Measure	Description	Benefits	Application
Traffic Control Countermeasures			
Traffic Signal or All-Way Stop	Conventional traffic control devices with warrants for use based on the Manual on Uniform Control Devices (MUTCD).	Reduces pedestrian-vehicle conflicts.	Must meet warrants based on traffic and pedestrian and bicycle volumes; however, exceptions are possible based on demonstrated safety concerns (collision history).
Flashing Beacons	Flashing amber lights are installed on overhead or post mounted signs, in advance of the crosswalk or at the entrance to the crosswalk. Can be pedestrian/ bicycle activated by a push button or by auto-detection using detection cameras.	Blinking lights during pedestrian/bicycle crossing times increase the number of drivers yielding for pedestrians/ bicyclists and reduces vehicle conflicts. This measure can also improve conditions on multi-lane roadways.	Best used in places where motorists cannot see a traditional sign due to topography or other barriers.
In-Roadway Warning Lights	Both sides of a crosswalk are lined with pavement markers, often containing an amber LED strobe light. The lights may be push-button activated or activated with pedestrian/ bicycle detection.	This measure provides a dynamic visual cue, and is increasingly effective in bad weather.	May not be appropriate in areas with heavy winter weather due to high maintenance costs. May not be appropriate for locations with bright sunlight. May not be appropriate on high speed roads. Lights may cause confusion when pedestrians fail to activate and/or falsely activate system.

Table C-1: Roadway Improvement Measures for Pathway Crossings (continued)

Measure	Description	Benefits	Application
High-Visibility Signs and Markings	High-visibility markings include a family of crosswalk striping styles including the "ladder" and the "triple four." One style, the zebra-style crosswalk pavement markings, were once popular in Europe, but have been phased out because the signal-controlled puffin is more effective. High-visibility fluorescent yellow green signs are approved and posted at crossings to increase the visibility of a pedestrian/ bicycle crossing ahead.	FHWA recently ended its approval process for the experimental use of fluorescent yellow crosswalk markings and found that they had no discernable benefit over white or yellow markings. No other colors were tested beyond yellow and white crosswalk markings.	Beneficial in areas with high pedestrian activity, as near schools, and in areas where travel speeds are high and/or motorist visibility is low.
Advanced Yield Lines	Standard white stop or yield limit lines are placed in advance of marked, uncontrolled crosswalks.	Measure increases the pedestrian and bicyclists' visibility to motorists, reduces the number of vehicles encroaching on the crosswalk, and improves general pedestrian/ bicycle conditions on multi-lane roadways. It is an affordable option.	Useful in areas where pedestrian/ bicycle visibility is low and in areas with aggressive drivers, as advance limit lines will help prevent drivers from encroaching on the crosswalk. Addresses the multiple-threat collision on multi-lane roads.
Speed Feedback Sign	High-visibility sign that tells drivers their speeds versus the posted speed limit.	Reduces vehicle speeds and makes drivers aware of the posted speed limit.	Best in locations where vehicle speeds are of concern.

Table C-1: Roadway Improvement Measures for Pathway Crossings (continued)

Measure	Description	Benefits	Application
Geometric Treatments			
Median Refuge Island	Raised islands are placed in the center of a roadway, separating opposing lanes of traffic with cutouts for accessibility along the pedestrian/ bicycle path.	This measure allows pedestrians and bicyclists to focus on each direction of traffic one direction at a time, and the refuge provides pedestrians with a better view of oncoming traffic as well as allowing drivers to see pedestrians more easily. It can also split up a multi-lane road and act as a supplement to additional pedestrian/ bicycle tools.	Recommended for multi-lane roads wide enough to accommodate an ADA-accessible median.
Staggered Median Refuge Island	This measure is similar to traditional median refuge islands; the only difference is that the crosswalks in the roadway are staggered such that a pedestrian crosses half the street and then must walk towards on-coming traffic to reach the second half of the crosswalk. This measure must be designed for accessibility by including rails and truncated domes to direct sight-impaired pedestrians along the path of travel.	Benefits of this tool include an increase in the concentration of pedestrians/ bicyclists at a crossing and the provision of better traffic views for pedestrians/ bicyclists. Motorists are better able to see pedestrians/ bicyclists as they travel through the staggered refuge.	Best used on multi-lane roads with obstructed pedestrian visibility (because they provide pedestrians a better view of oncoming traffic and allow drivers to more clearly see pedestrians) or with offset intersections.

Table C-1: Roadway Improvement Measures for Pathway Crossings (continued)

Measure	Description	Benefits	Application
Curb Extension	Also known as a bulb-out, this traffic-calming measure is meant to slow traffic and increase driver awareness. It consists of an extension of the curb into the street, making the pedestrian/ bicycle space (sidewalk) wider.	Curb extensions narrow the distance that a pedestrian or bicyclist has to cross and increases the sidewalk space on the corners. They also improve emergency vehicle access[48] and make it difficult for drivers to turn illegally.	Due to the high cost of installation, this tool would only be suitable on streets with high pedestrian/ bicycle activity, on-street parking, and infrequent (or no) curb-edge transit service. Often used in combination with crosswalks or other markings.
Curb Ramps	Curb ramps are sloped ramps that are constructed at the edge of a curb (normally at intersections) as a transition between the sidewalk and a crosswalk. Ramps may be widened at pathway entrances, but should be designed to look distinct from a regular driveway entrance[49]. Bollards or other pathway treatments can be used to distinguish the pathway entrance.	Curb ramps provide easy access between the sidewalk and roadway for people using wheelchairs, strollers, walkers, crutches, handcarts, bicycles, and also for pedestrians with mobility impairments who have trouble stepping up and down high curbs.	Curb ramps must be installed at all intersections and mid-block locations where pedestrian crossings exist, as mandated by federal legislation (1973 Rehabilitation Act and 1990 Americans with Disabilities Act). Where feasible, separate curb ramps for each crosswalk at an intersection should be provided rather than having a single ramp at a corner for both crosswalks.

[48] Emergency access is often improved through the use of curb extensions if intersections are kept clear of parked cars. Fire engines and other emergency vehicles can climb a curb where they would not be able to move a parked car. At midblock locations, curb extensions can keep fire hydrants clear of parked cars and make them more accessible.

[49] The width of the ramp should be at least as wide as the average width of the trail to improve safety for users who will be traveling at various speeds. In addition, the overall width of the trail should be increased, so the curb ramp can be slightly offset to the side.
(Source: http://www.fhwa.dot.gov/environment/sidewalk2/sidewalks216.htm)

Table C-1: Roadway Improvement Measures for Pathway Crossings (continued)

Measure	Description	Benefits	Application
Raised Crosswalk	A crosswalk whose surface is elevated above the travel lanes.	Attracts drivers' attention; encourages lower travel speeds by providing visual and tactile feedback when approaching the crosswalk.	Appropriate for multi-lane roadways, roadways with lower speed limits that are not emergency routes, and roadways with high levels of pedestrian/ bicycle activity, such as near schools, shopping malls, etc.
Pedestrian & Bicycle Access and Amenities			
Marked Crosswalk	Marked crosswalks should be installed to provide designated pedestrian crossings at major pedestrian generators, crossings with significant pedestrian volumes (at least 15 per hour), crossings with high vehicle-pedestrian collisions, and other areas based on engineering judgment.	Marked crosswalks provide a designated crossing, which may improve walkability and reduce jaywalking.	Marked crosswalks alone should not be installed on multi-lane roads with more than about 10,000 vehicles/ day. Enhanced crosswalk treatments (as presented in this table) should supplement the marked crosswalk, particularly with limited visibility, high motor vehicle speeds or more than two lanes of traffic.
Accessibility Upgrades	Treatments such as audible pedestrian signals, accessible push buttons, and truncated domes should be installed at crossings to accommodate disabled pedestrians.	Improves accessibility of pedestrian facilities for all users.	Appropriate accessibility upgrades should be provided for all pedestrian facilities following a citywide ADA Transition Plan.
Pedestrian/Bicycle Countdown Signal	Displays a "countdown" of the number of seconds remaining for the pedestrian/ bicycle crossing interval. In some jurisdictions the countdown includes the walk phase. In other jurisdictions, the countdown is only displayed during the flashing don't walk phase.	Increases pedestrian/ bicycle awareness and allows them the flexibility to know when to speed up if the pedestrian/ bicycle phase is about to expire.	Pedestrian signals should be prioritized for areas with pedestrian activity, roadways with high volumes of vehicular traffic, multi-lane roadways, and areas with elderly or disabled persons (who may walk slower than others may).

Table C-1: Roadway Improvement Measures for Pathway Crossings (continued)

Measure	Description	Benefits	Application
Bicycle Wait Area	Painted wait area adjacent to the sidewalk curb where bicyclists can safely wait to make a two-legged turn and be visible to drivers.	Accommodates bicyclists making a two-legged left turn across a wide roadway by providing a dedicated space to wait for the signal.	Best used on multi-lane roads that are difficult for bicyclists to make left turns.
Pathway Speed Control			
Bollards	A short vertical post used to define pathway and roadway areas and control vehicle, pedestrian and bicycle movements	The diagonal layout of bollards will make the space between the bollards appear narrower, slowing bicyclists and deterring motorcyclists from entering the trail.	Bollards can be placed at pathway access points to separate the pathway from motor vehicles and to warn and slow bicyclists as they approach street crossings. Bollards should be spaced to provide access by people using wheelchairs. A trail sign post can be incorporated into the bollard layout.

Appendix D. Funding Sources

This appendix summarizes potential funding sources available for design, construction, maintenance and operations for the proposed EBMUD Aqueduct Pathway.

Table D-1: Funding Acronyms and Resources

Acronyms
BAAQMD: Bay Area Air Quality Management District
Caltrans: California Department of Transportation
CMAQ: Congestion Mitigation and Air Quality
CTC: California Transportation Commission
FHWA: Federal Highway Administration
MTC: Metropolitan Transportation Commission
State DPR: California Department of Parks and Recreation (under the State Resources Agency)
SAFETEA-LU: Safe Accountable Flexible, Efficient Transportation Equity Act: A Legacy for Users
CCTA: Contra Costa Transportation Authority
Resources
Caltrans TEA-21 website: http://www.dot.ca.gov FHWA SAFETEA-LU website: http://www.fhwa.dot.gov/reauthorization http://www.dot.ca.gov/hq/LocalPrograms/ http://www.fhwa.dot.gov/environmnet/rectrails/index.htm http://www.ccc.ca.gov/ http://www.mtc.ca.gov/planning/smart_growth/hip.htm http://www.mtc.ca.gov/funding/STA-TDA/ http://www.baaqmd.gov/pln/grants_and_incentives/bfp/index.htm http://www.transcoalition.org/c/bikeped/bikeped_saferoutes.html http://www.ccta.net

Table D-2: Funding Sources

Grant Source	Due Date	Administering Agency	Max Grant Amount	Matching Requirement	Planning	Construction	Maintenance	Paved Pathway	Recreational Trail	Comments
Federally-Administered Funding										
Transportation, Community and System Preservation Program	Mar	FHWA	Max award in 2010 $1.9 M	20%	X	X	--	X	X	Projects that improve system efficiency reduce environmental impacts of transportation, etc. Contact K. Sue Kiser, Regional FHWA office, (916) 498-5009
State-Administered Funding										
Bicycle Transportation Account	Early 2011	Caltrans	$1.2 m	10%	X	X		X	--	Projects that improve safety and convenience of bicycle commuters. Contact Ann Mahoney, Caltrans, (916) 653-0036
Federal Safe Routes to School (SR2S)	Early 2011	Caltrans	$1 M	none	X	X		X	--	Construction, education, encouragement and enforcement program to encourage walking and bicycling to school (K-8). Contact Caltrans District 4 Transportation Planning and Local Assistance office at (510) 286-5226.

Grant Source	Due Date	Administering Agency	Max Grant Amount	Matching Requirement	Planning	Construction	Maintenance	Paved Pathway	Recreational Trail	Comments
California Safe Routes to School (SR2S)	July 15	Caltrans	$450,000	10%	X	X		X	X	Primarily construction program to enhance safety of pedestrian and bicycle facilities en route to school (K-12). Contact Caltrans District 4, (510) 286-5598
Recreational Trails Program (RTP)	Oct. 1	State DPR	Not avail.	12%		X			X	For recreational trails to benefit bicyclists, pedestrians, and other users; contact State Dept. of Parks & Rec. , Statewide Trails Coordinator, (916) 653-8803
California Conservation Corps	On-going	California Conservation Corps	Not applicable	None		X	X	X	X	Labor for construction or annual maintenance. Contact the Corps at (916) 341-3100.
Locally-Administered Funding										
Transportation Fund for Clean Air	--	CCTA/ BAAMQD		None				X		Projects must provide a nexus to improving air quality. Projects must be included in countywide bicycle plan or congestion management program.
Bicycle Facilities Program	Sept.	BAAMQD	$210,000	50%				X		Contact BAAMQD (Avra Goldman) at (415) 749-5093.

Grant Source	Due Date	Administering Agency	Max Grant Amount	Matching Requirement	Planning	Construction	Maintenance	Paved Pathway	Recreational Trail	Comments
Regional Bicycle Network Program (replaces the Regional Bicycle and Pedestrian Program)	Not avail.	MTC, CCTA	Not avail.	None		X		X	X	Projects must be in the Regional Bicycle Plan. Contact MTC at (510) 817-5733.
Safe Routes to Transit	2011	MTC	$500,000 capital projects, $100,000 planning projects	None	X	X		X	X	Eligible projects must have a bridge nexus (i.e., reduce congestion on one or more state toll bridges). Program is run by Transform (510-740-3150) and the East Bay Bicycle Coalition (510-533-7433).
Transportation Development Act (TDA) Article 3 (2% of total TDA)	Jan.	CCTA (MTC)	Not avail.	None	X	X	X	X	X	Projects must be included in either a detailed circulation element or plan included in a general plan or an adopted comprehensive bikeway plan and must be ready to implement within the next fiscal year. Contact MTC at (510) 817-5733.

Grant Source	Due Date	Administering Agency	Max Grant Amount	Matching Requirement	Planning	Construction	Maintenance	Paved Pathway	Recreational Trail	Comments
Transportation for Livable Communities		MTC	$400,000	None	X	X	X	X	X	MTC awards TLC grants to projects that encourage bicycle and pedestrian access in transit hubs. Only projects located in priority development areas are eligible for funding.
Measure J		CCTA	Not avail.	None		X	X	X	X	Projects and programs must be identified in CCTA Transportation Expenditure Program (TEP).
Other Funding Sources										
Core Area Landscape and Lighting District	Not applic.	City of Lafayette	Not applic.	Not applic.			X	X	X	With future expansion of this assessment district, the City may seek to add maintenance of proposed pathway. Requires approval of affected property owners.
Business Improvement Districts	Not applic.	City of Lafayette	Not applic.	Not applic.			X	X	X	If a BID was approved by businesses in downtown, maintenance of proposed pathway could be included if it was deemed to provide benefit to businesses.
Business License Requirement	Not applic.	City of Lafayette	Not applic.	Not applic.			X	X	X	If a business license tax was approved, a portion of revenues could be allocated to maintenance of proposed pathway.

