Highway 17
Wildlife Passage and Regional Trail Crossings

January 2019

Revised Alternatives Report

APPENDICES

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Revised Alternatives Report - Appendices

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Appendices

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Glossary of Terms and Acronyms

AASHTO: American Association of State Highway and Transportation Officials

LRFD: Load and Resistance factor Design

ADA: Americans with Disabilities Act

Caltrans: California Department of Transportation

Catex: Categorical Exemption (CEQA)

CE: Categorical Exclusion (NEPA)

CDFW: California Department of Fish and Wildlife

CE: Categorical Exemption

CEQA: California Environmental Quality Act

CHP: California Highway Patrol

DPR: Draft Project Report

EA: Environmental Assessment

ED: Environmental Documentation

EIR: Environmental Impact Report

EIS: Environmental Impact Statement

FHWA: Federal Highway Administration

GIS: Geographic Information Systems

M: Million

Midpen: Midpeninsula Regional Open Space District

MND: Mitigated Negative Declaration

NA: Not Applicable

NB: Northbound

NEPA: National Environmental Protection Act

OSP: Open Space Preserve

PA&ED: Project Approval/Environmental Documentation

PDT: Caltrans Project Development Team

PID: Project Initiation Document

POST: Peninsula Open Space Trust

PR: Project Report

PS&E: Plans, Specification, and Estimates
PSR: Project Study Report

PSR-PDS: Project Study Report – Project Development Support

PSSR: Project Scope and Summary Report

RRFBs: Rectangular Rapid-Flashing Beacons

ROW: Right-of-way

SB: Southbound

SC County Parks: Santa Clara County Parks and Recreation Department

SC County Roads and Airports Department: Santa Clara County Roads and Airports Department

SCVWD: Santa Clara Valley Water District

SJW: San Jose Water Company

Stage 1 Report: 2016 Preliminary Alternatives Report

SCVP-PID: Small Capital Value Project – Project Initiation Document

TCE: Temporary Construction Easement

Appendix A: Background, Design and Evaluation Considerations

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Appendix A: Background, Design and Evaluation Considerations

1. Study Area Overview

The study area for focused wildlife and trail crossing study is along the Highway 17 corridor from the southern limits of the Town of Los Gatos south to approximately the Bear Creek Road Overcrossing. This area is the confluence of a vast extent of protected open space and park land owned and/or managed by Midpen, the Santa Clara Valley Water District (SCVWD), and Santa Clara County Parks, and includes large areas of private watershed land owned by San Jose Water Company (SJW) – see Figure 1. The Study Area for wildlife crossing opportunities extends further south, to approximately Aldercroft Creek, because existing culverts offer highway crossing opportunities for smaller wildlife (not likely for mountain lions and deer).

Two major facilities divide the Study Area, constraining passage to both wildlife and humans; Lexington Reservoir and the adjacent Highway 17. The 475-acre reservoir is owned and operated by SCVWD. It lies within a 914-acre area owned by SCVWD that is operated as a County Park by the Santa Clara County Parks Department under a partnership agreement. The Park features shoreline fishing and limited boating and is a terminus of the popular Los Gatos Creek Trail and trails in the adjacent St. Joseph's Hill and Sierra Azul Open Space Preserves. The areas under consideration for location of wildlife or trail crossings are all within Caltrans right-of-way (ROW), portions of which SCVWD and SJW have rights to locate, access, and/or operate some of their facilities. The proposed crossing(s) and connections to them would require encroachment permit(s) and operation and maintenance agreement(s) from Caltrans District 4. Other connections to the potential crossings, such as around the spillway or along the reservoir, may cross SCVWD property, SJW property, and/or Santa Clara County roads, and would require encroachment permit(s) or other access permission, and formal agreement(s) for operation and maintenance.

Alma Bridge Road east of the on and off ramp portions paralleling Highway 17, which are in Caltrans ROW, is owned and operated by Santa Clara County through its Roads and Airports Department. The portion of Montevina Road that parallels Highway 17 on the west (north of Black Road) is also in Caltrans ROW, although the portions that curve away from the highway at the northwest, and the portion south of Black Road are County ROW.

Within the study area, Highway 17 is a four-lane highway with heavy traffic volumes due to its function as a commuter route and major recreational access route between the Bay Area and Santa Cruz. A concrete median barrier runs through the entire length of the Study Area except for a break at The Cats Restaurant entrance near the northern limit of the study area. The reservoir and surrounding topography channel wildlife north of the dam, where the highway presents a major barrier that has resulted in frequent wildlife mortality, and also concentrates trail use along with heavy truck traffic and heavy recreation access traffic on Alma Bridge Road.

Watershed lands owned by the private San Jose Water Company (SJW) occupy Trout Creek Canyon to the northwest of the Reservoir and Soda Springs Canyon to the east, as well as a strip along Los Gatos Creek. The Los Gatos Creek Trail is located in Caltrans ROW from Main Street in Los Gatos to approximately opposite The Cats restaurant.

Founded in 1866, San Jose Water Company is an investor owned public utility, and is one of the largest urban water systems in the United States, serving over 1 million people in the greater San Jose metropolitan area. SCVWD is a wholesale water supplier to SJW, which treats and stores the water at facilities at the northwest end of the Reservoir, and across Highway 17 to the west. SJW facilities are located on either side of Highway 17 in proximity to proposed crossing locations.

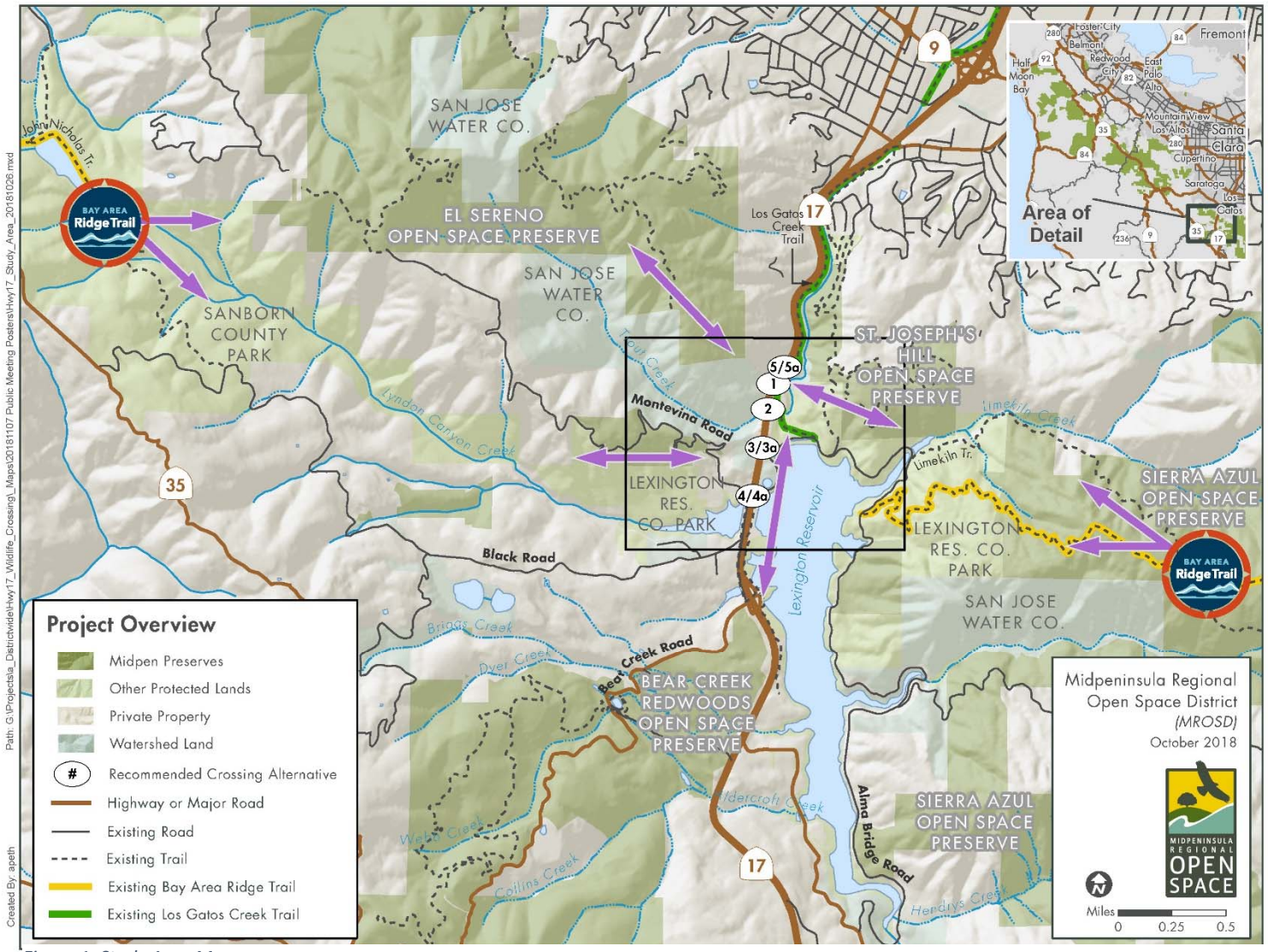

Figure 1: Study Area Map

2. Background Documents

2.1. Related Plans, Studies and Projects – Wildlife Crossing

2.1.1. California State Wildlife Action Plan

The California State Wildlife Action Plan is the California Department of Fish and Wildlife's (CDFW) plan for "conserving California wildlife resources while responding to environmental challenges." It contains a vision for wildlife conservation in California, statewide goals, and conservation targets and strategies.

2.1.2. Safeguarding California Plan

The Safeguarding California Plan is the California Natural Resource Agency's plan for adapting to climate change impacts on the built and natural environments. It is a roadmap for how state agencies should prepare for climate change impacts, including on biodiversity and habitat.

2.1.3. Caltrans District 5 Wildlife Corridor Studies

Caltrans recently conducted a review of major wildlife corridors that are intersected by highways in District 5 including Monterey, Santa Cruz and San Benito counties (Huber et al. 2014). This review used the following resources to identify major wildlife corridors: 1) California Essential Habitat Connectivity Database (CEHC; Spencer et al. 2010), 2) Regional Wildlife Corridor and Habitat Connectivity Plan for the Central Coast (Huber et al. 2014), 3) research conducted by non-governmental organizations and other research projects. These resources acknowledged the importance of Highway 17 as a potential barrier to wildlife movement in the area. The study by Huber et al. (2014) identified important locations for maintaining important wildlife habitat linkages in District 5.