Grant Source	Due Date	Administering Agency	Max Grant Amount	Matching Requirement	Planning	Construction	Maintenance	Paved Pathway	Recreational Trail	Comments
Lamorinda Transportation Improvement	Not applic.	Lamorinda Project Management Committee	Not applic.	None	X	X		X		Projects must be added to the Expenditure Plan. There must be a nexus between the pathway mitigations, and the traffic impacts of the new development.
Maintenance Requirements	Not applic.	City of Lafayette	Not. Applic.	None	X	X	X	X	X	Pathway construction or maintenance could be a condition of new development. There must be a nexus shown between pathway benefits and developer fees.
Volunteer and Public-Private Partnerships	Not applic.	Not applic.	Not applic.	Not applic.			X	X	X	Community-based initiative to maintain pathway.
Private Foundation	Not applic.	Not applic.	Not applic.	Not applic.	X	X	X	X	X	Endowments can provide for pathway maintenance over the lifetime of the project.

Appendix E. Consolidated Comments on the Public Review Draft of the Feasibility Study

This appendix includes all comments received on the Public Review Draft of the Feasibility Study for a Pedestrian and Bicycle Pathway along the EBMUD Aqueduct ROW, and summarizes the response to these comments. This appendix presents the staff report and minutes for the November 14, 2011 City Council meeting and the staff report for the February 13, 2012 City Council meeting.

E.1 Comments Received During the Public Review Period

People submitting comment letters:

1. William Kirkpatrick, EBMUD
2. Bruce Allan, Chair Lafayette BPAC
3. Marie Blits, President Lafayette Homeowners Council
4. Abigail Fateman and John Cunningham
5. Sergio Ruiz, Caltrans
6. Jeff Peacock, Chair Lafayette Parks, Trails and Recreation Commission
7. Ed Stevenson, Building Manager, Lafayette War Veterans
8. Chris Dodge
9. Mel Epps

People registering comments at the study's website:

10. Steve Richard
11. Jeffry Gilman (Lafayette Creeks Committee)
12. Mike Noonan
13. Curtis Springfield
14. Big Wayne
15. Octavio Lacayo

E.1.1 Comment Letters

Comment letters and comments received at the study's website are presented on the following pages.

Correspondence #1

EAST BAY MUNICIPAL UTILITY DISTRICT

RECEIVED

SEP 30 2011

CITY OF LAFAYETTE
ENGINEERING DEPT

September 29, 2011

Leah Greenblat, Transportation Planner, Project Manger
City of Lafayette
3675 Mt. Diablo Boulevard, Suite 210
Lafayette, CA 94549

Re: Notice of Public Review Draft – Feasibility & Options Study for a Pedestrian & Bicycle Pathway Along the EBMUD Aqueduct ROW, Lafayette

Dear Ms. Greenblat:

East Bay Municipal Utility District (EBMUD) appreciates the opportunity to comment on the Public Review Draft Feasibility & Options Study (Study) for a Pedestrian & Bicycle Pathway Along the EBMUD Aqueduct Right-of-Way (ROW) in the City of Lafayette (City). EBMUD has the following comments.

GENERAL

The pedestrian and bicycle pathway is proposed to be located along EBMUD's Mokelumne Aqueducts (Aqueducts) owned in fee, from Risa Road to Brown Avenue, south of State Route 24 and north of Mt. Diablo Boulevard within the City limits. EBMUD purchased the Aqueduct ROW land and constructed the first Aqueduct in the late 1920's before the City was developed and the Aqueduct has been in continuous service since that time. EBMUD recognizes that as communities have developed since the 1920s, the ROW has become important open space. EBMUD has license agreements in place with 11 different agencies in Contra Costa and San Joaquin Counties including an agreement with the City that was completed in 2003. All of the agreements preserve EBMUD's ability to operate and maintain the Aqueducts supplying water to the 1.3 million customers in EBMUD's service area.

1.1 The Study indicates the City would like to negotiate provisions of the existing license agreement for the proposed project. EBMUD agrees that the existing license agreement was developed for a different project scope and is not appropriate for the proposed project. If the City proceeds with the preferred bicycle pathway project described in the Study, a new license agreement will need to be developed. The new agreement will likely require more maintenance by the City and include a stricter indemnification for EBMUD given the higher use proposed for the Aqueduct ROW. It is unclear in the Study if the project will consist of trails only or a combination of trails and landscape. The proposed project is not clear about the extent of landscaping. The new license agreement cannot be completed until these details are

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understood and agreed to. The associated maintenance requirements will largely depend on these plans. Property rights for each of the roadway crossings for the proposed project should be identified and verified prior to development of final crossing designs for each roadway.

Landscaping improvements included in the project as well as major hardscape features such as switchbacks will necessitate a changed maintenance approach. EBMUD would remove graffiti from its facilities only. Based on the scope of the project in this Study, trash removal should be the responsibility of the City following these improvements.

1.2 EBMUD cannot make improvements or perform maintenance for the benefit of other local governments because doing so would be considered a gift of public funds. EBMUD cannot construct or reconstruct the City's landscape or bicycle path improvements and cannot contribute to maintenance of these facilities. References to EBMUD sharing maintenance for the improvements should be removed from the Study documents as an alternative.

1.3 EBMUD must have complete access to its Aqueduct facilities for operations, routine and emergency maintenance, and for long-term capital replacement projects. There is a $30 million planned capital improvement project for the No. 1 Aqueduct currently scheduled for 2015-2020 time frame. This project will require major excavation, materials storage and construction traffic along the right of way for the entire study area. Maintenance on the Aqueducts is continuous and EBMUD will need uninterrupted access to its facilities at all times and will need to close portions or all of the ROW for varying amounts of time and with minimal notice to perform the maintenance.

1.4 The project sponsor must adhere to EBMUD's requirements on use of the ROW describe in EBMUD's Procedure 718 – Raw Water Aqueduct Right-of-Way Non-Aqueduct Uses. Highlights of these requirements are summarized below and a copy of the procedure is enclosed for your reference.

- Gravity drainage of the ROW needs to be maintained.
- Permanent structures (e.g., building structures, bridge supports, retaining walls, traffic signal lights, cameras, etc.) and all related appurtenances cannot be placed on EBMUD property.
- Property line fences and walls (including footings) need to be completely off the ROW and extend the full length of the project.
- A field meeting can be held to discuss issues if needed.
- A temporary construction or entry permit is required for any and all access to EBMUD's ROW.
- Temporary construction fences are required along the entire length of the property line and need to be maintained throughout the project construction period.

- Drawings will need to include a section labeled "EBMUD Notes" and can be discussed at drawing review.
- Survey markers need to remain undisturbed.
- Drainage structure maintenance responsibility needs to be indentified for any installations.

Additionally, EBMUD requires the project sponsor to submit a complete set of project drawings (full-size or half-size 11x17) for review and approval. All submittals need to be sent to the attention of Andrew K. Enos, Jr., Superintendent of EBMUD Aqueduct Section. Documents requiring courier use such as FedEx should be sent to 1804 West Main Street, Stockton, CA 95203. Letter correspondence should be sent to P.O. Box 228, Stockton, CA 95201.

SPECIFIC COMMENTS TO THE STUDY

1.5 On page 1-3, under Pathway Crossings, the last sentence states ". . . signalized at-grade crossings are the most feasible . . .". This sentence should be eliminated. Signalization, lighting, controllers, signage and other traffic control elements associated with any of the roadway crossings will not be allowed on the EBMUD Aqueduct ROW. This is a typical restriction on all improvements along the EBMUD Aqueduct ROW.

1.6 On page 1-4, under Preferred Pathway Design, the last sentence states "Planning and design of a pathway through the EBMUD Aqueduct ROW would be carried out in accordance with EBMUD's structural requirements, administrative procedures, and maintenance activity needs." In October 2010, EBMUD made comments to the City on the first draft of the Opportunities and Constraints Report which included a requirement that paved paths be a minimum of 12-feet wide with 2-feet graded shoulders. However, the Class I Bikeway Design Standard on page 3-6 prescribes a minimum width of 8 feet. The Study should be revised to reflect EBMUD's requirement that 12-feet is the standard for new paved path installations on EBMUD ROW as it allows efficient access by emergency response agencies like police, fire, ambulance.

1.7 On page 1-7, the cost estimate shown in Table 1-1 under Phasing, presents a pathway total maintenance cost. Please provide a breakdown of the cost as it is not clear what maintenance costs are included in the total cost.

1.8 On page 1-8, under Construction and Maintenance Costs, the last sentence states, "Actual maintenance costs will likely be lower, depending on final design …". The City should consider the elimination of switchbacks to the greatest extent possible. Switchbacks on hilly slopes will make existing Aqueduct maintenance methods difficult if not impossible. Alternative maintenance methods will likely increase maintenance cost.

1.9 On page 1-9, under Funding Options, the fourth bullet states "Require adjacent property owners to maintain the pathway." EBMUD is opposed to this alternative because it is

1.9 cont. very difficult to manage the work of private owners on EBMUD property. This is the reason EBMUD only issues Revocable Landscape Licenses to public agencies. The City can issue a sub-license to the property owners; however, the City must have ultimate responsibility for the maintenance. If the private owners do not perform, the City will need to respond to meet the requirements of the license agreement. The seventh bullet under Funding Options reads, "Request maintenance assistance from EBMUD or East Bay Regional Parks District." EBMUD cannot provide maintenance assistance and therefore requests that its name be removed from the statement.

1.10 On page 3-1, under Policy Summary, the last sentence of the first paragraph should include *Caltrans*, ". . . EBMUD Aqueduct and *Caltrans* ROWs".

1.11 On page 3-3, under Regional Plans and Policies, the third sentence states that the Lafayette Reservoir connects to the Aqueduct ROW. The Aqueducts and Lafayette Reservoir do not connect and are independent systems. Please incorporate the correction into the Study.

1.12 On page 3-4, under Design Standards, the next to the last sentence states, ". . . Class I bikeways have a maximum grade of five percent. . . ". The City should carefully reconsider the criteria for the switchbacks in the areas listed below to minimize maintenance costs and EBMUD's requirement to not allow permanent structures (e.g., retaining walls) over the Aqueducts.

- West of Happy Valley Road
- West of Dolores Drive
- West of Oak Hill Road
- East of Oak Hill Road
- East of 2nd Avenue

Switchbacks cannot impact EBMUD access to the Aqueduct ROW or impact operation and maintenance of the Aqueducts.

1.13 On page 4-7, under Topography, the first paragraph states, "The EBMUD Aqueduct ROW has varying slopes . . . some sections also have tree canopy." Currently, maintenance of this tree canopy is largely done on an as-needed basis. Significantly increased use of this ROW will likely require substantially increased maintenance by the City of this canopy to prevent possible injury due to falling tree limbs, etc.

1.14 On page 4-7, under Aqueduct/Utility Locations, the first sentence should be revised to read, ". . . EBMUD's water supply system, which serves ~~1.4~~ *approximately 1.3* million people . . ."

On page 4-9, under Aqueduct/Utility Locations, the fifth sentence states, "Due to the age of the Aqueducts and the lack of accurate mapping, the exact locations of a majority of

1.15 the pipelines within the Pathway Study Area are unknown." This statement is incorrect and should be deleted form the Study. EBMUD as-built drawings of the Lafayette Aqueducts accurately describe actual horizontal and vertical alignments.

1.16 On page 4-9, under Aqueduct/Utility Locations, the last paragraph reads, "…smaller domestic water lines lie within the southern portion of the EBMUD Aqueduct ROW." The paragraph is not accurate. There is a major distribution pipeline in the far northern portion of the ROW between Dolores Drive and Happy Valley Road.

1.17 On page 4-31, under Private Property-Owner Concerns, the first paragraph states, "Many properties adjoining EBMUD's ROW are privately-owned. Private property owner concerns associated with pathway implementations include impacts on security, pathway access and potential for trespass, privacy, funding and maintenance, aesthetic impacts, lightning design and pathway access after dark, parking, traffic operations and existing easements." These are issues and costs that will need to be resolved in the license agreement and the cost for these efforts should be evaluated in the Study.

1.18 On page 4-31, under Security, the first sentence of the third paragraph cites, ". . . studies show that neither public nor private landowners have suffered from trail development." The citation does not reflect EBMUD's experience with actual trails in the Bay Point and Highway 24 corridor. EBMUD is concerned that increased access will increase vandalism of EBMUD facilities. Fencing, patrols, and other techniques to address the security issues and concerns will need to be addressed in the new license agreement.

1.19 In Chapter 5, Options Evaluation and Preferred Options, cost estimates for different project elements are identified. These different conceptual cost estimates identify the need for excavation and fill at various locations along the EBMUD ROW. If the City decides to proceed with this project, additional discussions will be required with EBMUD during the project planning and design phases to better understand the specific project sites where the EBMUD ROW and our infrastructure may be impacted. EBMUD will need to review the design and issue an encroachment permit for the construction phase if we approve the design.

1.20 On page 5-12, under Pathway Design, the pathway cost estimate in Table 5-2 includes the cost for the installation of stairs. Stairs are considered a permanent installation and are not allowed on EBMUD property.

1.21 On page 6-3, under Maintenance and Operations Requirements, the last paragraph states "If the City decides to pursue construction of the EBMUD Aqueduct Pathway, it is likely that the City and EBMUD will update the Revocable Landscaping License agreement to reflect more appropriate and achievable maintenance requirements. Rather than eliminate maintenance tasks, it is likely a revised agreement would reduce the frequency with which tasks are conducted." EBMUD agrees that a new license

agreement is necessary for the project proposed in this study. However, there are insufficient details for the proposed project to be able to define the maintenance requirements and it is problematic for the study to suggest or theorize that maintenance will be reduced for the proposed project.

1.22 On page 6-16, under Funding Source, Option 4 recommends "The City may wish to consider requiring adjacent property owners to maintain the pathway and associated landscaping." EBMUD is opposed to Option 4 unless the City issues the private owners a sub-license agreement for meeting the requirements of the landscape license. If the private owners do not perform, the City will need to respond to meet the requirements of the license agreement.

1.23 On page 6-16, under Funding Source, Option 7 recommends ". . .the City should explore the option of having EBMUD assist with maintenance of the proposed pathway." As already indicated in the Option 7 discussion, EBMUD cannot provide maintenance assistance.

1.24 On page 7-2, under Phase1: Risa Road to BART, the first paragraph, last sentence states "Construction of the bridge over Happy Valley Road requires coordination and approvals from Caltrans, EBMUD, and BART . . . The bridge design must avoid placing structural load over the Aqueduct in the EBMUD ROW." It should be clarified that the proposed bridge design must <u>not</u> place any permanent structures in/or on the Aqueduct ROW.