Although it doesn't cover Santa Clara County, where the current study is located within Bay Area-centered Caltrans District 4, the Caltrans District 5 Wildlife Corridor Study is relevant in the context of regional wildlife connectivity studies and projects.

2.1.4. Critical Linkages: Bay Area & Beyond Report

The Bay Area Open Space Council is a unique non-profit organization that is a network of 65 nonprofits and public agencies (including Midpen) in the San Francisco Bay Area. Collectively these partners maintain thousands of miles of trails, steward over 1 million acres of publicly accessible parks and protected wildlife habitat and agricultural land, and support local healthy food production. Between 2006 and 2011 the Bay Area Open Space Council partnered with 125 regional experts to develop the Conservation Lands Network as a tool for conservation practitioners, landowners, land managers, policy makers and the public. The Conservation Lands Network (CLN) is a collaborative, science-based effort to conserve the habitats that comprise the most essential lands needed to sustain the biodiversity of the San Francisco Bay Area.

The *Critical Linkages: Bay Area & Beyond Report* [1] is the result of the CLN's efforts developing linkage designs for several priority landscape linkages whose protection is crucial to maintaining ecological and

[1] Penrod, K., P. E. Garding, C. Paulman, P. Beier, S. Weiss, N. Schaefer, R. Branciforte and K. Gaffney. 2013. Critical Linkages: Bay Area & Beyond. Produced by Science & Collaboration for Connected Wildlands, Fair Oaks, CA

evolutionary processes throughout the region. The goal is to secure functional connections between existing wildlands to maintain landscape-level ecosystem processes, including movements of such wide-ranging species as mountain lion (*Puma concolor*) and American badger (*Taxidea taxus*). The linkage conservation plan generated by this project was based on computer data analysis and field work that evaluate the habitat suitability and movement needs of the selected focal species. This delineated the best potential movement routes between targeted areas and addressed whether suitable habitat occurs in large enough patches to support viable populations and whether those patches are close enough together to allow for inter-patch dispersal. A crucial element of each linkage design is a set of recommendations to mitigate barriers, restore habitats, and manage the linkage. The authors conducted field surveys to ground-truth existing habitat conditions, document existing barriers and potential passageways, and describe restoration and management opportunities. Because paved roads often present the most formidable potential barriers, data was gathered on all types of potential crossing structures, areas where crossing structures could be improved or installed, and opportunities to restore vegetation to improve road crossings and minimize roadkills. This report identifies the need for a wildlife travel corridor in Caltrans District 4 at the Lexington study site, and shows the importance of this connection in the context of regional wildlife habitat protection. Figure 2, excerpted from the report, shows the habitat linkages in the Santa Cruz Mountains that focus on the area around Lexington Reservoir.

www.scwildlands.org in collaboration with the Bay Area Open Space Council's Conservation Lands Network www.BayAreaLands.org.

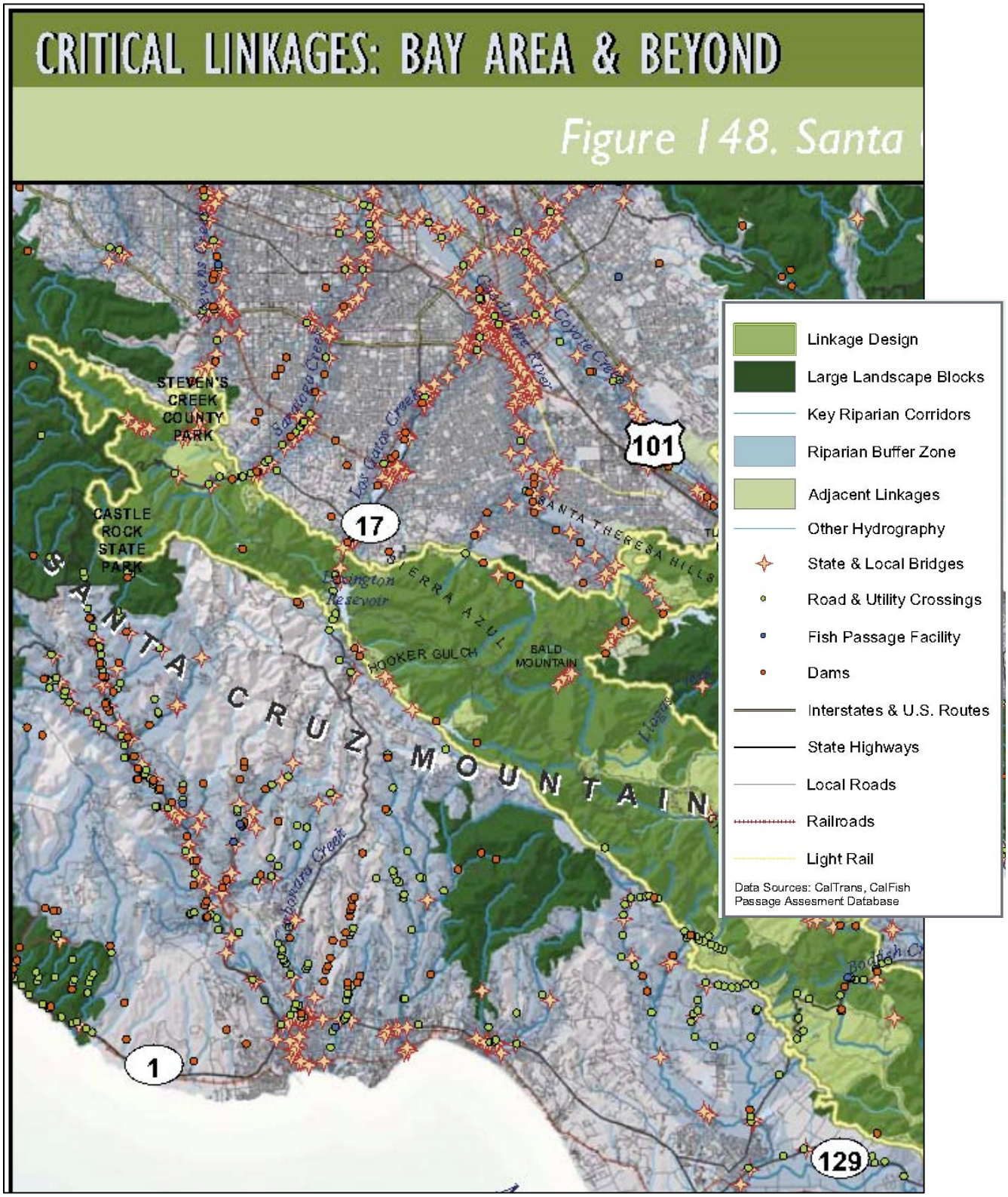

Figure 2: Habitat Corridors in the Santa Cruz Mountains from the Critical Linkages Report

2.1.5. Pathways for Wildlife Lexington Study

Pathways for Wildlife (PfW) was hired by Midpen in 2012 to study existing wildlife crossings opportunities and constraints within the Study Area. In 2014 under a cost share agreement, Midpen, the Santa Cruz Land Trust, and Peninsula Open Space Trust hired PfW to identify road kill hot spots along the entire Highway 17 corridor to identify the best locations for wildlife crossing structures in both Santa Clara County (District 4 Caltrans) and Santa Cruz County (District 5 Caltrans). In September 2013, PfW compiled data on the location of mountain lion road-kills and cross-highway movements (via UCSC telemetry data) and collected movement data using camera traps at four existing culverts within the Lexington study area. The 2014-2017 PfW reports identified hotspot locations and the limitations of existing culverts within the Study Area and concluded that the Trout Creek Canyon as the best existing culvert location to improve for wildlife crossing within Caltrans District 4.

2.1.6. UCSC Puma Project

Long-term research of mountain lions (or puma) in the Santa Cruz Mountains began in 2008 at the University of California Santa Cruz (UCSC). This project strives to better understand the impacts of habitat fragmentation (roads, housing developments etc.) on mountain lion behavior and movement. The study has documented mountain lions both successfully and unsuccessfully crossing Highway 17 within the project area (Wilmers et al. 2013). Habitat Connectivity analysis completed by the UCSC Puma Project indicates that the area to the north of Lexington Reservoir and south of the Town of Los Gatos is a critical connection for mountain lions within the Santa Clara County portion of Highway 17.

2.1.7. Laurel Curve Wildlife Crossing Project

Laurel Curve is located on Highway 17 approximately five miles south of the Lexington Reservoir dam. Due to mountainous terrain and large traffic volumes (55,000 annual average vehicles per day) collision rates are significantly above average along Highway 17 near Laurel Road. This 4-lane divided highway has a narrow median and concrete median barrier similar to the Lexington study area.

The Laurel Curve wildlife crossing project was initiated by the private non-profit Land Trust of Santa Cruz County (LTSCC) in 2012. LTSCC's 2011 Conservation Blueprint identified protecting land in this key wildlife corridor and providing safe passage for wildlife across the highway as critical to the long-term survival of the county's mountain lion population. LTSCC partnered with Chris Wilmers, who heads the UCSC Puma Project and Caltrans District 5 (Santa Cruz County is in Caltrans District 5, which is headquartered in San Luis Obispo, while Santa Clara County is in Caltrans District 4, headquartered in Oakland).

The UCSC Puma Project and PfW have documented multiple road-kill animals on Highway 17 at Laurel Curve, thus underscoring the need for improved wildlife passage at this location. Both the Laurel Curve and the Lexington Dam locations within the overall Highway 17 corridor have underlying conditions which make them unsafe for wildlife passage and motor vehicles (due to potential collision with wildlife). The Laurel Curve Wildlife Crossing project is an important complement to the planned Lexington Reservoir crossing; both are needed to address major "hot spots" within their respective counties for lion, deer and other animal mortality, and to ensure the long-term survival of the regional mountain lion population. While both projects are beneficial, the implementation of one project does not preclude the need for the other. A separate project to address wildlife concerns at Laurel Curve is underway through District 5 Caltrans. Only together will both projects be most effective.