EBMUD remains committed to working with the City and our neighboring jurisdictions to ensure the public's best interests are considered while protecting critical water infrastructure. If you have any questions concerning this response, please contact Andrew K. Enos, Jr., Superintendent, Aqueduct Section of the Water Supply Division at (209) 946-8001.

Sincerely,

William R. Kirkpatrick
Manager of Water Distribution Planning

WRK:AKE:ELE:sb
sb11_149.doc

Enclosure

cc: Lauren Ledbetter, Project Manager

bcc: X. Irias
E. White
S. Boeri
J. Hurlburt
A. Enos
R. Cortez
D. Rehnstrom
E. Esparza
Chron
C-1678

cc: Lauren Ledbetter, Project Manager
Alta Planning + Design
2560 9th Street, Suite 212
Berkeley, CA 94710

Correspondence #2

September 30, 2011

Leah Greenblat
Transportation Planner
City of Lafayette
3675 Mt. Diablo Blvd., Suite 210
Lafayette, CA 94549

Subject: Lafayette Bicycle Pedestrian Advisory Committee (BPAC) review of EBMUD Aqueduct Right-of-way Trail Feasibility Study

Leah:

The Lafayette BPAC has been actively engaged with the EBMUD Aqueduct Right-of-way Trail Feasibility study, the public comment period for which concludes today. Two members of the BPAC have served as BPAC liaisons to the study's Citizen Advisory Committee (CAC), and were actively involved in providing input and review in that capacity. Furthermore, other BPAC members have been in attendance at all of the other public sessions held by the study team, have reviewed the document, and provided input individually. At the BPAC public meeting on Wednesday, September 14, 2011, the topic was again discussed and we would like to summarize here the majority view of the BPAC regarding the study.

1. The Lafayette BPAC is in general support of the objectives, approaches, and conclusions defined in the study, and recommend that development of the EBMUD Aqueduct Right-of-way Trail be pursued as described, with a number of caveats.

2.1

2. The trail should be constructed following the Phasing plan described in the study. However, we are of the opinion that at the conclusion of each phase there should be a re-examination of the cost and use actuals relative to the projections made in the study to confirm that the cost/benefit assumptions continue to hold before a subsequent phase is started. Even if all three phases are not ultimately implemented for whatever reasons, we feel that the Phase 1 and 2 trail segments have value in and of themselves, though complete implementation might provide benefits that are larger than the sum of the parts.

2.2

3. The BPAC has a general concern about the projected costs of trail maintenance, in that the City could be taking on a significant financial liability. The study identifies a number of activities that must be pursued before more accurate maintenance costs can be identified, such as renegotiating the current maintenance requirements for the Right-of-way with EBMUD. The BPAC is of the opinion that accurate maintenance costs must be identified and the City secure funding sources for them before the project proceeds further. The BPAC is particularly concerned that without sufficient pre-secured funding, the financial obligations relative to trail maintenance could negatively affect adequate funding for other important pedestrian and cycling initiatives over time by siphoning off resources that might otherwise be available.

Thank you,

Bruce G. Allan
Chair – Lafayette Bicycle Pedestrian Advisory Committee (BPAC)

CC: Lafayette City Council, Lafayette Circulation Commission

LAFAYETTE HOMEOWNERS COUNCIL

Correspondence #3

September 30, 2011

Honorable Mayor Anduri and City Council
City of Lafayette
3675 Mount Diablo Boulevard, Suite 210
Lafayette, CA 94549

Subject: Public Review of the Draft Feasibility and Options Study for a Pedestrian and Bicycle Pathway Along the EBMUD Aqueduct Right of Way in the Downtown Lafayette Area

Mayor Anduri and Honorable Council Members:

The Lafayette Homeowners Council (LHC) welcomes the opportunity to comment on the Draft Feasibility and Options Study, as we have been involved in this process from the beginning. One or more Board Members have attended all Citizen Advisory Committee (CAC) meetings, field trips, public workshops, and both recent public reviews. The comments which follow comprise an overall consensus by LHC members on the CAC, together with other LHC Board Members.

As noted in the Feasibility Study and various public presentations, we understand that this Study is the first in a series of steps to evaluate the proposed Pathway before decisions are made on whether to proceed with any design or construction steps.

We have great appreciation for the concept of pathways that encourage walking and biking in lieu of vehicle transportation in Lafayette. We are interested in learning more about this current proposed Pathway as the process advances from the feasibility study to more rigorous study.

In our view, each Phase (the Study divides the proposed Pathway into three geographic portions for study and phased implementation) should be fully funded and complete with enough reserve monies to maintain, police and retrofit, *prior to starting the next phase*. The City, through funding sources such as those enumerated in the Study or through inter-operational agreements with other entities, including EBMUD, Caltrans, and business or property owners, should assure this. We believe that such fiscal responsibility is critical to enhancing our City and making it a more desirable place to live, commute and work. 3.1

While our Board Members may differ on overall or individual elements or impacts of the three recommended phases at this juncture, we are united in our concern regarding the importance of planning level accuracy of capital and maintenance/policing cost estimates, as well as *those costs not specifically enumerated* but mentioned in passing or contained in a footnote on an individual segment, such as additional traffic studies, environmental reports, soil reports, and more local data (to supplement the national data) on potential users Also, in the absence of an identified administrative overhead component, including a professional construction manager, it is important to identify whether those costs have been bundled together as a contingency, or are to be considered later through some form of implementation studies. Further, we support the parties' proposed renegotiation of the EBMUD lease agreement, to more realistically incorporate the proposed creation and maintenance of the Pathway. And, of course, these further studies themselves will require funding along the way. 3.2

To: Mayor Anduri and Honorable City Council Members
Re: Comments on Draft Feasibility and Options Study, EBMUD Aqueduct Pathway
Date: September 30, 2011
Page 2

SPECIFIC CONCERNS

A. Professional Construction Manager.

3.3 We emphasize the absolute necessity for employing a qualified professional construction manager on any implementation of the Pathway's segments. The benefit is coordination of all aspects of the design and the construction, thereby achieving a cost effective project.

B. Reliance on the DSP DEIR/FEIR for Environmental Information and Guidance

Air Quality and Noise

3.4 Public hearings have yet to be held on the Downtown Specific Plan Final Environmental Impact Report (DSP FEIR), which incorporates most of the data from the Draft Environmental Impact Report (DEIR); indeed, there are many issues yet unresolved regarding the accuracy and sufficiency of information presented. Since this Feasibility Study is by extension a study derived from the Lafayette Bikeways Master Plan which was deemed *not* subject to CEQA, to now utilize the DSP DEIR/FEIR for guidance on issues as noise, air quality, and such, is problematic. Since development of the Pathway will be in the future and many advances in electric and other fuel efficient vehicles are expected, we urge that environmental quality be addressed as each phase of the project is designed and built. The expected vehicle advances may improve air quality but will not mitigate traffic noise, which is due primarily to tire noise.

Traffic Data

3.5 The Feasibility Study relies to some degree on the DSP and its DEIR/FEIR for traffic counts, movements, and related items. We request that the Study specify whether the source was: (1) the series of reports done by Fehr and Peers for the original draft DSP prepared by WRT; (2) TJKM's studies prepared for the DEIR on the revised draft DSP written by City Staff; or (3) new turning movements, volume counts, and related data generated by Fehr and Peers for this Feasibility Study. At the first public review of this Feasibility Study document, a member of the public emphasized that the Study does not address the weekday AM peak phenomenon of Oak Hill Road heavy northbound traffic seeking to access the westbound Highway 24 on-ramp on Deer Hill Road. It was not clear from the Consultant's response whether AM peak hour traffic

3.6 volumes were available to the consultant at that time. As each phase of the Study begins, it is important that up-to-date traffic data, analysis and strategies are utilized.

C. Establish a Stakeholder Advisory Committee

3.7 Key to support for each phase of the Pathway is establishment of an advisory committee comprised of persons representing all stakeholders for that particular phase: adjacent residential and commercial property owners, the disabled, seniors, parents, schools, bicyclists, and others identified as the process proceeds. The participation of such a committee was extremely effective in achieving development and support for the Lafayette Moraga Trail. The concerns and issues of each stakeholder group must not be underestimated or ignored, particularly those of the adjacent property owners.

Thank you for considering our comments.

Sincerely,

Marie C. Blits, President
Lafayette Homeowners Council

cc: Leah Greenblat, City of Lafayette Transportation Planner

Fateman-Cunningham Family

Leah Greenblat, Transportation Planner
City of Lafayette
3675 Mt. Diablo Boulevard, Suite 210
Lafayette, CA 94549

Correspondence #4

September 30, 2011

Ms. Greenblat:

We are writing to express our enthusiastic support for the City's efforts to explore the development of a Pedestrian and Bicycle Pathway along the EBMUD Aqueduct ROW. We also wanted to take this opportunity to provide comments on the Draft of the Feasibility and Options Study for a Pedestrian and Bicycle Pathway along the EBMUD Aqueduct ROW.

4.1

Our family frequently rides bikes to downtown to run errands to the library and businesses. We have found that is very difficult to negotiate the large parking lot areas fronting Mount Diablo Blvd near Safeway, Peets, Whole Foods and other businesses as a pedestrian or cyclist. If constructed with multiple access points to the business areas along Mt Diablo Blvd, the path would help us safely travel around and through downtown while avoiding vehicle traffic and parking lots. We encourage you to provide access to businesses along the pathway. This will provide safe access for people who use the path as an alternative to either riding a bicycle or driving along Mt. Diablo Blvd.

We support the pathway project and request that as it moves forward, the City and businesses adjacent to the path work together to identify access points in addition to street crossings along the path. This will maximize the path's use as a safe route for pedestrians and cyclists to patronize downtown businesses.

Thank you for your work on this project,

Abigail Fateman

John Cunningham

Greenblat, Leah

From: Sergio Ruiz
Sent: Tuesday, September 27, 2011 4:09 PM
To: Greenblat, Leah
Cc: Beth Thomas
Subject: Comments on Public Review Draft Feasibility & Options Study

Correspondence #5

Hi Leah.

Below are some comments from Caltrans on the Public Review Draft Feasibility and Options Study for a Pedestrian and Bicycle Pathway Along the EBMUD Aqueduct ROW.

5.1 Page 5-44 - Oak Hill Road and Eastbound SR 24 Off-ramp
"All pedestrians and bicyclists cross at the same time, regardless of direction, while all vehicle movements are held." Holding all vehicle movements during the crosswalk phase will minimize conflicts with pedestrians and bicyclists crossing Oak Hill Road. For future traffic analysis, include a no turn on red (NTOR) option, in combination with the above-described phasing, for vehicles wanting to turn right onto southbound Oak Hill Road. A NTOR would reduce potential conflicts even further while bicyclists and pedestrians are crossing. If sufficient traffic-calming measures are provided for right-turning vehicles, a NTOR may be unnecessary.

5.2 The pathway section adjacent to the Oak Hill Road off-ramp will need to be separated by an approved barrier. Coordinate with Caltrans during the design phase on barrier type, aesthetic treatments and possible concrete/railing combination.

5.3 Page 5-57 - Signal Analysis for First Street Options 2, 3, and 4
For the First Street pathway crossing, determine if either alternative will impact traffic on the westbound SR 24 off-ramp onto Deer Hill Road. Although it is not within project boundaries, its proximity may result in potential impacts to traffic queuing onto SR 24. Include this for future traffic study.

Let me know if you have any questions.

Sergio Ruiz
Transportation Planner
Community Planning Branch
Caltrans District 4

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Greenblat, Leah

From: Russell, Jennifer
Sent: Thursday, September 15, 2011 2:06 PM
To: Greenblat, Leah
Subject: FW: Comments from PTR on Feasibility and Options Study - EBMUD Aquaduct Pathway

Correspondence #6

Hi Leah

Thank you for giving the PTR Commission an opportunity to comment on the Feasibility and Options Study for a multi-purpose pathway along the EBMUD Aqueduct. After attending the presentation and discussing this matter at its August 24 and September 14, 2011 meetings, the Commission had no comments beyond its previously submitted comments of November 11, 2004. Individual Commissioners, who had specific comments, were encouraged to submit them as Lafayette residents.

Jeff Peacock, Chair
Lafayette Parks, Trails & Recreation Commission

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Rcvd.
8/22/11

Correspondence #7

Lafayette War Veterans, Inc.
Veterans Memorial Building in Lafayette

The Veterans Memorial Building supports the creation of a recreational trail that travels from one end to the other of the city. We do have a concern about section of the trail that would be adjacent to our building. We are asking that in the planning of this project, steps be taken to insure that users of the trail will be clear that the parking lot at the Veterans Memorial Building is reserved for our renters and their guests.

7.1

It's a great temptation for the public to want to use our parking lot to leave their car while walking to the reservoir or dropping a car off in order to car pool with another or a variety of other reasons. We don't want to add "using the trail" to that list.

Because our parking lot sits empty most of the time, it is understandable why this encroachment happens. But the reality is that nobody outside of our building staff knows when the next event will occur at the building. When an event is scheduled, our lot will fill up in as little as fifteen minutes. Therefore, it must be kept ready at all times.

We asked that in the planning for the west end of the trail that provision be made to prevent access to or from the trail from our parking lot. This could include the construction of a barrier or the planting of flora that will prevent this access or egress. We'd also request that notices be place at the entrances to the park warning the public that if they have left their car in our parking lot, it could be subject to being towed.

Thank you for this consideration.

Sincerely,

Ed Stevenson,
Building Manager

Greenblat, Leah

From: Chris Dodge
Sent: Wednesday, August 03, 2011 2:03 PM
To: Greenblat, Leah
Subject: comment on proposed pathway

Correspondence #8

8.1 Leah - I am an enthusiastic supporter of the proposed pathway in Lafayette. my only request is that there be a small dirt path next to the concrete path (similar to the way the Lafayette/Moraga trail does it) so that runners who want to use the pathway can have that option (in order to protect their knees). i think the additional cost would be minimal relative to the benefits.

thanks

Chris Dodge

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Greenblat, Leah

Correspondence #9

From: Robbins, Joanne
Sent: Monday, August 15, 2011 9:28 AM
To: Mel Epps
Cc: Greenblat, Leah
Subject: RE: Proposed Pedestrain Pa;thway along freeway

Dear Mr. Epps: Thank you for your e-mail. Your letter is being forwarded to Leah Greenblat so it can be included with the other public comments on this proposed project.

Joanne Robbins, CMC
City Clerk
City of Lafayette
3675 Mt. Diablo Blvd. #210
Lafayette, CA 94549
925-284-1968
925-299-3210 direct
925-284-3169 fax

From: Mel Epps
Sent: Monday, August 15, 2011 9:22 AM
To: Robbins, Joanne
Cc: Mel Epps
Subject: Proposed Pedestrain Pa;thway along freeway

Apparently our city council members and some of our managers have great expectations of getting into state and national elected positions. I say this because they appear to have lost control of spending and suffer from an absence of common sense.