The purpose of the project is to examine two design options to construct a wildlife crossing under Route 17 at Laurel Road (between Post Mile [PM] 9.4 and PM 9.6) in order to enhance the safe movement of wildlife (primarily mountain lions) and improve traffic safety. The Laurel Road area was determined to be the highest priority location out of four high priority habitat linkages identified by Huber et al. (2014) within District 5 Caltrans.

A Project Study Report (PSR) was completed by Caltrans District 5 in June 2015. Design Option 1 is a 12' high x 16'wide x 125' long concrete box culvert. Design Option 2 is a single span bridge 60' long and 84' in width. This option would provide an undercrossing with a natural bottom that is 16' wide and 12' in height. The width is limited by the existing infrastructure for both options. The total cost is estimated at $8 million and construction is projected to begin in 2021.

Coyote Valley Landscape Linkage: A Vision for a Resilient, Multibenefit Landscape

In December 2017, the Santa Clara Open Space Authority in conjunction with the Conservation Biology Institute released the Coyote Valley Landscape Linkage report. This report "articulates a vision to protect and restore essential areas within Coyote Valley [south of San Jose and north of Morgan Hill California] that are vital to ensure ecological connectivity, health and resilience to a changing climate." The report notes the biological values of Coyote Valley but also identifies the need for local and statewide wildlife infrastructure investment at both the regional and the state level to protect wildlife connectivity values. The report identifies that: "At a regional scale, the long-term success of wildlife passage infrastructure investments within the Santa Cruz Mountains, at Highway 17, are directly tied to future conservation actions in Coyote Valley as ultimately species need to travel not only within the Santa Cruz Mountains but also to and from the Diablo and Gabilan ranges."

2.2. Related Plans, Studies and Projects – Trail Crossing

Town of Los Gatos Bicycle and Pedestrian Master Plan

The Town of Los Gatos completed the first Bicycle and Pedestrian Master Plan (Master Plan), in March 2017. The Master Plan addresses regional trails, including the Los Gatos Creek Trail that runs 10 miles from central San Jose through Los Gatos to Lexington Reservoir. Though the crossing Study Area is outside the Town limits, the potential crossing would be very desirable to improve regional bicycle and pedestrian access opportunities from the Town.

Bay Area Ridge Trail

The Ridge Trail Council publishes maps of the completed and dedicated Ridge Trail alignments and works with local agencies on the alignment or design of the future Ridge Trail. The Ridge Trail Council has published 'guidelines' regarding the physical nature of the trail alignment that include:

- Locating as much as possible along the first prominent ridge above the Bay;
- Trail located to provide Bay views, if possible;
- Preference for natural surface tread;
- Tread width from 18 in. to 20 ft. (depending on setting and opportunities);
- On private lands, locating as near as possible to property boundaries.

These guidelines are subject to individual landowner and agency review, and generally the Ridge Trail Council defers to land managers' policies on specifics of individual trail locations and characteristics. In

this case the primary partners have been Santa Clara County Parks and Midpen. Within the study area, the Ridge Trail Council has expressed interest in a single track trail.

Santa Clara County General Plan Countywide Trails Master Plan

The *Santa Clara County Countywide Trails Master Plan* Report and Map provides information about regional trails that the Board of Supervisors adopted as part of the County General Plan, including the Ridge Trail. It includes design guidelines for trail width, vertical clearances and slopes for regional multi-use trails within Santa Clara County. The type of unpaved "single track" trail sought by the Ridge Trail Council is included in the Design Guidelines.

The *Sanborn County Park Trails Master* Plan shows a potential connection from that County Park west of Highway 17 through the El Sereno Open Space Preserve across Trout Creek that could lead to a potential Highway 17 crossing.

Juan Bautista de Anza National Historic Trail

In 1775-76 Spanish Lt. Colonel Juan Bautista de Anza led more than 240 men, women and children on an overland journey across the frontier of New Spain from what is now Nogales, Arizona to the first European settlement in the San Francisco Bay Area. The 1,200-mile Juan Bautista de Anza National Historic Trail commemorates, protects, marks, and interprets the route traveled by Anza and the colonists. It was designated a National Historic Trail by Congress in 1990 through an amendment to the National Trails System Act (16 U.S.C. 1241-51) and is administered by the National Park Service. In the vicinity of Lexington Reservoir the Anza Trail "recreational route" is shown as coinciding with the Bay Area Ridge Trail. The National Park Service does not have specific design standards for the trail, which is typically designated on routes developed by others, but prefers trails having views into the San Francisco Bay Area. The "recreational retrace" of the historic trail generally shares an alignment with the Bay Area Ridge Trail in the vicinity of Lexington Reservoir.

Bear Creek Redwoods Open Space Preserve Master Plan

This 1,432-acre Preserve adjoins Highway 17 to the west of Lexington Reservoir offers visitors shaded fir and redwood forests, cool perennial creeks, and spectacular views of the Sierra Azul Range. There is an existing private stable in the northeast corner of the preserve, and an extensive trail system that is currently open only on a permit basis. Midpen is in the process of designing an improved and expanded parking area, trail crossing of Bear Creek Road, and trails that will connect south up the ridge to Highway 35/Skyline Boulevard (see Figure 3). When Bear Creek Redwoods is fully improved and opened it will add a significant new destination and trail connections that will increase the demand for a more direct trail connection across Highway 17 to access surrounding open space and trails opportunities. The portion west of Bear Creek Road is scheduled to open in 2019.

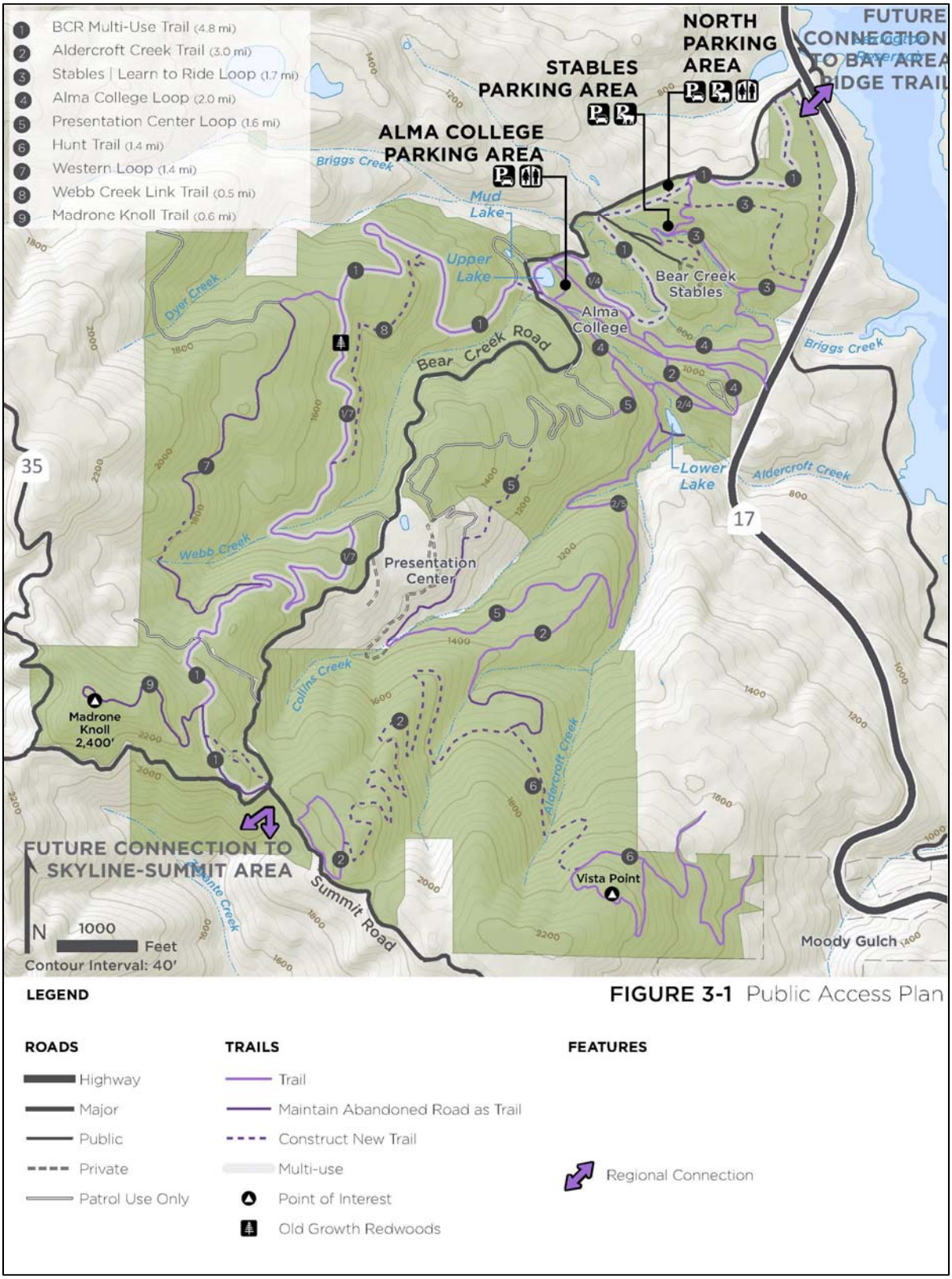

Figure 3: Bear Creek Redwoods OSP Preliminary Public Access Plan

Safe on 17 Task Force

Led by the California Highway Patrol (CHP), the "Safe on 17" Task Force was formed in 1999 to address high collision rates on this stretch of road. Since its founding, the Task Force has seen a 49 percent average reduction in major injury and fatality collisions. The Task Force brings together key stakeholders who implement aggressive strategies in enforcement, engineering, education, and emergency services to prevent collisions and reduce their severity. Members consist of representatives from: the Santa Cruz and San Jose California CHP Areas; Caltrans Districts 4 and 5; the Santa Clara Valley Transportation Authority (VTA); the Metropolitan Transportation Commission (MTC); Santa Cruz County Regional Transportation Commission; and local legislators, media, and emergency services providers. It meets twice each year to leverage resources and share new ideas for continued safety improvements.

3. Deficiencies in Crossing Opportunities

This section synthesizes information collected from prior studies to clarify selection of the region from Lexington Reservoir to Los Gatos as the priority area for which to designate and construct wildlife and recreational trail crossings of Highway 17 within Santa Clara County (District 4 Caltrans).

3.1. Wildlife/Traffic Conflict

The Pathways for Wildlife Study details the factors that cause mountain lions to cross Highway 17. The Executive Summary states:

> The Santa Cruz Mountain lion population is considered an important source population, in which there are documented breeding individuals producing juveniles that will need to disperse out of their parental home range to find their own (Wilmers et al. 2013). Currently, there are approximately 50-70 mountain lions present in the mountain range (Wilmers pers. comm. 2015). The home ranges of mountain lions in the Santa Cruz Mountains have been found to be approximately 160 km² for males and 60 km² for females (UCSC Puma Project). Dispersing juveniles must often travel far out of their parental home range, while avoiding established adult male territories, and often must travel through a fragmented landscape that includes a matrix of roads and highways (Gehrt et al., Urban Carnivores 2010).
>
> The Santa Cruz Mountains are becoming increasingly isolated by habitat fragmentation, which is making it more difficult for mountain lions to travel in and out of the mountain range. This is a problem which could lead to genetic isolation if new individuals are unable to immigrate into the population (Beier 1993 & 1995).
>
> Experts found that there needs to be at least one new individual immigrating into a population each year to maintain a genetically healthy population (Beier 1993). A recent study by the Santa Cruz Puma Project has documented that the Santa Cruz mountain lion population has a low genetic diversity (Wilmers pers. comm. 2014). Each year, over the past nine years, there are one or more documented mountain lion fatalities due to vehicle collisions on Highway 17, which could be contributing to the low genetic diversity status of the puma population.
>
> Additionally, data collected between 2000 and 2017 indicated that there were a total of 153 animals killed by vehicle collisions in the study area, including many small to medium mammals,

as well as mountain lion and deer , indicating that a significant motorist safety issue also exists in this section of Highway 17. [2]

3.1.1. Wildlife Road-Kill Data Summary

Road-kill data collected by Caltrans between 2000 and 2010 were summarized in the PfW report, in addition to PfW weekly road-kill surveys since late 2013 (see Figure 4). In the last 11 years, eleven mountains lions have been hit by vehicles in Santa Clara County, 7 of these moralities have been within the Lexington study area. Figure 5 shows Lexington area mountain lion crossing data from the UCSC Puma Project combined with road kill data from 2007 through 2017. On average there has been at least one mountain lion killed per year on Highway 17 in the Lexington Reservoir area. A recent Hot Spot GIS analysis with the roadkill data in Coyote Valley provides a statistically significant result that Trout Creek and Ravine Creel are the Hot Spots on the highway for animal-vehicle collisions. The result is shown on Figure 6.

3.1.2. Cross-Highway 17 Movement

Based on tracking of collared lions the UCSC Puma Project found that the area north of Lexington Reservoir up to Los Gatos is a “hot spot” for mountain lion crossings (see Figure 5, reproduced from the UCSC Puma Project report [3] and the Pathways for Wildlife Study). Deer are the mountain lion’s primary prey, with a habitat that overlays that of the lions. Deer also seek to cross Highway 17 and are regularly killed in the attempt, endangering drivers in the process. Countless smaller animals – bobcats, skunks, raccoons, possums, as well as reptiles and amphibians and domestic animals are also killed on the highway, and often create safety hazards through their attempts to cross.

UCSC Puma Project telemetry data shows that two radio-collared mountain lions (1 male [M26], 1 female [F11]) have crossed Highway 17 in the study area. M26 has crossed somewhere between Alma Bridge and Trout Creek, while F11 has crossed in proximity to the Trout Creek culvert, as shown in Figure 5 (in the figure lines are approximate; used to connect two data points on opposite sides of the highway, while the actual location of the crossing is unknown). The location of three mountain lion road-kills coincides with the crossing location of F11. A large proportion of mountain lion road-kills have occurred near Trout Creek and its associated ravine. This suggests that mountain lions will continue to try to cross Highway 17 in this area.

3.1.3. Camera Study

PfW has monitored wildlife activity within and adjacent to three existing culverts in the Lexington study area (Lexington, Trout Creek, Ravine Creek; Pathways for Wildlife 2016). A total of 1820 camera events were taken of wildlife at four camera stations (two located at the Trout Creek culvert). A single mountain lion was detected only one time in the study area at the Trout Creek culvert entrance, but it did not pass through. For all other wildlife species, the Lexington culvert had the highest average number of detections per month (n=50), while Trout Creek (northbound) had 19 per month, southbound Trout Creek 0.5 per month, and Ravine Culvert 0.9 per month.

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[2] *Highway 17 Wildlife Connectivity Project: Lexington Study Area*, Pathways for Wildlife, February 2016.

[3] Wilmers CC, Wang Y, Nickel B, Houghtaling P, Shakeri Y, et al. (2013) Scale Dependent Behavioral Responses to Human Development by a Large Predator, the Puma. PLoS ONE 8(4): e60590. doi:10.1371/journal.pone.0060590

3.1.4. Wildlife Crossing Hot-Spots

Pathways for Wildlife recently ran a GIS-based analysis of the entire span of animal-vehicle collision data from Los Gatos to Scotts Valley. and Trout Creek (see Figure 6). The darker red the colors appear, the more statistically significant the correlation is between wildlife movement and the specific location of crossing attempts. This shows that Trout Creek Culvert and Ravine Culvert are at the center of the "hot spot" for attempted wildlife crossings of Highway 17.