Why would anyone with an ounce of common sense want to build a 1 1/2 mile trail along a freeway at an "estimated" cost of $ 5.9 million to $ 5.9 million? (Oh yes, hasn't the cost of the BMX park escalated from the initial estimate of $ 105,000 to $ 240,000 and climbing?) One can only assume that these figures will escalate also. And then incur yearly maintenance costs of $ 150,000! 9.1

Leah Greenblat was quoted in the Local News as saying "It will provide improved access to the BART station and to downtown and local shopping areas". There are existing sidewalks that cover the same distance from Risa Road to Brown Avenue as well as paved roads for bicyclists at no cost. How does the city council waste their time on such poor ideas? 9.2

Who will pay the $ 150,000 in yearly maintenance costs? Some group outside Lafayette may say it will provide the funds but with the states financial condition the funds may be withdrawn leaving Lafayette to pay the maintenance fees. Then there is the problem of liability.

Safety cannot be a factor in this project as the City of Lafayette has exhibited that safety is not high on its priority list. As an example, bicyclists still present a serious hazard along the route of St Mary's Road to Olympic. I have yet to see one bicyclist stop for the numerous stop signs along that route. Also, they often ride two and three abreast causing any cars following them to go into the oncoming lanes to pass them. Another example is the BMX Park which would have children ridding there unsupervised in an area far from nearest road.

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Comments on Public Review Draft Submitted Via Study's Website (www.lafayettepathway.com)

Submitted Date	Comments:	Name:
9/26/2011 11:38 10.1	I'm sorry to have missed the walking tours of the proposed path, but will throw my 2 cents in any way. In general there is a strong desire by the community for more safe bike routes/paths around Lafayette. For the aqueduct trail I think it's important to identify the most important uses and design the path to accommodate those uses. Two of the most valuable uses would be: a) for residents to be able to use the trail as a way to get to/from BART on their bikes (need path connection to BART station), b) for easy bike access to the business areas on the north side of Mt. Diablo - especially the Safeway/Whole Foods shopping areas (need path connection to key shopping areas).	Steve Richard
9/25/2011 18:19 11.1	The City of Lafayette Creeks Committee at its September 12, 2011 meeting unanimously approved the following resolution: "The City of Lafayette Creeks Committee requests that the bicycle and pedestrian pathway along the EBMUD right-of-way strongly considers the use of pervious pavement for the surface of the pathway, given that there will be approximately two (2) acres of new pavement added as part of the proposed pathway project." [submitted by Jeffrey Gilman, Creeks Committee member and acting minute-taker for September 12, 2011 meeting]	Jeffrey Gilman (Lafayette Creeks Committee)
8/30/2011 9:58 12.1	I do not have to read any further than the first page of your public review draft to determine that your urban planning priorities are all wrong. The plan is well-meaning but you have it backwards. You should be ENCOURAGING bicyclists and pedestrians into your downtown area (Mt Diablo Blvd.) rather than DISCOURAGING them by pushing them off to a separate path AWAY from the downtown. You are guaranteeing that your downtown will forever be dedicated to supporting the almighty motor vehicle rather than the vibrant city center it could be if pedestrians and bicyclists were higher on your priority list. This section in your document says it all: "... the City considered reallocation of the Mt. Diablo Boulevard public ROW through Downtown to create additional space for bicyclists and pedestrians. However, the trade-offs associated with reallocation of the limited public ROW were considered to be too great." The specific "trade-offs" are not detailed, but it is obvious that it would mean reduced traffic flow and less parking. Cars ahead of people. Get your priorities straight and spend the taxpayers money to improve access for bicyclists and pedestrians in downtown rather than wasting it by pushing them away.	Mike Noonan
8/16/2011 9:40 13.1	As part of a larger plan it seems like it would make sense for the pathway to run East to Pleasant Hill Rd as this is a major corridor in the community and would give many more residents access to the path. As the plan stands now residents in east Lafayette do not seem to benefit from the construction as there is not convenient pedestrian / bike access east of Brown. Any thoughts would be welcome.	Curtis Springfield

	Submitted	Comments:	Name:
14.1	8/4/2011 10:31	--------- it'd sure be nice to have a bathroom at the pumping plant site. it'd be nice to have drinking fountains every two miles or so . . .	Big Wayne
15.1	8/3/2011 14:02	I bike to bart daily from east lafayette during the warm months. I like the proposal, and mostly the oak hill road crossing on figures 5-14 and 5-15. One thing that I think is missing is some connection to the north side of the bart station. I have a bike locker on the north side and there is no easy way to get there from the south side of the station so I currently bike up the east side of oak hill road, make a difficult crossing to the west side at the location of the proposed crossing, up the sidewalk, through the parking lot to the locker area. Also the bike racks on the north side of the station are more desirable because of the presence of the station agent and larger foot traffic there. Is there a plan to provide some form of access to the north side of the station? Thanks.	octavio lacayo

Correspondence #16

Greenblat, Leah

From: Avon Wilson
Sent: Thursday, August 18, 2011 9:09 PM
To: Greenblat, Leah
Cc:
Subject: EBMUD Pathway Written Report and Public Presentation

Dear Leah,

I apologize for not following through immediately on my promise to send some questions for consideration by you and the consulting team before the next public presentation of the EBMUD Pathway proposal. Life and doctors' appointments intervened. However!

- 16.1 I was asked at the last LHC Board meeting how CEQA applies to a study of this nature. For the life of me, I couldn't remember what the Citizens' Committee had been told at the outset, but I think it would be prudent to provide that information on Monday and include a statement to that effect at the beginning of the written report. Relative to this, the written report cites the DSP D/FEIR for various issues, such as Traffic, Air Quality, etc., but doesn't specifically cite the report's EIR grounding.
- 16.2 I know that one of the study's consultants is Fehr and Peers. It would be helpful to know and I think the study should state, what Fehr and Peers data was used in the study: was it the series of studies used for the first DSP iteration by WRT , the TJKM studies for the DSP DEIR. or are the figures presented based on new data gathered by Fehr and Peers for this particular EBMUD Pathway Study?
- 16.3 I am a little concerned by the statement in the written report and re-iterated by Ian, that the BAAQD person to whom he spoke indicated that the air pollution: particulate matter and OZONE fallout was less significant to a *moving* pedestrian and/or bicyclist than to a stationary resident. Does this apply to only periodic and recreational users or to transportational commuters or all of the above? We must be careful that such statements can be backed up by more than one Air District staff member.
- 16.4 As you know, I resigned as an active member of the Citizens' Advisory Committee because of uncertainty regarding my future attendance. Brian Smith is my designated replacement. I think it would be good if his name replaced that of Joe Garrity as a representative of the LHC on the written report's list of Citizen Advisory Committee members.

Thanks for all your hard work.

Avon

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E.1.2 Response to Comments

The following responses are best reviewed with the comment letters presented in Section E.1.1.

Correspondence #1: William Kirkpatrick, EBMUD

Response to Comment 1-1: Noted, a new license agreement will need to be developed.

Response to Comment 1-2: Since EBMUD already has existing maintenance responsibilities along the Aqueduct ROW, the study suggests that, if a pathway were constructed, potential areas of overlap should be identified to improve efficiency. For example, a paved pathway may serve to also provide access for maintenance vehicles in lieu of the existing maintenance path. If found to be workable, then the jurisdictions may wish to develop a shared maintenance approach; the details of which would be specified in the new license agreement. The existing revocable license agreement (Section A-3) says EBMUD shall restore the ground surface to its pre-existing grade and make best efforts to limit damage to landscaping. Further discussion will be needed to determine arrangements for repairing damaged portions of the pathway.

Response to Comment 1-3: The City was aware of a possible project, but did not know that a specific planned capital improvement project for the No. 1 Aqueduct was scheduled for 2015-2020. EBMUD staff has since indicated that this project's schedule may be delayed. The consultant team has investigated further and revised the Public Review Draft by adding this paragraph to section 4.4.2:

"EBMUD has a planned capital improvement project—the Lafayette Aqueduct No. 1 Relining Project—which is scheduled for the 2015-2020 timeframe. This project will repair the lining on the Lafayette Aqueduct No. 1 from the Walnut Creek Water Treatment Plant to the Lafayette Control Works. If the City decides to pursue construction of the proposed pathway, the timing of this capital improvement project may be advantageous, as it will be easier to construct a pathway in the context of a larger project than in isolation."

Response to Comment 1-4: The retaining walls that occur on EBMUD ROW are gravity type which we understood could be used subject to review by EBMUD. The proposed gravity retaining walls within EBMUD ROW would be removable, consistent with discussions held with EBMUD, the City and the Project Team on August 23, 2010. Per that discussion it is understood that 'removable/temporary' structures include gravity retaining wall, timber, etc. We have added the clarification (shown here underlined) to the first paragraph of section 4.4.2: "EBMUD may allow a less permanent structure, such as a gravity retaining wall (e.g., a keystone retaining wall), to be installed within their ROW." We have also changed all generic references to "retaining wall" to "gravity retaining wall," where the proposed retaining wall would be placed within the EBMUD Aqueduct right-of-way.

The advance video detection proposed at Dolores Drive can be installed in compliance with EBMUD's procedures. Passive video detection can detect movement up to 300' away, and the study recommends detecting pathway users 200 feet in advance of the Dolores Drive intersection. We have revised the Public Review Draft to reflect this by adding the following item to recommendation 3b, passive video detection, in Section 5.4.4. Dolores Drive Crossing: "Cameras should either be installed outside of the EBMUD ROW, which would require an encroachment permit from adjacent property owners (Caltrans or other), or at the roadway crossing looking back at the path, on City of Lafayette's ROW."

The consultant team has evaluated the locations of the proposed pathway lighting at street intersections, medians (at Private Drive) and in-pavement flashers (at Dolores Dr.) and added the following clarifications to the Public Review Draft:

The following sentence has been added to all items in Chapter 5 recommending pedestrian scale lighting: "Light poles should be installed within City of Lafayette's ROW or easement over the EBMUD Aqueduct ROW."

The recommendation for a median at Private Drive (item 6, Section 5.4.3) has been revised to clarify that ". This extension of the median falls within the City's easement over the EBMUD Aqueduct ROW. If a raised median is not feasible per EBMUD's procedures, a painted median can be considered as an alternative."

In section 5.5.2 Oak Hill Road Crossing Options, option 2 has been revised to include the note, "Traffic signal poles should be located within Caltrans' or City of Lafayette's easement over the EBMUD Aqueduct ROW." In Section 5.6.2 First Street Crossing, option 3 has been revised to include the note that "Traffic signal poles should be located within Caltrans' or City of Lafayette's easement over the EBMUD Aqueduct ROW."

Response to Comment 1-5: The Public Review Draft has been revised to acknowledge that the signalized at-grade crossings occur within the Caltrans' ROW, not EBMUD's. (See response to comment 1-4.)

Response to Comment 1-6: When describing a Class 1 Bikeway Design Standard, the Caltrans standard is used as the reference. The Public Review Draft has been revised to incorporate EBMUD's 12-foot wide pathway requirement in both the discussion of facility type and the preferred pathway design. The change from 10-foot to 12-foot paved width will not require modifications to cost estimates or alignments. The cost of paving an extra two feet of pathway is minimal and can be contained within the 25% contingency already included in cost estimates. The alignments are conceptual, and will be refined if the City decides to pursue the pathway further.

Response to Comment 1-7: The Pubic Review Draft has been revised to clarify costs included in maintenance. Specifically, Table 1-1 Cost Estimates by Phasing and the associated narrative has been revised to show annual maintenance, long-term maintenance (e.g. slurry sealing and AC overlay), and reconstruction of pathway at 30 years. Similar modifications have been made to Table 7-1 and associated narrative.

Response to Comment 1-8: The draft layout is based on satisfying the standards for a Class 1 Bikeway and an ADA compliant pathway, as this will provide for the widest range of users and access to transportation funding. The initial layout was developed to minimize switchbacks to the greatest extent possible. If the project advances, then future design phases will refine the alignment further.

Response to Comment 1-9: The City understands that if it issues a sub-license to an adjacent property owner, the City is ultimately responsible for maintenance if the property owner fails to comply. See also Response to Comment 1-2. The Public Review Draft's Chapter 6 Funding and Maintenance Strategy has been revised to clarify this. Specifically, the following sentence has been added to Option 4, Adjacent Property Owner Maintenance Requirements in Section 6.4.2: "Under the existing EBMUD Landscaping Licensing Agreement, if the City issues a sub-license to an adjacent property owner, the City is ultimately responsible for maintenance if the property owner fails to comply."

Response to Comment 1-10: Noted. The Public Review Draft has been revised on page 3-1, Policy Summary, first paragraph, last sentence to include Caltrans and read, "...EBMUD Aqueduct and Caltrans ROWs."

Response to Comment 1-11: Noted. The Public Review Draft has been revised on page 3-3, EBMUD Trails so that it does not imply that the EBMUD Reservoir is connected to the Aqueduct ROW.

Response to Comment 1-12: See response to comment 1-8. A subsequent conversation with EBMUD staff clarified that one of the concerns with switchbacks was the impact switchbacks might have on discing the site to meet the Fire Marshal's standards. Steep locations of the Aqueduct ROW are difficult to disc and a pathway with switchbacks may further hinder the ability to disc. During the design phase, the City should evaluate which areas may no longer be suitable for discing and consider installation of landscaping in order to meet the Fire Marshal's standards. The following paragraph has been added Section 6.2.1. "In some cases, maintenance requirements may impact the final design. For example, if switchbacks along the pathway limit the ability to disc vegetation near the switchbacks, it is recommended the City consider alternate means to disc or install landscaping at the impacted areas to meet Fire Marshal standards. If the City decides to pursue the pathway, the City should consider impacts to maintenance while preparing the final design."

Response to Comment 1-13: Noted. Section 6.2.1Maintenance and Operations Requirements has been revised to note that "...construction of a pathway along the EBMUD Aqueduct ROW may require increasing the frequency of maintaining tree canopy from an as-needed basis to a higher level." As frequency of maintaining tree canopy will be determined by the final pathway alignment and more detailed review of canopy cover, maintenance costs have not been adjusted.

Response to Comment 1-14: Noted. On page 4-7 the number of people served by EBMUD has been changed in the Public Review Draft from 1.4 to "approximately 1.3 million people..." Note: Also modified in Section 4.8.2

Response to Comment 1-15: Although not our understanding from previous conversations with EBMUD staff, we are pleased to learn that "EBMUD as-built drawings of the Lafayette Aqueducts accurately describe actual horizontal and vertical alignments." On page 4-10, second sentence has been deleted. A review of the EBMUD as-built drawings provided to Mark Thomas & Company does not suggest that there are any conflicts with Lafayette Pathway preliminary engineering. Please note that explicit invert and top of pipe elevations are not shown in the as-built drawings that Mark Thomas has been provided. Steps were taken in the preliminary design process to avoid conflict with known, above ground Aqueduct features and eliminate/minimize the need for excavation within the EBMUD Right of Way.

Response to Comment 1-16: Noted. On page 4-10, under Aqueduct/Utility Locations, the last paragraph has been revised to incorporate reference to a major distribution pipeline in the far northern portion of the ROW between Dolores Drive and Happy Valley Road. Per Mark Thomas & Company, the major distribution pipeline indicated in EBMUD's letter is not explicitly shown on the as-built drawings in plan or profile view. Preliminary design of the pathway in this area DOES take steps to avoid conflict with known, above ground Aqueduct features and minimize excavation of any sort. Pedestrian bridge footings that will require significant excavation are proposed outside of the EBMUD right of near the area in question. Also, a keystone block retaining wall in a "fill scenario" is proposed within the right of way near the area in question to accommodate the grade difference of the pathway, created by the tight switchbacks. All construction of the pathway and the wall at the area in question can be done above existing ground elevation.

Response to Comment 1-17: Chapter 4 of the Draft Feasibility and Options Study discusses private property-owner concerns, including security, pathway access and potential for trespass, privacy, aesthetic impacts, lightning design and pathway access after dark, parking, traffic operations and existing easements. Funding

and maintenance are discussed in Chapter 6. The planning-level cost estimates include a 25 percent contingency (that is, an amount equal to one-quarter of the total construction costs) to account for these additional costs. More detailed cost estimates would be prepared during a future phase, if the City decides to pursue the pathway. On page 4-31 under Private Property-Owner Concerns and in the Next Steps, page 7-5, section 7.2.6, has been revised to note that some of these concerns will need to be addressed in the new license agreement. A list of the specific items noted in the study needing to be addressed in the new license agreement have been added to page 7-6.

Response to Comment 1-18: In a phone conversation on January 25, 2011, the EBMUD Manager of Security and Emergency Preparedness, Steve Frew, indicated that the proposed EBMUD Aqueduct Pathway would not be a cause for concern related to Homeland Security issues. He did have suggestions for improving general security along the proposed pathway. Specifically, he requested that any design enhance the visibility of the pathway to deter unwanted activities, and requested installation of a fence along Happy Valley Creek to deter people from walking across the exposed Aqueducts. He indicated that EBMUD has a precedent for working with communities to transform unused EBMUD right-of-way into formalized recreational amenities, and sees this transformation as beneficial to security. The following sentence, and a reference to the aforementioned phone call has been added to Section 4.8.1, under Security, "Additionally, EBMUD has a precedent for working with communities to transform unused EBMUD right-of-way into formalized recreational amenities, and sees this transformation as beneficial to security."

Response to Comment 1-19: Yes, cost estimates include import borrow and grading for the Class I path, including some in the EBMUD Aqueduct ROW. The following sentence has been added to the end of Section 5.3.1 "If the City decides to pursue construction of the pathway, additional discussions with EBMUD, review and approval of the pathway design, and issuance of an encroachment permit for construction will be needed during future planning and design phases."

Response to Comment 1-20: The steps envisioned would be rustic and not permanent in nature. They would help prevent further erosion of the hillside due to current informal use. At the design stage, the City would coordinate on the design with EBMUD. Narrative and photos illustrating an example of the type of steps has been incorporated into Section 5.4.1 under Section 5.4 Segment 1: Risa Road to BART. The narrative states, "The proposed timber stairs would be constructed using railroad ties and rebar to hold them in place. Construction would require minor ground disturbances at the timber stair location. The timber stairs would not be placed on top of the aqueducts or considered permanent structures. "

Response to Comment 1-21: Noted. On page 6-3, the last sentence has been deleted: "~~Rather than eliminate maintenance tasks, it is likely a revised agreement would reduce the frequency with which tasks are conducted.~~"

Response to Comment 1-22: See Response to Comment 1-9.

Response to Comment 1-23: See Response to Comment 1-2.

Response to Comment 1-24: The proposed pedestrian and bicycle bridge at Happy Valley Road does not place any permanent structures in/or on the EBMUD Aqueduct ROW. The bridge footings and retaining walls would be located within Caltrans ROW and are shown on Figure 5-7 of the Draft Feasibility and Options Study. The EBMUD approvals would be required for the pathway segments which connect to the bridge. The

last sentence in the first paragraph under Section 7.1.1 has been revised to read, "...the bridge design must ~~avoid placing~~ not place a structural load over the Aqueduct..."

Correspondence #2 Bruce Allan, Chair, Lafayette Bicycle and Pedestrian Advisory Committee

Response to Comment 2-1: An evaluation of the completed phase prior to implementing the next phase is reasonable and consistent with the conservative approach taken throughout the study. The following paragraph has been added to page 7-1, "Prior to implementing Phase 2 and Phase 3, the prior completed phase should be evaluated to determine if cost-benefit assumptions continue to hold. At that point, a determination can be made whether to pursue the subsequent phase."

Response to Comment 2-2: Regarding securing maintenance costs, renegotiating the license agreement and next steps, the comment letter's proposal may not give the City the best flexibility to pursue opportunities to implement the project. EBMUD would like the maintenance terms renegotiated when there is a more detailed design available, while the commenter is suggesting to not pursue next steps until accurate maintenance costs are identified and secured. At this stage it may be appropriate to acknowledge, as the study does, that the City should identify a maintenance funding source prior to the construction of the pathway. The next steps in Section 7.2 have been reordered to more closely reflect the likely order of implementation. The following sentence has been added to Section 7.2.6. Secure Operations and Maintenance Funding, "Since the costs of maintenance and operations are tied to the final design of the pathway this step must come after designs have been finalized and the EBMUD Revocable Landscaping License Agreement is renegotiated."

Correspondence # 3 Marie Blits, President, Lafayette Homeowners Council

Response to Comment 3-1: See Response to Comment 2-2. The study acknowledges that funds for operation and maintenance be secured prior to construction; however, completely pre-funding, prior to construction, all elements including the pathways long-term reconstruction is not realistic and inconsistent with how the City and other jurisdictions plan for CIP projects.

Response to Comment 3-2: Construction, operation and maintenance cost estimates are based on actual costs. Reality checks of the cost estimates have occurred by comparing the estimates to existing projects.

Response to Comment 3-3: Decisions on project staffing will be made at the time the project is undertaken.

Response to Comment 3-4: An EIR is an informational document and the Downtown Specific Plan Draft Environmental Impact Report has been used in this instance as it provides the most current and available data. If the City Council decides it wishes to pursue the pathway's implementation, one of the next steps would likely include the statutory environmental review. Section 7.2.2. Environmental Review has been added to the Next Steps discussion in Chapter 7 of the Public Review Draft.

Response to Comment 3-5: The study used traffic count data from the Downtown Lafayette Specific Plan EIR (completed by TJKM and data collected in September 2007 and 2009) and the Traffic Impact Study for the Proposed Whole Foods Market (completed by TJKM in May 2010 and data collected in July 2009).

Response to Comment 3-6: Morning Peak hour traffic volumes for northbound Oak Hill Road are referenced in the development of this feasibility study. Figure 4-4 (page 4-5) shows existing traffic volumes at several intersections in the study area; including Oak Hill Road at the SR24 off-ramp (data collected 2007/2009). Figure 4-5 (page 4-6) shows the predicted future traffic volumes at these intersections, given build-out of the Downtown Specific Plan.

Level of service at Oak Hill Road/ SR24 off-ramp for both existing conditions and future build out of the DSP are shown in Table 4-3, page 4-27. The consultant team conducted preliminary traffic analysis for preferred Option 3 (lane reduction) on Oak Hill Road, and found that the intersection would operate at an acceptable level of service during the PM peak, as shown in Table 5-13, page 5-42. The study notes that signalizing this intersection would significantly reduce delay.

Response to Comment 3-7: The project will follow the City's standard protocols for public outreach and project delivery.

Correspondence #4: Abigail Fateman and John Cunningham

Response to Comment 4-1: If the project proceeds to the design and implementation phase, the City will work with adjacent property owners to facilitate connections between the pathway and adjacent properties.

Correspondence #5: Sergio Ruiz, Caltrans

Response to Comment 5-1: Further traffic analysis of Oak Hill Road/SR 24 Off-ramp is identified in Chapter 7, Next Steps. Section 7.2.3 Conduct Additional Traffic Analysis, in the Next Steps discussion in Chapter 7 has been revised to note that No Right Turn On Red should be included in the future evaluation.

Response to Comment 5-2: Noted. On page 5-47, Figure 5-15 depicts a barrier between the pathway and the off-ramp. If the project proceeds to the design phase, a barrier design would be submitted to Caltrans for approval.

Response to Comment 5-3: Further traffic analysis of a traffic signal at the intersections of First Street and the SR-24 On-ramp is identified in Chapter 7, Next Steps. Analysis of possible queuing onto Deer Hill Road and SR24 is one element of this step. . Section 7.2.3 Conduct Additional Traffic Analysis, in the Next Steps discussion in Chapter 7 has been revised to note that queuing analysis needs to be evaluated for Deer Hill Road and SR24.

Correspondence #6 Jeff Peacock, Chair, Lafayette Parks, Trails and Recreation Commission

No specific comments submitted on the Public Review Draft.

Correspondence #7 Ed Stevenson, Building Manager, Lafayette Veterans Memorial Building

Response to Comment 7-1: Noted. Signage and site design and access matters would be addressed in a future design phase of pathway development.

Correspondence # 8 Chris Dodge:

Response to comment 8-1: Noted. The pathway design standard includes 2-foot wide shoulders on both sides of the paved pathway. Figure 5-2, Preferred Pathway Design Standard, has been added to Section 5.3.1 Pathway Design, illustrating the recommended pathway cross-section.

Correspondence #9 Mel Epps:

Response to Comment 9-1: Chapter 6 provides a Benefit-Cost Analysis of the pathway. Table 6-8: Net Present Value Benefit-Cost Results has been revised to include a summary column.

Response to Comment 9-2: The background information as to why the City undertook the pathway study is included in Chapter 1, Section 1.2 Policy Context, page 1-1.

Correspondence #10 Steve Richard

Response to Comment 10-1: See Response to Comment 4-1.

Correspondence #11 Jeffrey Gilman, Lafayette Creeks Committee

Response to Comment 11-1: Pavement material is a matter to be considered during the design phase. The new figure 5-2, Preferred Pathway Design Standard, in Section 5.3.1, includes a note that "Pathway surfacing material to be determined during design development and may include pervious pavement."

Correspondence #12 Mike Noonan

Response to Comment 12-1: Balancing the demand for ROW among various modes is addressed in several of the City's planning and policy documents including the General Plan. The revised draft Downtown Lafayette Specific Plan contains several recommendations towards improving pedestrian and bicycle access and circulation. The pathway study is consistent with the City's overall approach.

Correspondence #13 Curtis Springfield

Response to Comment 13-1: The City's adopted Bikeways Master Plan identifies additional projects that would connect the northern and eastern portion of Lafayette with the proposed pathway. The second paragraph on page 2-1 has been revised to further describe the adjoining bikeways projects.

Correspondence #14 Big Wayne

Response to Comment 14-1: The Pumping Plant site is not within the project area. Amenities such as drinking fountains would be considered during the design phase of the pathways development.

Correspondence #15 Octavio Lacayo

Response to Comment 15-1: Access to the north side of the Lafayette BART station is outside the scope of this study. BART is aware that improving north-south bicycle and pedestrian access through the station is of interest to the community.

Correspondence #16 Avon Wilson

Response to Comment 16.1: See Response to Comment 3-4. Feasibility studies such as this are statutorily exempt from environmental review. If the City Council decides to proceed with the pathway, environmental review would be required at such point when the City would be bound to implementing some form of the project such as executing a new license agreement or completion of the design phase.

Response to Comment 16-2: See Response to Comment 3-5

Response to Comment 16-3: Additional discussion of air quality matters has been incorporated into Chapter 1, Executive Summary, Section 1.3.7 Environmental Constraints and Chapter 4, Existing Conditions, Opportunities and Constraints, Section 4.9.2 Potential Air Quality Impacts to Trail Users

Response to Comment 16-4: Noted. The Acknowledgements page has been updated.

E.2 City Council Staff Reports and Minutes

The staff report and meeting minutes for the November 14, 2011 City Council meeting and the staff report for the February 13, 2012 City Council meeting are presented on the following pages. (Note: the November 14th meeting minutes are presented in the February 13th staff report.)

City of Lafayette Staff Report

For:	City Council
By:	Tony Coe, Engineering Services Manager
Meeting Date:	November 14, 2011
Subject:	Presentation of Final Draft of EBMUD Aqueduct Pathway Feasibility and Options Study

Background

The City Council will recall that you authorized staff to obtain a planning grant to undertake a feasibility study of the concept of a bicycle and pedestrian pathway within the EBMUD aqueduct right-of-way, generally running parallel to State Route 24, BART, and Mt. Diablo Boulevard through the downtown. The Bikeways Master Plan identifies this pathway as a means to achieve a complete non-motorized transportation network through downtown Lafayette and connecting to other regional facilities, and its feasibility study is listed as a priority task. The 1.5-mile-long study area runs from Risa Road to Brown Avenue.

Upon securing grant funding, staff issued a request for proposals and selected a consultant team headed by Alta Planning and Design. Over the past 15 months the team has delved into a variety of technical, planning, logistical, and regulatory issues that affect the pathway's long-term viability. The study process also includes an extensive public outreach effort guided by two advisory committees consisting of interested local citizen and outside agency stakeholders, Councilmember Federighi, City commissioners and staff. The effort culminated in a public review draft that was circulated for review and comments in August, followed by two public workshops with invitations to all City Commissions and Committees to attend. Staff also made a presentation to the Lafayette Homeowners Council at its request. Formal comments received from this review process have been incorporated where appropriate into a final draft, which staff now wishes to present to the City Council. Individual responses to these comments are also contained in a companion document to the study.

The consultant team will present highlights of the study to the City Council at your meeting, and staff is requesting any comments and feedback that you may have on the final draft. We expect to return with additional information and clarification where needed to allow the City Council to consider adoption of the study at a future date.

7C

Fiscal Impact

The feasibility study has been undertaken with mostly grant funds with a roughly $13,000 local match. The pathway project will require substantial capital to construct and maintain. Challenges and opportunities related to project funding are discussed in the feasibility study.

Recommendation

City Council receives presentation of final draft of feasibility study and provide comments to staff.

CONTINUED TO Feb 13, 2012
LAFAYETTE CITY COUNCIL
J R Adams 1-23-12
CITY CLERK DATE

City of Lafayette Staff Report

For:	City Council
By:	Leah C. Greenblat, Transportation Planner
Meeting Date:	January 23, 2012
Subject:	Consideration of Final Feasibility and Options Study for a Pedestrian and Bicycle Pathway along the EBMUD Aqueduct Right-of-Way

Please bring your copy of the Draft Final Report from November 2011 or it is available online at http://lafayette.waterware.com/docushare/dsweb/View/Collection-589

Introduction

At its November 14, 2011 meeting, the City Council received a presentation on the Draft Final Feasibility and Options Study for a Pedestrian and Bicycle Pathway along the EBMUD Aqueduct Right-of-Way. The Council also reviewed comments provided by various interested parties and stakeholders. (The Planning Commission did not submit formal comments at the time; however the Commission did discuss the study at its September 19, 2011 meeting. The minutes from that meeting are attached.) At that time the Council provided comments directed staff to prepare responses and return to the Council with this matter for consideration to accept the study. Staff has prepared responses and developed a suggested list of next step actions, should the Council wish to continue to pursue implementation of a pathway. Staff seeks the Council's acceptance of the final study, re-confirmation of the project's status in the Bikeways Master Plan, and acceptance of the list of next step actions.