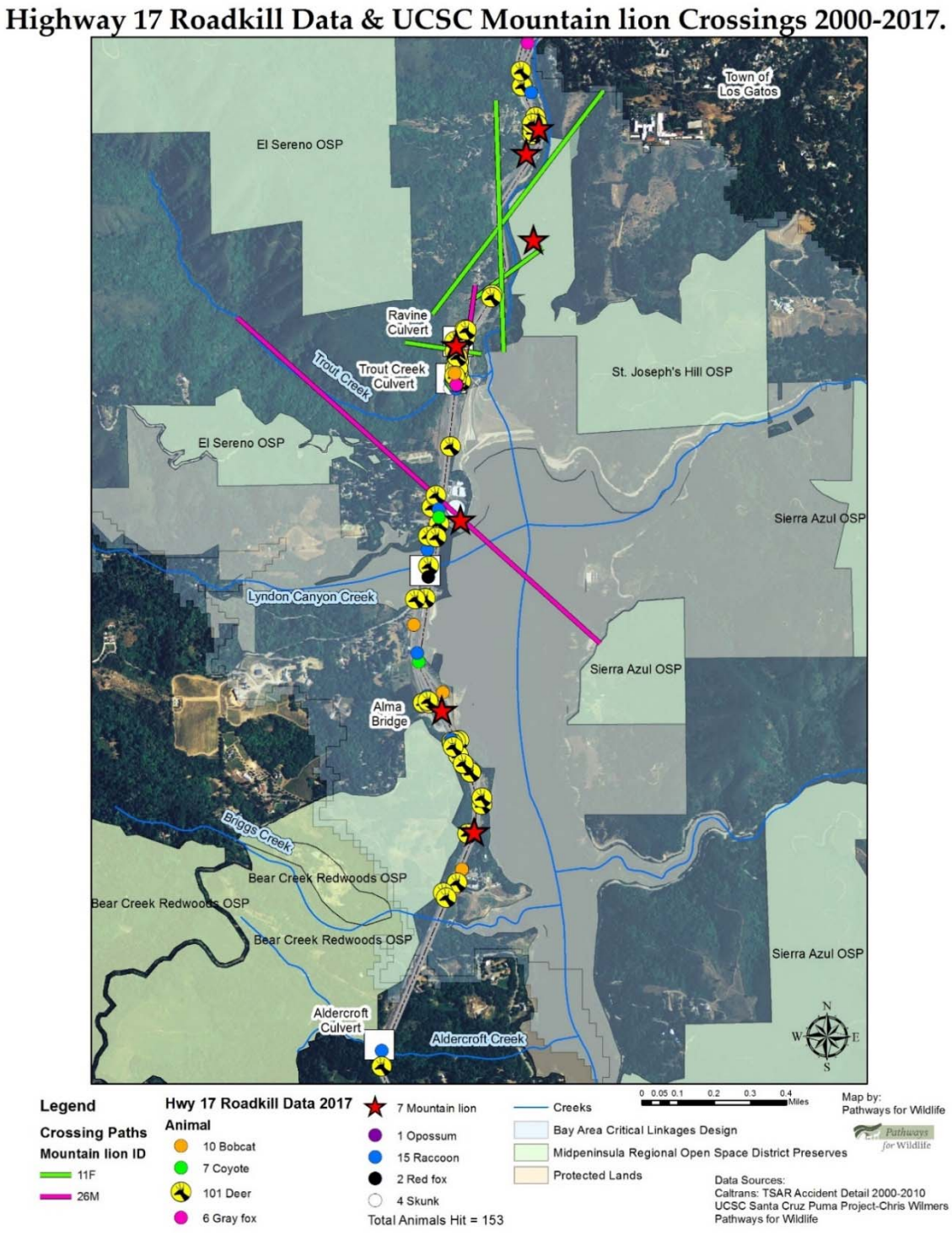


Figure 4: Mountain Lion Crossings and Roadkill Data

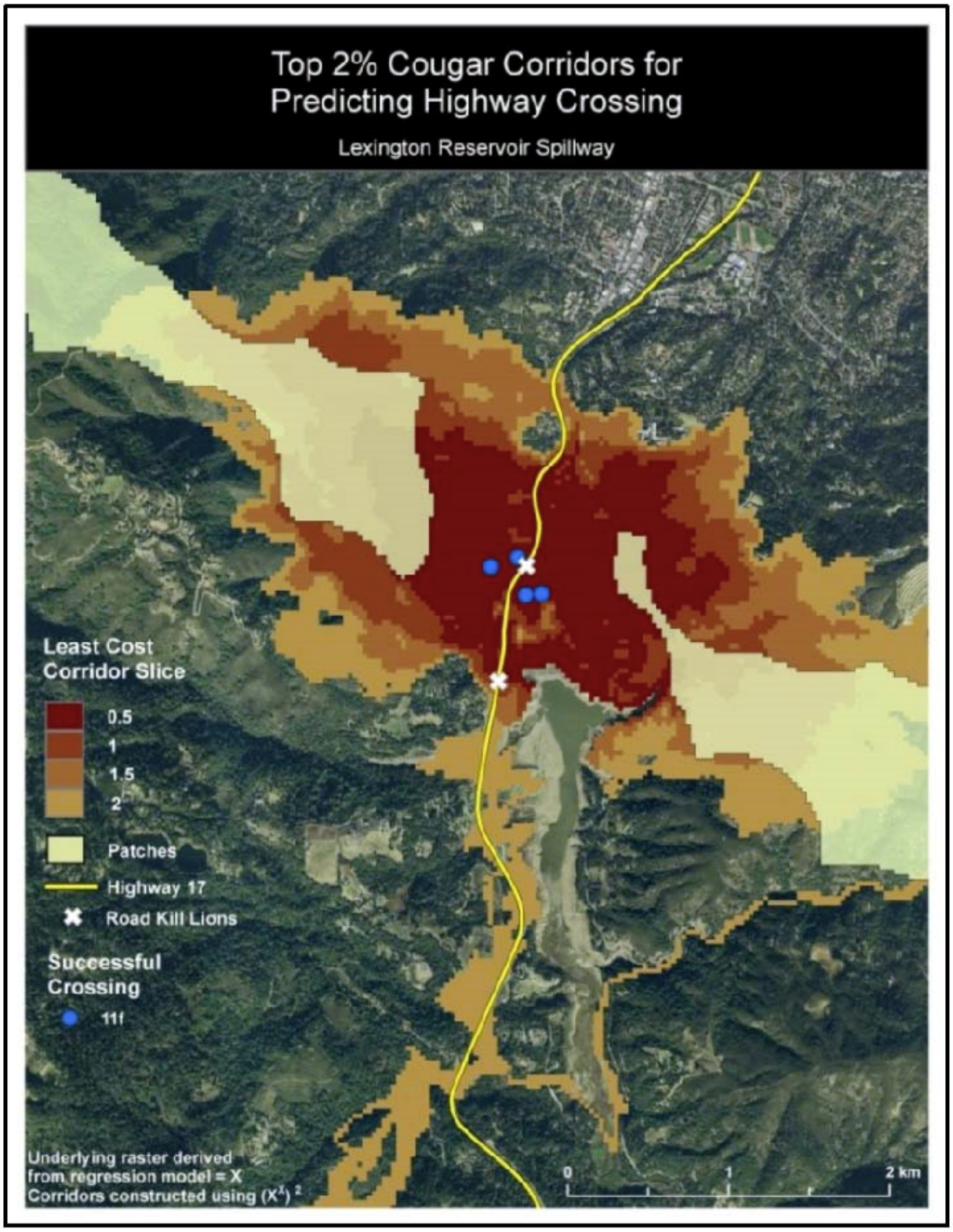


Figure 5: Top 2% Cougar Corridors for Predicting Highway Crossings (from UCSC Puma Project Report)

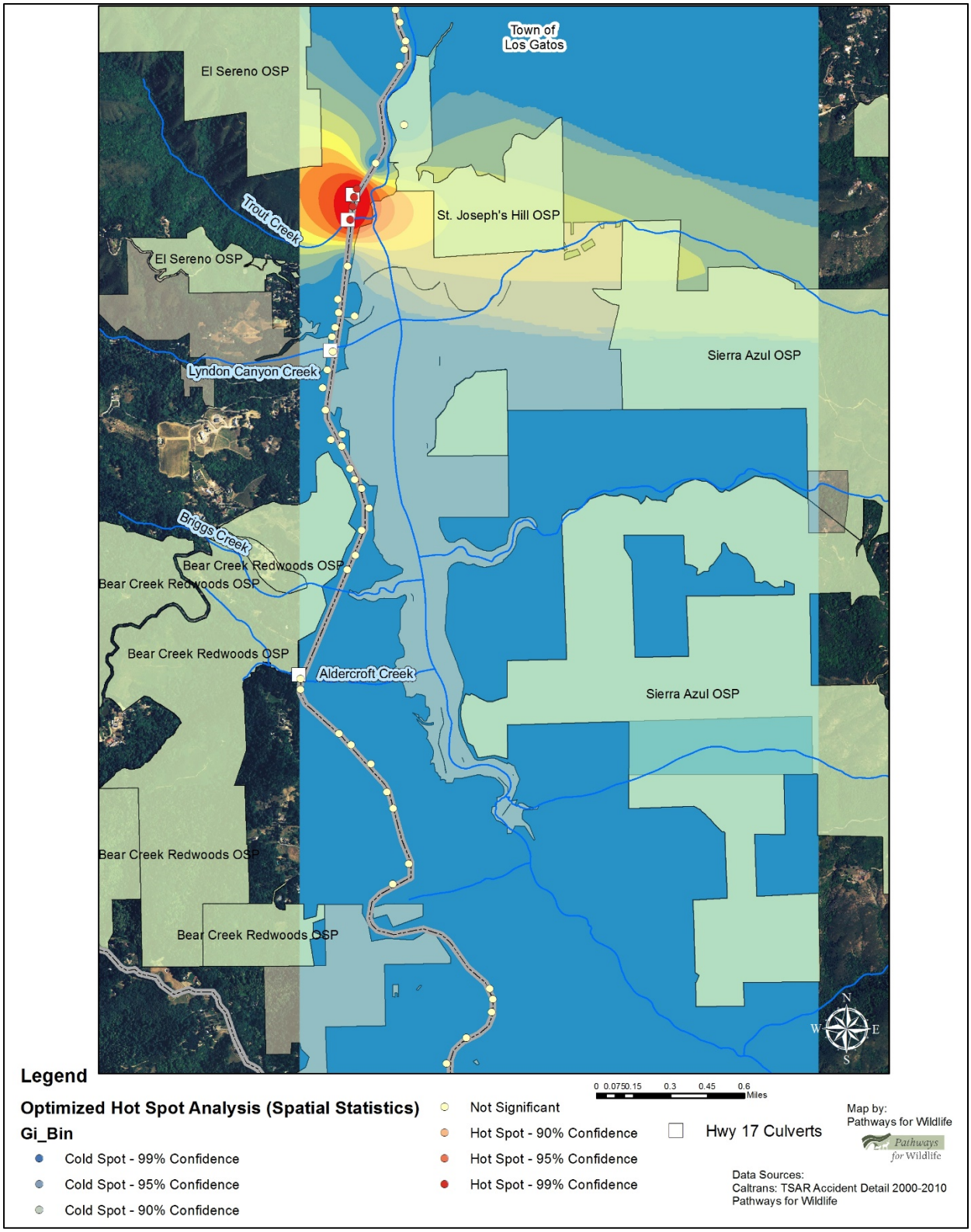


Figure 6: Optimized Hot Spot Analysis with Highway 17 Animal-Vehicle Collision Data

4. Conditions and Objectives for Design

The Preliminary Alternatives Study for the wildlife and trail crossings seeks to review all options and identify preferred options based on a sound set of criteria reflecting all the important conditions, objectives and considerations.

4.1. Conditions, Considerations and Objectives

This section reviews the several categories of requirements and objectives that will influence the design and selection of a feasible wildlife or multi-use trail crossing.

4.1.1. Wildlife Crossings

Data obtained from the PfW monitoring and UCSC mountain lion research in the Highway 17 corridor collectively is an important resource and field data to identify key areas for cross-highway movements and the suitability of existing below-grade passages (culverts).

Although Highway 17 is a formidable barrier to wildlife movement, mountain lions are crossing the highway and two mountain lions have been documented crossing the highway a half dozen times. A female radio-collared mountain lion has crossed four times in the vicinity of the Trout Creek ravine. Three mountain lions have been killed while crossing Highway 17 in close proximity to Trout Creek Canyon. The Trout Creek area is a recognized hot spot for mountain lion mortalities on Highway 17.

Camera monitoring of three culverts under Highway 17 in the Lexington study area revealed that 1) many wildlife species approach the culverts, 2) some culverts are rarely or never used, 3) documented passage use is primarily by common, generalist mammals (raccoon, fox, bobcat, opossum, skunk), 4) deer have not used any of the culverts, and 5) a mountain lion was detected only once in the study area, at the entrance to the Trout Creek culvert, but did not pass through.

Design parameters for effective wildlife crossings for the target species (mountain lion and deer) as well as accommodations for special status species are summarized below. Incorporation of these design considerations/features (as appropriate) is of upmost importance to optimize use of the structures by the target species as well as by special status species.

Example of wildlife undercrossing in Banff N.P. Alberta; Photo – Transwild Alliance.org

Objectives

Wildlife crossing mitigation has two main objectives: 1) to connect habitats and wildlife populations and 2) reduce mortality of wildlife on roads. To achieve this goal, wildlife crossings are designed to allow movement of wildlife above or below roads, either exclusively for wildlife use, mixed wildlife–human use, or as part of other infrastructure, e.g., creeks, canals. Wildlife crossings range in shape and size, depending on their specific objective (Clevenger and Huijser 2011).

The correct location of wildlife crossings is equally important as design. The design of the crossing structure must meet the habitat and behavior needs of the focal species- for this project mountain lion and deer. Other factors that influence design and location are the physical constraints of the site, e.g., soil, terrain, hydrology, available material, and budget.

Planning

The core principles in planning the location and design of wildlife crossings include: 1) locate crossings where movements and mortality occur on roads; 2) the habitat surrounding planned crossings should be secured and long-term commitment in place to keep as suitable habitat for wildlife movement; 3) crossing structures must connect to a larger regional corridor network, and 4) terrain and topography at site are conducive to construction.

Design

While mountain lion and deer are the target species for this project, any mitigation designed for these species will serve to reduce road-kill and increase highway permeability for a variety of other local wildlife, including raccoons, bobcats and foxes.

The specific design parameters for wildlife crossings for mountain lions must be in or close proximity to high quality mountain lion habitat, which consists of natural forest/shrub cover and areas of low human/housing density (Wilmers et al. 2013). The minimum dimensions of wildlife crossings for mountain lions is 4m high and 7m wide (13’ x 23’; Clevenger and Huijser 2011).