Discussion

The City Council had the following questions and concerns at your meeting of November 14:

1. Without Phase 3 (Oak Hill Road to Brown Avenue), is Phase 2 (BART to Oak Hill Road) still worth doing and what would it accomplish?
2. Explore connections from the path to on-street sidewalk at some point between private driveway east of Veterans Building and Dolores Drive.
3. Provide context of this project's cost compared with other similar projects.
4. Is there a less expensive but viable non-ADA-but-bike-accessible option for Segment 2 (BART to Oak Hill Road)?
5. Based on experience with actual facilities, do switchbacks in fact negate a project's viability as a bike transportation facility?

9B

6. Provide a better explanation of how this project benefits property values and economic activity. Cite studies and other examples.

7. Explain the basis for the projected doubling of bike usage. Will pedestrian usage actually increase given that the east-west alignment duplicates current sidewalks on Mt. Diablo Blvd?

8. The unit benefit value assigned to bike/ped trips seems high. Explain the basis and assumptions. Explain why this value does not equate to demand pricing; i.e. would someone pay $X to use the path.

9. Address confusion over annual maintenance cost of $1.1M over 30 years.

10. Explain further the difference between long term maintenance and reconstruction sinking fund.

11. Revisit the next steps sequence starting with acceptance of study.

Staff has since coordinated with the consultant team to research and respond to the Council's questions, as follows:

1. Without Phase 3 (Oak Hill Road to Brown Avenue), is Phase 2 (BART to Oak Hill Road) still worth doing and what would it accomplish?

Yes. Chapter 7, Phasing Plan and Next Steps, discusses project sequencing. Each phase has been selected to provide independent utility. As described in Section 7.1.2, Phase 2 (BART to Oak Hill Road, including the Oak Hill Road Crossing) links BART more directly to certain employment and service destinations in downtown Lafayette. The Oak Hill Road and First Street crossings are critical to the functionality of the pathway between BART and Brown Avenue. However, given the greater community concerns and the uncertainty of potential downstream traffic effects with signalizing First Street, it is recommended that signalization of that intersection be implemented in Phase 3 rather than Phase 2.

We have expanded the discussion of the utility of Phase 2 in Section 7.1.2. The first paragraph now reads (additions are underlined):

Phase 2 continues the pathway from BART to Oak Hill Road, providing connections between the station and employment and services in Downtown Lafayette, including access to the Safeway shopping center, and shops and services along Mount Diablo Boulevard. This phase includes widening the sidewalk on the east side of Oak Hill Road between Mt. Diablo Boulevard and Deer Hill Road, which will improve bicycle and pedestrian access to downtown.

2. Explore connections from the path to on-street sidewalk at some point between private driveway east of Veterans Building and Dolores Drive.

This feasibility study addresses in detail access to the pathway at roadway crossings. Other minor pathway access points are addressed conceptually in *Section 4.7.1 Access Points* and shown in Figure 4-6 Potential Access Points and Locations for Improved Security/Privacy from the EBMUD Aqueduct ROW. The figure includes a potential access point between the private driveway east of the Veterans Building and Dolores Drive, through private property. Details

regarding minor pathway access points will be addressed if the City decides to pursue construction of this pathway. Future development along the pathway alignment could also be conditioned to provide access to the pathway.

3. Provide context of this project's cost compared with other similar projects.

Chapter 6, Section 6.1. (Page 6-2) compares the cost of the EBMUD Aqueduct path to that of St. Stephen's Trail in Orinda. The EBMUD Aqueduct Trail would cost approximately $4 million per mile.

St. Stephen's Trail: 1 mile long, $1.8 million in 2011 dollars. The St. Stephen's Trail was completed in 1998 but required a decade of Caltrans coordination to secure permits and approvals. This trail's alignment consists of mostly gradual topography yet some traditional retaining walls were also utilized as needed. (This estimate is based on fact sheet from CCTA 2008 Strategic Plan, escalated from 2008 dollars.)

Treat Avenue Bicycle and Pedestrian Bridge on Iron Horse Trail: $13.4 million (2011 dollars), required a decade to plan & design, (1,300 users/day) (Cost estimate is based on fact sheet from CCTA 2008 Strategic Plan, escalated from 2008 dollars.)

Alameda CTC draft costs for the Pedestrian and Bicycle Master Plan updates estimate $1.2 million per mile for construction of class I multi-use paths, based on a review of paths constructed in the Bay Area since 2006.

The cost estimate developed for this study is quite inclusive and contains the cost of some elements which may be fully or partially funded and constructed by others; e.g. traffic signals on Oak Hill Road and First Street. Additionally, the pathway's cost estimate takes into account that this corridor contains challenging topography, roadway crossings and utility requirements which necessitate a bridge, traffic signals and potentially special EBMUD design requirements. Lastly, the pathway's cost estimates likely include more extensive project development costs than the St. Stephen's Trail due to multi-agency (EBMUD and Caltrans) involvement. The Treat Avenue bridge is perhaps the fairer comparison of the two as it is a more recent project also with complex vehicle traffic and utility challenges.

4. Is there a less expensive but viable non-ADA-but-bike-accessible option for Segment 2 (BART to Oak Hill Road)?

Chapter 5, Section 5.5 provides the cost for both a Class I Bikeway/ADA-Accessible pathway and an unpaved, non-ADA compliant, multi-use pathway that follows the existing topography. While it is about one-third the cost to provide an unpaved and non-ADA compliant pathway over the rise from BART to Oak Hill Road, this facility would have slopes up to 25% and be so steep as to be used only by a few intrepid bicyclists. Further, this type of pathway would not meet one of the project's primary goals of providing access to a range of users and improving the ability of less experienced bicyclists to access BART and downtown Lafayette. The study does not recommend a non-ADA-but-bicycle accessible route as the preferred option, due to potential lack of grant funding opportunities and lower use.

5. Based on experience with actual facilities, do switchbacks in fact negate the project's viability as a bike transportation facility?

The project consultant provided several examples of pathways that have been constructed with a number of switchbacks. Some accommodate significant levels of use:

Lick Run Greenway, Roanoke, VA (photo right) Provides access to an overpass of an interstate highway and connects to a shopping mall. Data from one month (June 2010) show between 40-50 users per day. Hourly averages show peaking at 6 am, noon, and 6 pm, suggesting it is primarily used for recreation. The city is looking into an extension to the trail that may help boost its use.

Banks Veronia Trail, Oregon State Parks, (photo right) This trail has 200,000 users annually. This is a rural pathway 25 miles outside of Portland, OR.

Coastal Trail, south of Pacifica, CA (photo left) Provides alternative access to Highway 1. This pathway includes a significant number of switchbacks. Use data not available, but Google aerials show bicyclists on path.

Freedom Parkway Trail, Atlanta, Georgia (aerial photo left) The pathway is "relatively popular" according to the jurisdictions Assistant Director for Transportation Planning. This pathway connects to a transit station.

In a local example, the access to the south side of the BART station in Lafayette was recently renovated to have a series of switchback ramps. While they are mainly intended for wheelchair users, staff has observed that BART users with bicycles ride down the ramps from the station to the street level.

6. Provide a better explanation of how this project benefits property values and economic activity. Cite studies and other examples.

Section 6.3, Benefit Cost Analysis, includes references to several studies that describe the economic benefits of pathways. Specifically, home prices near pathways tend to be higher than home prices farther from pathways, and bicycle and pedestrian facilities can lead to increased spending by consumers. These papers are summarized below.

Karadeniz, D. (2008). The Impact of the Little Miami Scenic Trail on Single Family Residential Property Values. Unpublished master's thesis, University of Cincinnati.
The authors utilized a hedonic price model to determine the effect of the Little Miami Scenic Trail, a 70+ mile multi-purpose rail-trail in southwest Ohio, on the 376 single-family residential property values located within one mile of a trail entrance. The findings included an increase in sale prices of $7.05 for each foot closer to the trail. Unlike previous similar studies, this model included land use characteristics and network distance to the trail. This study was in response to concerns by residents of property value decreases due to an increase of crime, traffic, and noise resulting from the trail.

Although not peer-reviewed, given its thoroughness and scientific approach, this study provides a valuable analysis of the impact of trails on property values.

Lindsey, G., J. Man, S. Payton, & K. Dickson. (2004). Property Values, Recreation Values, and Urban Greenways. Journal of Park and Recreation Administration, 22(3), 69-90.
The authors examined two aspects, the impact on property values and the recreational value of greenways in Indianapolis/Marion County. The study found that some greenways have a significant positive effect on property values, and that the recreational benefits of a trail exceed the costs. To determine the impact on property values, a hedonic model was used, with the value of houses within a linear half mile of publicly accessible trails in the greenway corridors as the study area. For the Monon trail, home values were 11.4 percent above the mean, but for the other greenway trails they were found to be -0.1 percent below the mean. The recreational benefits

were measured using the travel cost method, in which the costs of time and travel that people incur while using a recreational facility are assumed to equal the minimum price that they are willing to pay to use the facility. The total value of the willingness to pay is the total benefit of the facility. According to this analysis, the benefit-cost ratio was found to be 5.7 to 1, with a total benefit over a 10-year horizon of $22.6 million.

Los Angeles County Metropolitan Transportation Authority. (2007). Bicycle Paths: Safety Concerns and Property Values.
This paper summarizes research on two aspects of bicycle paths: safety concerns and impacts on property values. The latter portion of the paper lists the quantified benefit of bicycle paths on property values from several studies. These include the following examples:

- A 2006 study analyzed home values in seven Massachusetts towns near the Minuteman Bikeway and Nashua River Rail Trail. Homes near the trails sold at 99.3 percent of the listing price, compared to 98.1 percent for other homes in these towns. Additionally, homes near the trails sold in an average of 20 days faster compared to other homes.
- A 1998 study of property values along the Mountain Bay Trail in Wisconsin found that lots adjacent to the trail sold faster and for an average of 9 percent more than similar property not located next to the trail.
- A 1995 study of property values near city-owned open space in Boulder, Colorado found that the average value of property adjacent to the greenbelt, all other variables held constant, would be 32 percent higher than those 3,200 feet away. The greenbelt includes hiking and mountain biking trails.

Center for International Public Management, Inc. for the Florida Dept. of Environmental Protection, Office of Greenways and Trails. (1998). Thinking Green: A Guide to the Benefits and Costs of Greenways and Trails.
This guide included no original research, but summarizes findings from other sources, including the economic benefits of greenways of trails. A 1991 National Park Service study found that shorter, urban trails generate less per person, but can attract higher number of users, than longer, rural trails. In this study, rail-trail average expenditures per single use ranged from $1.90/person to $14.88/person. Property values were briefly discussed: property values near, though not adjacent to, greenways generally increase. Non-consumptive fees are another source of economic benefit for communities, and the report cites five examples, most involving an exchange of paving costs for easements or building rights.

7. Explain the basis for the projected doubling of bike usage. Will pedestrian usage actually increase given that the east-west alignment duplicates current sidewalks on Mt. Diablo Blvd?

To estimate bicycle usage for the EBMUD Aqueduct Pathway, the feasibility study relies on methodology presented in NCHRP Report 552, Guidelines for Analysis of Investments in Bicycle Facilities, published by the National Cooperative Highway Research Program. This methodology is very briefly noted in Section 6.3.1 of the report. We have revised this section of the report to include the following additional description of the methodology for determining bicycle and pedestrian usage:

The NCHRP report presents a sketch planning model that can be used to estimate bicycling demand in local areas. The sketch plan is derived from an analysis of bicycle demand research and high-quality, nationally consistent data (e.g. U.S. Census, National Household Travel Survey). Based on this research, the sketch plan uses bicycle commuting as a leading indicator for other types of bicycling in a community. The model estimates the number of bicyclists by:

a) Using U.S. Census or local data to establish the number of residents within 1600 meters, 800 meters and 400 meters of the proposed facility, then calculate the number of commuter by travel modes, including bicycling, within each buffer;

b) Applying low, medium, and high ratios between commuter bicyclists and all adult bicyclists to estimate the existing number of adult bicyclists on a given day. Ratios are derived from the aforementioned analysis of research.

c) Applying multipliers, based on proximity to the proposed facility, to calculate the number of bicyclists who would be induced to ride if a facility was built. Multipliers are derived from the aforementioned analysis of research.

To account for extrapolating data, the analysis includes low, medium and high usage scenarios. A lot of research went into developing the methodology used and while it may not be perfect, it is the best available.

Regarding pedestrian usage, the pathway will create a more direct pedestrian connection between BART and several of the densest residential clusters in Lafayette, decreasing walk time and increasing convenience and safety, all of which are important factors in a person's decision to walk to transit. In addition, the NCRHP method is based on several standard growth rate factors that take time to materialize; while these rates may not reflect current conditions, over time Lafayette may well increase its Downtown residential density more than the standard rates assume.

8. The unit benefit value assigned to bike/ped trips seems high. Explain the basis and assumptions. Explain why this value does not equate to demand pricing; i.e. would someone pay $X to use the path and explain why this may not be a fair metric of value.

Section 6.3.1 summarizes the methodology used to calculate benefits. The benefit values are based on the review and analysis of research related to each benefit category presented in NCHRP report 552. Note that the values are not "how much would you pay to use the trail" but much broader benefits that are typically not monetized: mobility, health benefits, recreation, reduced auto use benefits. The benefit assumptions in the NCHRP report are relevant to Lafayette, and the consultant team does not recommend revising the benefit amounts.

Staff believes it is not appropriate to compare the calculated benefit value with an amount someone would pay to use the facility, i.e. demand pricing. As with most public facilities people are not charged the true cost of using them and if, for example, a driver were charged the true cost of driving, roadway usage would likely be significantly different. Any cost-benefit ratio assuming demand pricing as justification for benefits would likely result in low benefits that would not justify a public project.

This section of the report has been revised to include additional detail on the sources used by NCHRP to estimate benefits. Additions to the document are underlined:

The NCHRP report relies on a review and analysis of relevant literature to estimate the benefits of proposed facilities. The total annual benefits are determined by summing the mobility, health, recreation, and reduced auto use benefits anticipated to result from implementation of the pathway. The benefit category monetary values are determined based on research review as identified by NCHRP Report 552 and summarized here:

a) The mobility benefit quantitatively evaluates individual preferences for different cycling environments. Mobility benefits are based on analysis of stated preference research. The mobility benefit for each existing and new cyclist of riding on an off-street bicycle trail, compared to riding on a street with parked cars is $4.08/trip, with 2 trips per day 5 days per week 50 weeks per year.
b) The annual health benefits is derived from multiplying $128, the annual per capita cost savings from physical activity, by the number of new cyclists. Benefits are based on a literature review of the cost savings of increased physical activity, and represent the median value of benefits presented in ten studies.
c) The annual recreation benefit for new adult cyclists, excluding new bicycle commuters, is calculated at $10/day times 365 days. Benefits are based on a literature review of numerous studies, which found that the typical monetary value of an hour of outdoor recreational activity is $10.
d) The reduced auto use benefit is based on an average 6-mile roundtrip commute distance and $0.13/per mile, the NCHRP Report 552 value for urban areas. Benefits are based on the review of several reports that discuss benefits of reduced auto use associated with increased bicycling. Benefits include the value of reduced congestion, reduced air pollution, and user cost savings.

9. Address confusion over annual maintenance cost of $1.1M over 30 years.

Maintenance costs are summarized in Section 1.5, Table 1-1, and described in Section 1.6 in the Executive Summary. Maintenance costs are described in detail in Section 6.2.3 and Table 6-4 in Chapter 6.

As noted in the document, maintenance costs are divided into two categories: 1) Annual routine maintenance, which includes ongoing maintenance that must be performed each year ($50,925 annually), and 2) long-term maintenance that will prolong the life of the pathway and is performed periodically (e.g. slurry sealing and AC overlay). It is assumed the City will put approximately $4,700 to $5,200 annually into a sinking reserve fund to pay for long-term maintenance. (Note that since maintenance costs are discounted over time, it is not appropriate to divide the total cost of maintenance over the 30-year pathway lifetime by 30 to come up with annual maintenance costs.) The annual maintenance and long-term maintenance cost contributions cited above assume completion of all phases of the pathway. These costs include traffic signal maintenance and operations which are expenses the City would not incur until Phases 2 and 3 were implemented. Table 7-1 Cost Estimates by Phase will be updated to more

clearly present the annual maintenance costs and the annual contribution required for long-term maintenance in addition to the cost over 30 years.

To provide greater City of Lafayette context to these maintenance costs, the Public Works 2011-2012 combined Traffic Maintenance and Road and Drain Maintenance budgets are $1.12 million excluding personnel costs. A large portion of these current maintenance expenditures support the operation of motorized vehicles on the City's roadways through replacing roadway striping, maintaining signage, filling potholes, operating traffic signals, etc. Some of the pathway maintenance costs may also overlap with existing street maintenance costs, such as traffic signal maintenance, which is necessary to manage traffic generally, not just to facilitate operation of the pathway.

Cost of reconstruction of the pathway is not considered a maintenance cost, and is discussed below.

10. Explain further the difference between long term maintenance and reconstruction sinking fund.

Reconstruction of the pathway at 30 years includes the cost of replacement of all features of the pathway—retaining walls, signals, and the pathway itself. Given the long-term maintenance that is recommended (see above), it is likely that many of these features will not need to be replaced, and may just require repair. As such, this is a very conservative estimate of the needs for replacement.

The executive summary and Chapter 6 have been modified to include this information.

11. Revisit next steps sequence starting with acceptance of study.

The study identifies a variety of actions that would be needed to move the pathway project ahead. Staff believes these can be more realistically broken down into smaller steps. While not necessarily sequential, the follow up actions could be grouped by timeframe, ranging from the near term (next 12 to 24 months) to the long term (10 or more years from now).

Near-Term Next Steps

1. Staff seeks the City Council's acceptance of the pathway study and re-confirmation of the Council's support for this project to remain on the Bikeways Master Plan. It is currently listed as Project 10B, EBMUD Aqueduct ROW Pathway Design and Construction from Walter Costa Trail to Brown Avenue.
2. Following acceptance, in the very-near term, Engineering staff would monitor the currently on-going process for developing a Mitigation Monitoring Plan for the Downtown Specific Plan. The FEIR for the DSP recommends the installation of two traffic signals at the same locations (Oak Hill Road and SR24 Eastbound Off-Ramp and First Street and SR24 Eastbound On-Ramp) as are needed in the pathway study. If through the broader DSP process, the community wishes to include these signals as mitigations, then the DSP and pathway study recommendations are complimentary. If the DSP process results in not including the two signals at mitigations, then the feasibility of extending the pathway beyond Phase 1 is significantly diminished as other means of

the pathway crossing the streets were studied and were not recommended due to their cost, impacts and feasibility.

3. There are several active development applications at the westerly end of the Phase 1 section of the pathway, e.g. the Woodbury Condominiums. These projects have already been conditioned to contribute to or implement a portion of the pathway, and staff could monitor these projects to coordinate implementation of the pathway consistent with the study's recommendations. Should the Woodbury project move forward, staff would likely need to begin re-negotiating the existing use license with EBMUD regarding the maintenance responsibilities associated with the pathway in EBMUD's right-of-way. Staff's approach would be to re-negotiate the license along this section of the EBMUD ROW only as a first step, and wait on the future phases until such time when they become more imminent.

Short to Mid-Term Next Steps

4. Depending on the outcome of the DSP process on the traffic signals at Oak Hill Road and First Street (Step 2 above), staff would seek grant funds to conduct additional analysis as outlined in the study. This would address specifically in more detail the implications of signalizing these two locations to facilitate pedestrian crossing as well as manage future vehicular traffic growth.
5. The positive outcome of Step 4 would support moving ahead with design development, preliminary engineering and environmental review for implementing Phase 1. Again grant funds would be sought for this work.
6. Various grant programs are available to fund the actual construction of projects of this type. This project could also be added to future updates to the Lamorinda Transportation Mitigation Fee Program. Staff could also seek opportunities to coordinate construction of usable segments of the path as an off-site improvement to new development, similar to what the Woodbury Development has committed to do.

Long-Term Next Steps

7. Upon completion of Phase 1 or any usable segments of the pathway, actual use and cost experience would then be available to be evaluated to decide whether the City should complete the entire pathway alignment over the long term.

Fiscal Impact

In the near-term, if the Council accepts the study and the proposed next steps, matching funds may be needed to secure grant funds to conduct additional studies and analyses. As is staff's practice, prior to submitting grant applications, staff would alert the Council to the possibility of matching funds being required.

Staff resources would also be used to secure implementation opportunities through development applications, negotiations with EBMUD, etc.

The study provides extensive discussion and estimates of the financial costs of the pathway's implementation. In summary, the entire pathway would cost $6.2 million to design and construct and $51,000 annually for routine maintenance. The City would also contribute about $5,000

annually to a long-term maintenance sinking fund. Should the City desire, it could additionally contribute approximately $100,000 annually to a long-term replacement fund.

Recommendation

Staff recommends that the City Council:

1. Accept the Final Feasibility and Options Study for a Pedestrian and Bicycle Pathway Along the EBMUD Aqueduct ROW with the modifications as noted;
2. Re-confirm support for the project to remain in the Bikeways Master Plan; and
3. Direct staff to pursue next steps as identified in this staff report.

Attachments

1. November 14, 2011 City Council minutes
2. September 19, 2011 Planning Commission meeting minutes excerpt

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will go to the ACS and 100% of proceeds from their Bounce for Breast Cancer Awareness Dance will be donated. The LYC also donated funds to have tee shirts printed which are on sale for $10 each;

Upcoming events will include:

- December 9, 2011-LYC's first ever open mic night, called the LYC Café;
- January 20, 2012-7th graders Tri-City Dance at the Community Center;
- February 24, 2012—8th Graders Tri-City Dance;
- March 2, 2012—Father/Daughter Dance;
- March 3, 2012—Basketball Tournament called Three-on-Three for Three/Three;
- March 23, 2012-Bounce for Breast Cancer Awareness Dance, featuring bounce houses;
- April 13, 2012—Ace of Clubs Concert—LYC is still looking for bands;
- Planning for next year's Haunted House; volunteer work parties will begin in September and the house will open in late October.

LYC Associate Members are youth from grades 6-12 who turn in applications to be members that can work events, attend meetings, but not vote. To become a member, apply on-line at the City's website. Youth outside of Lafayette can also volunteer with the LYC or are directed to contact the Orinda Teen Advisory Council or the Moraga Youth Involvement Committee.

Councilmembers thanked the Youth Commission for their work, planning strategies, and presentation which they confirmed could be found on U Tube. They further commented that the LYC sets the standard for entrepreneurial activities and confirmed they made $6,157 from the Haunted House event before and $4,599 after expenses for the event, which was a record setting amount.

C. Final Draft of the East Bay Municipal Utility District Aqueduct Pathway Feasibility and Options Study

Recommendation: Receive presentation and provide comments to staff.

Engineering Services Manager Tony Coe gave the staff report and said when the City developed and adopted its Bikeway Master Plan, the pathway concept was included because it parallels Mt. Diablo Boulevard through the downtown and serves to provide a connected bicycle and pedestrian network. At question is whether the concept can be implemented in terms of cost, coordination with EBMUD, Caltrans, and design challenges such as street crossings.

Mr. Coe reported that a planning grant was obtained to conduct the feasibility and options study and consultants were chosen to prepare a draft report which was circulated for public comment. The City undertook a fairly expensive public outreach effort overseen by two advisory committees, and the Draft Report was published in August. Comments were received and incorporated into a Final Draft which will be presented tonight by the consultant team. He said staff is seeking Council comments and feedback in order to incorporate them into a final study which will be returned for the Council's consideration and adoption.

Ian Moore, Fehr and Peers, gave a PowerPoint presentation of the EBMUD Aqueduct Pathway Feasibility and Options Study, presented the study area, project history, their technical analysis of what was possible in terms developing a pedestrian and bicycle pathway, those involved in the

technical advisory committee and the citizens advisory committee, pathway feasibility options and Caltrans design standards, three key challenge areas, switchbacks, crosswalk improvements, retaining wall, various alignments and signal controls.

Councilmember Tatzin questioned the location of EBMUD pipes at the Oak Hill off-ramp location, and Mr. Moore pointed them out as being located just south of what was shown or behind the existing retaining wall along the freeway. He noted that the entire EBMUD right-of-way is south of that retaining wall.

Mr. Moore then presented cost assumptions and said total construction costs are in the area of $6.2 million, plus annual maintenance costs.

Councilmember M. Anderson confirmed with Mr. Moore that annual maintenance costs, with added factors and methodologies for transportation costs, result in $1.7 million annually over the course of 30 years and he then discussed maintenance funding ideas.

Councilmember Tatzin questioned next steps for all cost-related items and likely sources for development. He recognized that estimates and timing are available for Phase 1, but if Phase 2 could not be done, he asked if Mr. Moore would recommend funding Phase 3. Mr. Moore responded by pointing out that Phase 2 would still connect some downtown shopping and the library via First Street even if the path does not continue on to Phase 3. However, the value of Phase 2 may be less if the City is not confident that Phase 3 can materialize.

Councilmember M. Anderson questioned whether a pedestrian connection at Mt. Diablo west of Dolores Drive and the EBMUD right-of-way as benefitting residents there. Mr. Moore replied that this was not analyzed in the study. Mr. Coe stated they actually have two approved developments in that area that will install a sidewalk along Mt. Diablo Boulevard starting where the Veterans Memorial frontage leaves off and extending east and connecting to where the existing sidewalk ends, which provides a connection to Dolores Drive, where a connection to the path can be made.

Councilmember M. Anderson wondered if there could be a connection further west so as to make it a nice, straight walk to BART. Mr. Coe said one connection is the Woodbury project and the other would be a new office development east of Woodbury that has a direct connection. The residential neighborhood between there and the BART station would have to use the on-street sidewalk going east to Dolores Drive.

Mayor Anduri questioned how one would compare the cost of this project to the cost of similar projects. Mr. Moore replied that the St. Stephens Trail project in Orinda is the only comparable project. That one cost about $1.5 million per mile. The Aqueduct Pathway would be more, but there are also other pathway projects that are even more expensive. So the Lafayette project is certainly not the highest cost.

Mayor Anduri asked regarding the underestimated true benefits such as economic activity and increase of property values, how likely are they to be realized with this project. Mr. Moore responded that regarding property values, communities that have made it a policy to include a pathway project such as this, consistently have higher property values. In the instances of individual parcel level, such as the Iron Horse Trail and the Lafayette-Moraga Trail, it is common to include these in real estate listings as they are considered a highly desirable feature, as they are commonly well built and well maintained.

Mayor Anduri further questioned what additional public input would be had from this point forward. Mr. Moore indicated that there would be opportunities during the project development process, including the recommended focus traffic analysis and design development.

Councilmember Tatzin said one of the assumptions made is that the number of pedestrians and bike trips would greatly increase. He questions where the underlying assumptions came from and whether they reflect Lafayette conditions. Mr. Moore indicated that some traffic counts were done, then extrapolated using regional data.

Councilmember Tatzin further commented he would make is that the bicyclist clearly would have problems getting to Mt. Diablo Blvd., even though we have sharrows. However, considering pedestrian traffic it is not quite the same perceived safety increase by going with this proposed trail, as they will be on sidewalks or in vehicles.

Councilmember Tatzin said in the cost benefit analysis assigns a benefit value of $4 for bicycles commute trips and $10 for recreational bicyclists. He wonders whether in reality people would actually pay these amounts as a fee to use the path.

Mayor Anduri asked for public comment on the item.

Public Comments:

TRACI REILLY asked if there was any discussion about measures for safety features on the path. Mr. Moore indicated that safety measures are addressed in the study as well as a discussion in the response to comments.

Councilmember M. Anderson asked what does "adoption" of the study mean? Mr. Coe said mainly this was a path identified in the Master Plan. When the study is returned to the Council, staff wants to make sure that it adequately addresses all issues known to date so the City can say that either the path is feasible or not feasible based on those factors. The Council could make a finding as to whether or not more information is needed. In order for this project to go forward, staff felt that it is important to have a conclusion on the feasibility question. . The study should allow us to say that this is a project for the future or not a good idea after all issues have been vetted and the City is not comfortable it is a viable project.

Councilmember Tatzin thanked all those who worked on the study. He referred to Section 2, there were two alternatives studied—one recommended which would cost $1.42 or $1.43 million not including the signal, and the other was having people follow the East Bay Aqueduct for $27,000 to $47,000, which is a significant difference. While there is an ADA compliance issue, this also includes switchbacks on the western portion. Another option might be to say to people coming from the east to the west that you get to that area if you require an ADA accessible path, go down the sidewalk, go half a block over to Mt. Diablo Boulevard and go to the BART station. If one wants to walk along the non-ADA compliant trail, do so, and he thinks the City could use $1 million in ADA accessible improvements to benefit more people. He thinks that the need for an ADA accessible trail and using it in this location for the cost of $1 million is slim. He would be interested in seeing some reactions to this.