Example of wildlife undercrossing under construction in Banff N.P. Alberta

Seventeen years of continuous monitoring of 40 wildlife crossings in Banff National Park, Alberta Canada suggests that mountain lions used nearly all structures (under and overpasses). Initially lions strongly preferred underpasses, but towards the end of the study [4] there was more overpass use. This could be due to the overpass habitat maturing into a thick vegetative cover (preferred habitat) over time, compared to the newly built overpass that lacked vegetative cover. Vegetative cover is important for mountain lion use of wildlife crossings and travel (Clevenger and Waltho 2000, 2005; Kertson et al. 2011, Wilmers et al. 2013). Mountain lions used 4m x 7m (13’ x 23’) elliptical culverts regularly. Many of those culverts were 57 - 64 m (187’ – 210’) in length.

[4] Clevenger, A.P., M. Barrueto. 2014. Trans-Canada Highway Wildlife and Monitoring Research, Final Report. Part B: Research. Report to Parks Canada Agency, Radium Hot Springs, British Columbia, Canada.

Special Status Species

A secondary objective for the wildlife crossing is to accommodate special status species that may be present in the vicinity, if possible. A search of the California Natural Diversity Data Base (CNDDB – see Figure 8) shows that western pond turtle, California giant salamander, Santa Cruz Black salamander, and California red legged frog are the likely special status animal species that might use the crossing(s). Bats might also use an undercrossing as a roosting location if properly designed. Semi-aquatic species benefit when there is a continuous and relatively level path of travel and associated riparian habitat. This includes California newt migrations to and from Los Gatos Creek, Lexington Reservoir and the surrounding areas.

A wildlife crossing at Ravine Creek or Trout Creek would provide opportunities for special status species and other aquatic species in main stem Los Gatos creek to access upper reaches of tributary drainages west of Highway 17 that are currently inaccessible to them without crossing the highway. Lexington Culvert also offers good potential to accommodate aquatic species, and smaller mammals, which reinforces the value of potential improvements at that culvert, even if it is not a viable alternative for the target species of deer and mountain lions.

Example of fencing to direct small animals to a wildlife crossing in the Netherlands

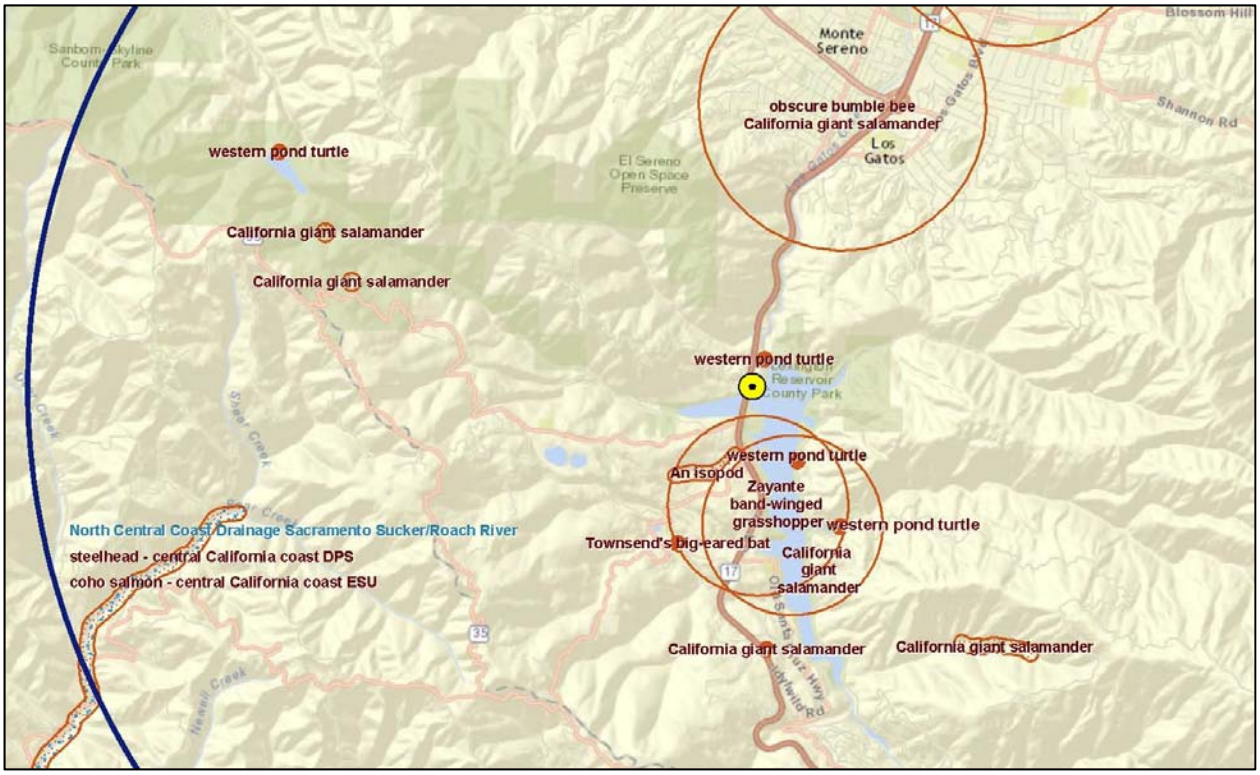


Figure 7: California Natural Diversity Data Base Map for Lexington Area

Herp (amphibian and reptile) crossing under construction - Waterton National Park, Alberta, Canada

Human Use and Maintenance

Wildlife crossings require human use management and maintenance for them to be functional over their life span (generally 70-80 years). Human use and habitation of wildlife crossing structures should be discouraged, including the use of dogs (Lenth et al. 2008). Associated fencing and jump-outs must be intact at all times for the crossing to be effective and mitigation to perform successfully.

Enhancement Features (Natural Materials)

- *Vegetation planting/clearing*: An important part of wildlife crossing design and function. Vegetation may be cleared to provide greater visibility around crossing structure entrances. Planting vegetation results in important cover for species that require cover for travel and crossing structure use.
  Natural surface: Can facilitate animals to use a crossing structures and hasten familiarity and use.
- *Baiting*: Similar to trail creation, placement of baits or dragging baits through crossing structures has hastened familiarity and use of crossings.

Enhancement Features (Artificial Materials)

- *Fencing*. Used to keep wildlife off of highway right-of-ways and funnel movements to wildlife crossings.
- *Jump*-out/*Escape ramp:* Placed within the fence line, jump-outs are used to allow animals to safely exit on their own the highway right-of-way.
- *Rip-rap:* Used to create artificial walkways above high-water mark in large creek bridge structures.
- *Elevated shelving:* Can be placed within culverts that regularly flood. Shelving is intended for small and medium-sized wildlife that may not use flooded crossing structures.
- *Elevated shelving:* Intended for small and medium-sized wildlife.

Example of directional/exclusion fencing – wire at top is to help deflect falling branches

Example of wildlife "jump out" to allow escape from highway

Siting and design criteria for functional wildlife crossings are included in Table 1 presented in the following pages. The wildlife crossing criteria reflect consideration of the following data:

- Road mortality location (Caltrans/PfW data): Provides clear information on where unsuccessful crossing attempts take place.
- Movement corridor (UCSC data): Provides unequivocal data on the location of where successful mountain lion crossings take place.
- Design/dimensions existing culvert: Existing passages must meet the minimum design requirements of the focal species (see Section 5.1).
- Habitat connectivity: Wildlife crossing must be in or close proximity to suitable habitat of focal species, i.e., forest/shrub cover, low density housing; low human disturbance.
- Focal species potential use (PfW data): Provides evidence of approach to but not use of existing culverts in study area.
- Line of sight: Being able to see through a culvert to appropriate habitat on the opposite side is a perquisite for use by many species of wildlife, in particular mountain lions (Foster and Humphrey 1995, Beier 1995).

4.1.2. Highway Design and Construction

Structural and Civil Approach

The feasibility of modifications to the existing culverts located within the project study area to better accommodate wildlife crossings was investigated. This included the evaluation of the existing culvert sites, took into account the observable physical conditions of the existing structures, and considered the requirements of successful wildlife movement patterns. Also taken into account were the constructability aspects pertaining to each site for possible modification of the culverts, including culvert material type, hydrological requirements, site constraints, construction equipment access, geotechnical parameters, height of fill/cover requirements, and other construction considerations that pertain to modifications to either existing structures or construction of new structures. These include construction staging, traffic handling, and utility conflicts. Once each site and structure was evaluated, the team developed a list of possibly viable alternatives and rejected alternatives, as discussed below.

Because the crossing(s) will go under or over a state highway, compliance with California Department of Transportation (Caltrans) standards and procedures will be required. The crossing(s) will require, at a minimum, an encroachment permit from Caltrans which will ensure that they are built to standards and Temporary Construction Easements (TCE's) that define the limits of construction and construction access and staging. The encroachment permit will require an operation and maintenance agreement to resolve who will be responsible for the structures and the associated operation and maintenance arrangements.

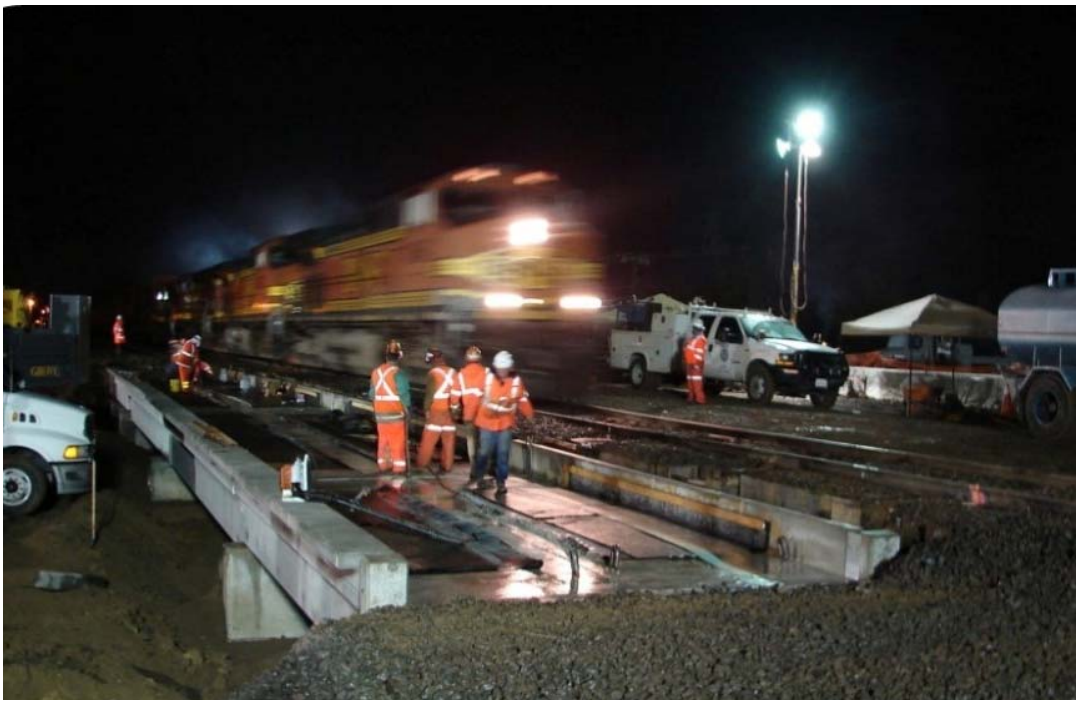
Highway Crossing Design and Construction Standards

The design of any structure must meet Caltrans standards contained in the Highway Design Manual and the procedures outlined in the American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance factor Design (LRFD) Bridge Design Specifications, most current edition, as modified by the California Amendments, as well as the current edition of the AASHTO LRFD Guide Specifications for the Design of Pedestrian Bridges in the case of an overcrossing. The seismic design must be in accordance with the most current version of the Caltrans Seismic Design Criteria.

Caltrans' primary objective is to maintain a functional highway. Highway 17 is a heavily travelled commute route with approximately 72,000 vehicles per average day within the project study area. There is no feasible detour route for construction for any of the alternatives. It would not be feasible to close any lanes during the daytime; only during late night hours could one direction and/or the other be narrowed to one lane to allow for construction. There is no center median in the entire Study Area – only a concrete barrier between the northbound and southbound lanes.

Recommended Undercrossing Construction Method

Based on feedback from Caltrans District 4 engineers (J. Peterson and J. Sikand, Caltrans District 4 Hydrology, oral communication, March 2016), the most feasible construction method for a crossing under Highway 17, given the construction staging and traffic control constraints, is to first construct piles (by drilling and then filing) gradually across the roadway surface during rolling lane closures at night that would maintain traffic access in each direction along Highway 17. Daytime traffic can then pass over the area normally without impact. The next step would be to construct pile abutment caps that would support voided slabs (pre-fabricated plates or bridges). The voided slabs would be precast, pre-stressed elements designed to carry Highway 17 traffic. These precast slabs would be delivered to the job site ready to be placed onto the previously installed pile caps and would allow for quicker construction during night time lane closures with tight work windows. This method will minimize impacts to daytime and commuter traffic. Once this structural bridge system is in place, excavation for the undercrossing opening can then proceed from either side of Highway 17 with little to no impacts to traffic above. Caltrans District 4 is already familiar with this approach and has implemented it successfully at sites on Interstate 880 and U.S.101. Figure 7 shows night-time construction using the process described above.



BNSF / G Street Underpass Night Construction (Client: City of Merced)

Figure 8: Pile Supported Precast Slab Bridge Construction

4.1.3. Geological/Geotechnical

The site is located on the northeastern flank of the Santa Cruz Mountains. Geologically, this mountain range consists of tectonically folded and sheared, mainly metamorphic rocks that are juxtaposed along numerous inactive and fewer active faults. Collectively, most of these rocks in the site vicinity are assigned to the Franciscan Complex. Geologic mapping of McLaughlin and others (2001) provides a framework for understanding the major earth materials in the project area; this mapping is presented in Figure 8.

Major Franciscan Complex rock types in the site vicinity include: sheared sandstone and shale (map unit fms); mélange (sheared shale with isolated larger, harder rock masses; map unit fm). Overlying these are younger, non-metamorphosed, sedimentary rocks of the Santa Clara Formation (map unit QTsc), generally consisting of sandstone, mudstone, and conglomerate.

Many of the rocks in the site vicinity are at least locally weakened by faulting and folding, with the result that they are susceptible to landsliding and erosion. Large areas of landslide deposits (map unit Qls) are mapped on slopes in the project vicinity, notably near the Bear Creek Road exit from Highway 17, and southward.

Geologically recent deposits associated with the streams that formed the modern valleys are found within the axes of drainages (map unit Qt). Colluvium (surficial soils) overlies bedrock, and is generally thicker in the axes of drainages. Landsliding in the project vicinity appears to be largely confined to colluvium and the uppermost weathered rock, in contrast to regional-scale, deep-seated landslides that are common south of the Bear Creek Road interchange. Debris flow landslides involving colluvium are common throughout the entire area. These can form on sideslopes or along drainage axes, although their primary impact is along drainage axes.

Existing earthen fill forms the embankment atop which Highway 17 is constructed where the highway is bordered on two sides by portions of Lexington Reservoir.

The active San Andreas fault is mapped as passing ½ to 1 mile southwest of the site (off the geologic map). Ancient, inactive faults that are related to the area's tectonic history are mapped as separating many of the rock types.

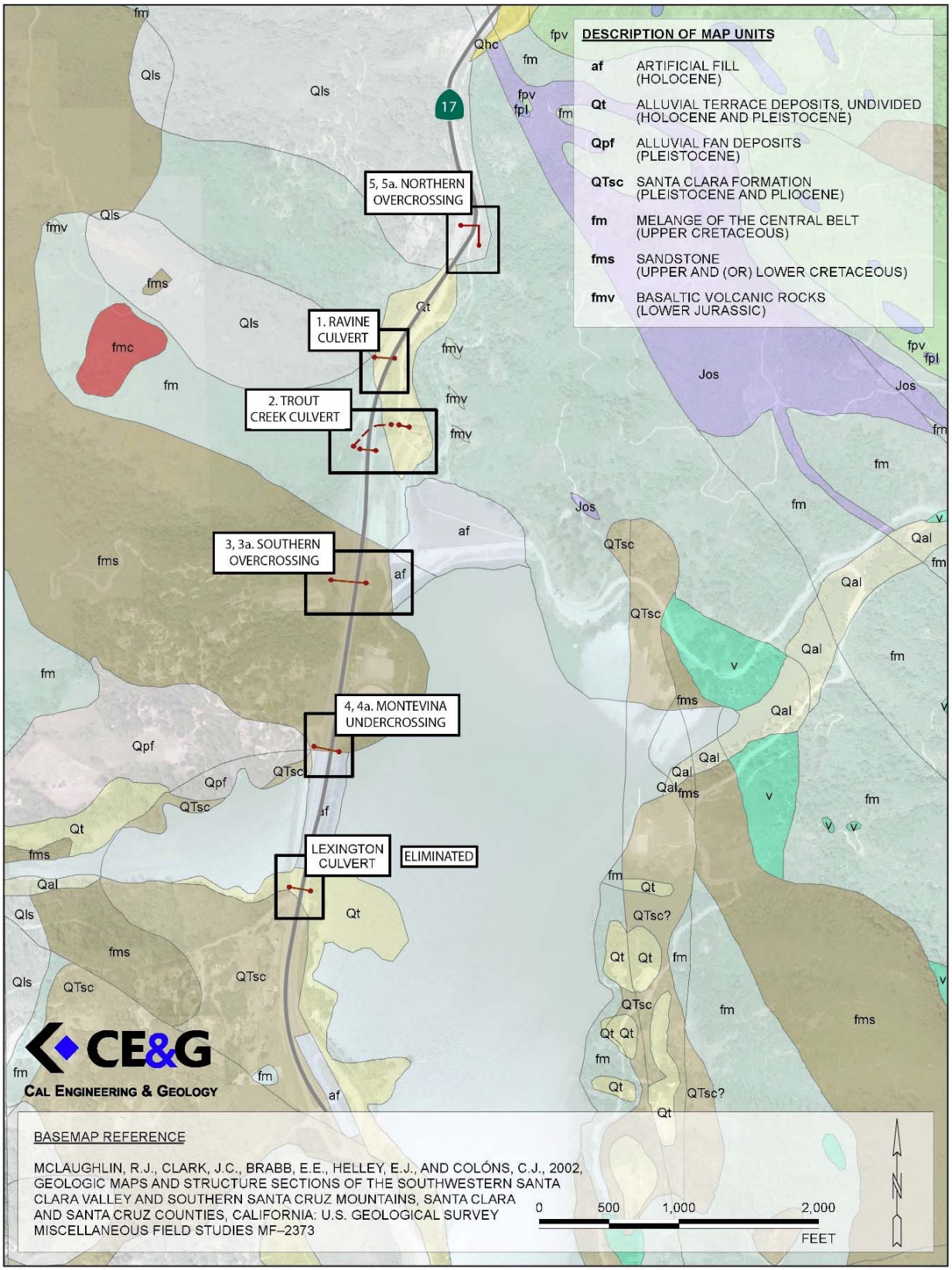


Figure 9: Study Area Geologic Map

4.1.4. Hydrologic

From a hydrologic standpoint, the various alternatives are located in the same general overall setting, with differences between them due to the idiosyncrasies of their individual watersheds and the relationship of the proposed structures to the pertinent drainage axis, as detailed in the site-specific descriptions. All existing structures carry water to varying degrees during the wet season. Trout Creek is the only location that typically flows year round, but can be dry in drought periods. All are located on the eastern (dry) side of the Santa Cruz Mountains drainage divide, and all are tributary to Los Gatos Creek.

4.1.5. Trail Crossing Design

Typically the Ridge Trail Council seeks an unpaved "single track" or road-width trail in a natural setting as close as possible to the main ridge of the mountains and hills that ring San Francisco Bay. The design objective for the Ridge Trail is typically a "back country" recreational trail – a very simple natural surface facility that in places may be quite steep – exceeding 20 – 25% gradient, but ideally closer to 10% maximum. The National Park Service staff responsible for the Anza Trail similarly works with local agencies to designate parts of their systems as the historic trail recreational retrace alternative, and are flexible on the design standard, but prefer trail alignments that favor views into the San Francisco Bay Area.