Councilmember B. Andersson said he thinks the information from the study is very valuable and worthwhile. There are many issues that have never been taken far enough for consideration until now. Now the City understands all issues, difficulties and possibilities. It is not an easy path, but it

could happen. It comes down to the cost benefit analysis, which appears to be a positive result, but he is more concerned with funding the maintenance. In terms of next steps……He thinks the key is that a path project should be laid out for a funding structure, recognizing there is a maintenance cost. He further suggested that there may be areas that money can be raised to pay these costs.

Councilmember M. Anderson said he appreciates the study because it objectively demonstrates the need for a lot of money to implement it probably won't get a lot of use, and he does not see people using the switchbacks because they are not conducive to bicycle commute. . He feels the alignment that has been discussed has the ability to serve the downtown and he doesn't believe it ties in to the other connections very well. Therefore, if there is more funds available on the contract to do some adjustment and consider a phasing concept and perhaps Phase 1 could be a stand-alone project as an access to BART. He further noted that this study as being complete, however he doesn't see a benefit for this actual improvement.

Mayor Anduri said this is a resource he would like to see more about the potential benefits years from now because he has a feeling that development pressures will encourage walking, bicycling and noted he wasn't sure how this would be measured in terms of a cost benefit analysis. He thanked the consultant team for their help.

Councilmember B. Andersson said a couple of reasons why he believes that there would be more users than currently anticipated is that a facility like this attracts more users over time. He cited the Lafayette-Moraga Trail. He believes that once it is implemented people will start using it and will build on it.

Mayor Anduri said there have been past complaints about "a trail to nowhere" from Murray Lane to the Community Park, and that no one would use it. He commented though that every time he goes to the area, he sees someone walking and people do use it.

Councilmember M. Anderson said the problem he sees with this is that we know that the switchback is not friendly to bike commutes. He noted that Murray Lane is a hiking trail and not a trail for commuters. He suggested finding one somewhere that can be tried out.

Convene Redevelopment Agency

ACTION: It was M/S/C (Tatzin/B. Andersson) to convene the Redevelopment Agency meeting. Vote: 4-0-1 (Ayes: Anduri, M. Anderson, B. Andersson, and Tatzin; Noes: None; Absent: Federighi).

8. CONSENT CALENDAR

ACTION: It was M/S/C (Tatzin/M. Anderson) to approve Consent Calendar Items A, B, C, D, E, and F. Vote: 4-0-1 (Ayes: Anduri, M. Anderson, B. Andersson, and Tatzin; Noes: None; Absent: Federighi).

A. City Council/RDA Minutes
October 24, 2011
Recommendation: Approve.

From: Jeanne Athejevich To: Leah

applicant's request.
Project Planner: Greg Wolff, Tel. (925) 299-3204 • gwolff@lovelafayette.org

Commissioner Mitchell moved approval of Consent Calendar Items A, as amended, B, and C; Commissioner Chastain seconded the motion, which carried by unanimous consent.

SPECIAL PRESENTATION – FOLLOW UP include with staff report for council

A. LAFAYETTE PATHWAY FEASIBILITY STUDY ALONG EBMUD AQUEDUCT RIGHT-OF-WAY
Recommendation: As follow up to last month's presentation, staff is available to respond to questions. The Commission may wish to identify comments and prepare a comment letter on the Public Review Draft.
Project Planner: Leah Greenblat, Tel. (925) 299-3229 • lgreenblat@lovelafayette.org
Estimated Start Time 7:05PM / Estimated Duration 45 Min

Ms. Greenblat said she was here to answer questions as a follow up on the feasibility study presentation last month which the Commission attended the first of two presentations. Following the first presentation, to respond to questions received, , staff developed additional PowerPoint slides to better describe and respond to questions, which she wanted nowto share with the Commission.

She said she understood that the Planning Commission wanted to focus its discussion on the three key intersections: Happy Valley Road, Oak Hill Road, and First Street. She presented the Happy Valley Road crossing which looks at the topography, or the 33% change in grade which is one of the reasons why the draft study is proposing a bridge at this location. Some of the improvement which consists of new curb bulbs, crosswalk, and in-pavement flashers will be done as part of the Downtown Street Improvement Streetscape project going out for bid and to be constructed later this year. Questions at the first meeting involved why people could not cut across portions of the path and staff wanted to better illustrate the actual grade change at the location. There is a 14.5 foot elevation change as well as in another location, where stairs will be proposed to take pedestrians down to Happy Valley Road. She said the plans reflect the new BART entrance with ramps, and it is clearer how the upper path meets the top of the BART plaza ramp.

Ms. Greenblat displayed the section between the BART alignment and Oak Hill Road. Staff proposes transitioning into the Caltrans right-of-way to miss a significant grade further to the east. She presented a view from the State Route 24 Oak Hill off-ramp and the uphill slope of the EBMUD Aqueduct. They are proposing that the north side of the off-ramp would get realigned and shifted over, and the existing wall will remain.

She said there were also questions about the Oak Hill State Route 24 off-ramp intersection. She presented the revised slide which shifts the lane assignments around so they are different north of the off-ramp versus south of the off-ramp, which she briefly explained.

There were also questions about the traffic and background data. She pointed out that the draft DSP in the cumulative no-project condition has this as a LOS D intersection. If the DSP project is added in under cumulative conditions, it is LOS F, or with signal control, LOS C. In the future, projects from the DSP will influence Level of Service. As part of the study, they looked at pedestrian crossings and evaluated it under a scramble phase. She said if a signal is installed, it helps with queuing on the off-ramp which Caltrans is especially concerned about.

The other key intersection was the First Street/State Route 24 on-ramp. She presented existing conditions and said the span is a much wider and flatter crossing than Happy Valley Road, and the

topography does not work as well to minimize the span. A bridge would need to back out farther to get to the height that was needed. Because of these issues, staff looked at two alternatives for First Street and the freeway. Both have signalization at the off-ramp, and one also has full signalization at the driveway at Whole Foods. Alternative 4 maintains the existing condition at Whole Foods.

In looking at the projects, the southbound, left-turn from First Street to the on-ramp is where the worst delay at this intersection is experienced in the future. Under cumulative conditions, with no project, the LOS is at F. With a signal control this can be slightly improved. Future steps identified in the study are to conduct additional traffic analysis at this intersection and at Oak Hill, but primarily at this intersection and looking at the upstream and downstream types of effects.

In conclusion, the cost is $6.1 to $6.2 million. Traffic signals for some of the pathway segments are included in the overall cost, but they could potentially be funded through other sources. She then presented the recommended phasing, stating that the first phase is to go from Risa Road to BART. The second phase is to go from BART to the east side of Oak Hill. The last phase, if acceptable, would take it to Brown Avenue. She said she was available to answer any questions.

Commissioner Mitchell asked if numbers were run to determine how much a bridge would cost, particularly at First Street. He said some municipalities like Pleasant Hill and Walnut Creek have long, ramped bridges. Ms. Greenblat said staff knows the cost at Treat Boulevard, which is $12.1 million. This bridge is a bit more complicated than what Lafayette would need. Another issue she did not mention is that the City cannot build structures in the EBMUD right-of-way. She said the reason the City was able to do the bridge at Happy Valley is because it is on Caltrans right-of-way the whole way.

Chair Curtin-Tinley questioned where the crossing works on the First Street, which Ms. Greenblat explained, stating the path comes down, there is a white rail fence, and one can cross at either option in two parts; first the southbound traffic, go along a median, and then cross the northbound traffic with a signal.

Commissioner Mitchell said in the southbound direction where there is the center median, it appears there is only one southbound lane in that particular spot and then it widens to two lanes. Ms. Greenblat said it does look like that, but she did not bring any cross sections with her.

Chair Curtin-Tinley asked if the signal is operated by the pedestrian or bicyclist, similar to what is in Walnut Creek by Nordstrom's. Ms. Greenblat said a pedestrian or bicyclist would need to push a button for signal control.

Commissioner Mitchell questioned what staff's preferred recommendation is, and Ms. Greenblat said staff needs to study the First Street crossing further and is not willing to commit yet to a specific one. There is some interest in trying to improve the pedestrian crossing at Whole Foods because there are many jaywalkers, but it might interrupt the flow more. If the signal was added at First Street, it would not be quite be as far for the jaywalkers, and they could go up to it and get a protected crossing.

Chair Curtin-Tinley referred to the crossing at Happy Valley and asked why is there a bridge crossing here as opposed to First Street. Ms. Greenblat said it is a matter of grades and too many switch-backs.

Chair Curtin-Tinley referred to the Oak Hill crossing, and asked if the lane changes going from two to one and two to one on Oak Hill is caused by a bike path, or she asked if this was a different project. Ms. Greenblat said interestingly, the Circulation Commission is looking at this option now because the City receives a number of complaints about the site distance coming off the off-ramp. The Circulation Commission just extended the no-parking zone, but it also improves a condition where there are now

two lanes and if someone is turning southbound into Safeway, they block one of those lanes. The benefit of this option is improvement of the southbound traffic. Chair Curtin-Tinley said; however, the northbound lane is reduced, which is the most heavily traveled portion. Ms. Greenblat said there were some questions about Mt. Diablo Boulevard and that turn, and currently, there is only one thru lane feeding in there at a time. If turning from Mt. Diablo Boulevard, one lane is turning at a time. From Oak Hill and going straight, there is only one thru lane there.

Chair Curtin-Tinley confirmed that purpose of tonight's meeting is for the Planning Commission to comment on the draft plan.

Chair Curtin-Tinley opened the public comment period. Seeing none, she returned back the discussion to the Commission.

Commissioner Mitchell said obviously Oak Hill and First Street will be a big challenge, and he is anxious to see what the Circulation Commission returns with. He is generally supportive of the trail. He thinks it will be a great amenity for the City and he hopes it works out. He also said if the City has conversations with Caltrans, particularly with regard to the right-of-way on the off-ramp on Oak Hill, he asked to include the fact that at Mt. Diablo Court, there was an application for 18 condominium units, and there was a proposed trail in the Caltrans right-of-way to approach Pleasant Hill Road from the end there.

Commissioner Lovitt questioned where funding is anticipated. Ms. Greenblat said there is an entire chapter on funding needs and expenses, but most of the funding is anticipated through federal transportation dollars that come through MTC or through sales tax dollars through CCTA. She said one of the reasons why there is a bridge at Happy Valley is to maintain a Class I bike facility and that it be ADA compliant, and by doing that, it opens up transportation dollars, as opposed to it being classified as a recreational facility, the dollars of which are much more limited.

Commissioner Humann said of the $6 million, how much of this is for the bridge. Ms. Greenblat said the bridge is a pre-manufactured bridge, and each phase was about $2 million. Commissioner Mitchell noted the cost is $1.2 million for the Happy Valley Crossing.

Vice Chair Ateljevich said she has concerns with the safety of both the Oak Hill and First Street crossings. Because she lives on a street that is crossed by the Regional Trail that goes through Lafayette, she sees at least 10 kids every day with one ear plugged up with their IPods and phones and they never stop. Twice, cars have been hit by bicycles. She is very worried, but she knows they tend to be more careful with busier streets, but there will always be the daredevil. Secondly, the mix on the Regional Trail includes a lot of kids and people out for recreational walking, but it does not include hardly any bicyclists as this would. Serious bicyclists go on St. Mary's Road, and they do not mix with kids and stop signs. Therefore, she does not see this as much as a recreational possibility as possibly one that would get people to BART. And, the first phases are more innocuous than the subsequent phases. If the City moves forward, she would hope they would put a good amount of time between phase 1 and any subsequent phasing to see how much demand there really is, because she does not feel comfortable with the cost-benefit analysis which is based largely on projections made in very different situations than this one. So, if it is going to exist, it had better be used a lot to be worth what it will cost.

Commissioner Chastain said he was not sure what to do about safety, as there are risks. He thinks what would be helpful in looking at this is that this is a good way to get to BART as well as the reservoir. This almost is more compelling to him. Vice Chair Ateljevich said she thinks they would take a different route before taking this one in coming from the north. If coming down south, they will come down Brooke Street. He also thinks it would cost more than what is estimated.

Commissioner Maggio said she sees a lot of benefit for the first phase without some of the constraints. She thinks it would be an asset to the community. There is a lot more studying to do. It should run through more Commissions, but she thinks at least the first phase would be very worthwhile. Vice Chair Ateljevich agreed and said it should be considered a 'test' phase, to which Commissioner Maggio agreed.

Chair Curtin-Tinley commended all the work that went into the feasibility report and would love to have a bike/pedestrian path throughout Lafayette. If she came from the north, she would never use the bike path because of the constraints on it. She also would not take children across the First Street crossing, not in front of an on-ramp to go on a freeway, and not one they would have to stop in the median, which is extremely unsafe. She thinks it would cause more traffic problems when having the pedestrians and bike users pressing the buttons, as it backs up cars. She likened it to problems she has experienced in Walnut Creek and said she was concerned with safety at First Street. She said she does not see it working at all, as it is already a mess. She is also concerned about Oak Hill Road and not in favor of any of the road improvements. The bridge on Happy Valley Road is also very expensive. She was supportive of the first phase and then after that, to look at the use of the bike path along Deer Hill Road.

Vice Chair Ateljevich said the other impact the City should study is the impact on the commute. Adding one more light will upset people greatly. She thinks a very good effort has been made to contact the public about this project, but no one knows exactly what it entails other than those closely involved. She agrees with Phase 1 relatively being innocuous and providing a service.

Commissioner Maggio said she thinks the placement of the bridge with the backdrop of the other overpass would really just go away, and this is a really good design idea to allow for the ADA access. Commissioner Lovitt said he thinks it would actually help.

Chair Curtin-Tinley asked how and where the bridge drops back down onto the path. Ms. Greenblat pointed out the location of the bridge, the sidewalk along the BART parking lot and the point where it forks. One would come down to the parking lot level or if one's destination is BART, they go right into the plaza level. She said people are on the bridge span and fill in various sections. She said it is short enough so that it can be a manufactured, and not designed, bridge.

Commissioner Lovitt commented that if the design for a pedestrian bridge could be something other than used parts of the Bay Bridge, it would soften the view of the freeway considerably. Ms. Greenblat said when discussed at the Technical Advisory level, the bridge would be similar to the one at the Community Park.

Chair Curtin-Tinley asked and confirmed there had also been consideration given to the height of the sides of the bridge for safety, and confirmed there were no further comments of the Commission.

NEW PUBLIC HEARING

A. **LLR03-11 ALAN & NEL WAGNER and LAMAR & ELIZABETH WILKINSON (APPLICANTS & OWNERS), LR-10 & R-40 ZONING**: Request for a Lot Line Revision pursuant to Chapter 6-24 of the Lafayette Municipal Code to adjust the property lines between a developed parcel & two undeveloped parcels located within the Hillside Overlay District at 1722 Reliez Valley Road.
APN's 167-240-019, 167-240-020, & 167-240-021
Recommendation: Approve the application for lot line revision.
Project Planner: Greg Wolff, Tel. (925) 299-3204 • gwolff@lovelafayette.org
Estimated Start Time 7:50PM / Estimated Duration 30 Min