A multi-use trail undercrossing could be narrower than the wildlife crossing. Access for equestrians has the largest overall clearance requirements. A widely-used equestrian trail design guide recommends the following dimensions:

> Low vertical clearance is a potential safety hazard for riders when stock need maneuvering space. Vertical clearance for physical barriers, including bridges, underpasses, and vegetation, should extend at least 10 feet (3 meters) above the tread. Vertical clearance of 12 feet (3.6 meters) is recommended. Increasing the vertical clearance, especially on engineered structures, can be quite costly, and designers must exercise good engineering judgment.[5]

Given that bicyclists, hikers, including people with dogs, as well as horses, would be sharing a potentially limited space up to approximately 200' long with no place to "step off the trail" a multi-use undercrossing or overcrossing should have adequate width– ideally a minimum of 12' clear. The crossing should meet minimum vertical clearance recommendations - 10 feet minimum per the above guide. Santa Clara County's *Uniform Inter-jurisdictional Trail Design, Use and Management Guidelines* provide minimum trail width and vertical clearance requirements which would be applicable for regional trails such as Ridge Trail and Anza Trail segments. The Interjurisdictional Guidelines don't specifically address the contemplated undercrossing situation: an "Urban Shared Use Trail" is specified in UD-2.2.2 on P. 17 as "optimum width of 12 feet" and Figure T-1 shows 12 feet with 2' shoulders. Figure T-16 shows a Levee Trail Undercrossing with a minimum vertical clearance of 8 feet.

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1. [5] Equestrian Design Guidebook for Trails, Trailheads and Campgrounds, Jan Hancock, Federal Highway Administration, 2012.

Although accommodating Regional Trails is a primary goal for the highway crossing, it would also connect nearby park facilities and local roads and trails that are severed by Highway 17. It would be highly desirable that the trail crossing accommodate the widest feasible range of non-motorized users, including road bicycles, and people with disabilities using wheelchairs and other mobility devices. It would also be beneficial if the crossing could be accessed by at least pickup sized maintenance and emergency vehicles. Therefore the criteria for the design of non-motorized transportation facilities are also applicable to the trail crossing. Caltrans classifies such a multi-use route as a "Class I" shared use path, and provides standards in the Highway Design Manual, Chapter 1000. Basically a Class I path must be paved, at least 8 feet wide, and have a gradient of no more than 5%, except on ramps which must not exceed 8.33% and which must have level rest areas at regular intervals. Santa Clara Valley Transportation Authority (VTA) *Bicycle Technical Guidelines* encourage a minimum effective trail width of 10 ft.

Resolving the connecting route(s) for the Ridge Trail is not part of the scope of the current Study – but consideration of where it might go is an important factor to consider in weighing crossing alternatives.

5. Crossing Alternatives Evaluation Criteria

The highway crossing site selection and facility design criteria and their significance are summarized below:

5.1. Crossing Design Criteria for Wildlife

1. **Close proximity to the identified wildlife corridor.** The crossing structure should be located as close as possible to the focus of recorded unsuccessful and successful mountain lion highway crossings and where deer have repeatedly investigated the culverts but not entered at the area north of Lexington Dam.

2. **Appropriate dimensions and design features.** The dimensions and design of the crossing structure should meet the following standards to meet the needs of mountain lions and deer:

   Undercrossing dimensions

   Length

   Recommended: Minimum possible.

   Notes: Like overcrossings, length is not easily adjusted as it is mostly determined by highway width. The rule is the shorter the crossing structure length, the better success it will have passing wildlife.

   Width

   Minimum: 16 ft.

   Recommended: ≥25 ft.

   Height

   Minimum: 10 ft.

   Recommended: 15 ft.

   Slope

   Minimum: Minimal slope. Maintain visibility one end to another

Recommended: No slope.

Slope (approach ramps)

Minimum: 3:1

Recommended: Minimum possible.

Skew:

Minimum: Minimal skew.

Recommended: No skew.

Overcrossing dimensions

Length

Minimum: Minimum possible.

Recommended: <120 ft.

Notes: Length is not easily adjusted as it is mostly determined by highway width. The rule is the shorter the overcrossing length, the better success it will have passing wildlife.

Width

Minimum: 20 ft.

Recommended: ≥50 ft.

Height

Minimum: n/a

Recommended: n/a

Slope

Minimum: Minimal slope.

Recommended: No slope.

Slope (approach ramps)

Minimum: 3:1

Recommended: Minimum possible.

Soil depth

Minimum: 3 ft.

Recommended: 4-6 ft.

Note: Overcrossing needs to support native soils for planting. Soil depth varies depending on desired vegetation (grasses, shrubs, trees) and landscaping design.

3. **Habitat connectivity.** The crossing should be located or designed so that the access and egress has the most continuous habitat possible (with an appropriate balance of openness and vegetation), ease of access to the crossing (minimal barriers, or fencing can be adjusted to serve as directional) by target and other wildlife species.

4. **Line of sight.** The crossing should have clear line of sight that provides good visibility when entering and exiting the crossing structure. Shorter tunnels will have better line of sight if they are straight.

5. **Less human exposure.** The crossing should have the least exposure to human uses and facilities. This includes measures to deter unauthorized trail use or potential homeless encampment.

6. **Accommodate species of special status.** The crossing should try and accommodate use by species of special status likely to occur within the Study Area, such as western pond turtle, California giant

salamander, Santa Cruz black salamander, and California red legged frog. These semi-aquatic species would benefit from the most continuous and relatively level path of travel and riparian habitat possible. Accommodations for special status bat species, such as installation of bat slits or wedges will also be considered.

5.2. Crossing Design Criteria for Trail Use

Ideally the trail connection would also serve opportunistic wildlife, and should meet those criteria to the extent that they are feasible and do not conflict with trail criteria.

1. **Accommodate the full range of potential regional trail users** (hikers, mountain bikers, equestrians, dog owners[6], road cyclists, people using wheelchairs and other mobility devices, and others who would need of prefer a paved trail connection). The crossing should be a minimum of 12' of clear width. Access to and within the crossing should meet ADA standards of maximum 5% slope. There should be both paved and dirt surfaces to accommodate different user needs.

2. **Provide as direct a connection as possible to the existing regional trail alignments** (east west and north south), ideally accessing the ridge overlooking the Santa Clara Valley; connection to a feasible trail route, at minimum an unpaved "back country" trail typical of other segments of regional trails in steep terrain.

3. **Provide a safe and enjoyable trail** (minimal exposure to traffic and maximum exposure to natural open space and views). This criterion pertains to the access route to the crossing as well as the crossing design itself. There should be minimal exposure to traffic and maximum exposure to natural open space and views. An overcrossing better meets this criterion because it provides more light and sense of space and better user experience.

4. **Provide connection to a feasible trail route** (at minimum an unpaved "back country" trail typical of other regional trail segments in steep terrain).

5. **Provide emergency and maintenance vehicle access** (for patrol, monitoring, and maintenance). Authorized patrol-sized vehicular access to or through the crossing is desirable for support of the trail use and for other emergency and maintenance operations, potentially including the operations of the reservoir and other existing facilities.

5.2.1. Constructability/Cost

The crossing must be feasible and cost-effective to design, permit and construct; the planning-level cost estimate is a reflection of this.

1. **Location with fill or cut embankments**. A highway location is needed that either has a fill embankment on both sides so that an undercrossing can be connected under the highway, or cut slopes on both sides so an overcrossing can be constructed; building ramp(s) or tunnel(s) to access

[6] The Bay Area Ridge Trail Council defers to the public land manager regarding dog access on the Ridge Trail that traverses public lands, so this access depends on specific policies and decisions of land owners and managers regarding dog access.

one or more ends of the crossings would be expensive and less functional for many of the criteria below.

2. **Environmental impact.** The crossing should avoid streams or removal of native trees and vegetation. Ideally the crossing would not be located in or impact a streambed or riparian area as that could increase the cost and environmental impact of the project. Carrying stream drainage also could conflict with wildlife or trail use, though this could also be beneficial for aquatic wildlife habitat connectivity. Also the project should avoid or minimize impact on visual and cultural resources, which include archaeological or historical resources.

   It should be noted that the "environmental impact" criteria is currently limited to assessing the obvious impact on vegetation, habitat, and visual resources, as the project is still in early, high-level conceptual stages. As detailed in the Implementation Chapter, the next PSR-PDS stage will help determine the extent of detailed environmental studies to be required.

   In compliance with the California Environmental Quality Act (CEQA), once a project alternative or range of alternatives has been selected (upon completion of the PSR-PDS), the project will also be evaluated for its potential for environmental impacts on a series of other resources under CEQA including:

   - Aesthetics
   - Agriculture and Forestry Resources
   - Air Quality
   - Biological Resources
   - Cultural Resources
   - Geology/Soils
   - Greenhouse Gas Emissions
   - Hazards & Hazardous Materials
   - Hydrology/Water Quality
   - Land Use/Planning
   - Mineral Resources
   - Noise
   - Population/Housing
   - Public Services
   - Recreation
   - Transportation/Traffic
   - Utilities/Service Systems

   If federal funding, or resources or facilities with federal protection or jurisdiction should become involved, it may also be necessary to prepare environmental documentation in compliance with the National Environmental Quality Act (NEPA), which has somewhat different format and coverage requirements than CEQA.

3. **Soils and geology feasible for construction.** The soils and geology of the region are typified by steep unstable slopes, episodic debris flows, dormant landslides, and earthquake shaking associated with

the nearby San Andreas Fault. These constraints are generally shared to a varying extent between the alternative sites. These constraints will need to be addressed in the engineering design.

4. **Can be designed to meet standards.** The crossing can be designed to meet Caltrans highway and structural design standards.

5. **Minimal impact on existing facilities and operations.** The crossing should have adequate area for construction access and staging and should avoid interference with highway or county road traffic and dam or water system facilities or utilities – both during construction and ongoing. The project should avoid any daytime lane closures of the highway. Night-time closures must be limited to one lane in any direction; no full closures or detours are feasible at any time.

6. **Lower relative cost.** The planning-level estimate of the cost to design, permit, obtain ROW/permissions, and construct the project (lower cost = higher score).

5.3. Future Decision Factors

These criteria cannot necessarily be determined at the initial stage of alternatives review, but will be addressed as the alternatives undergo public and additional stakeholder review and discussion with partner agencies and organizations.

1. **Project Readiness/Funding identified.** Project is a good match to a particular funding source, schedule aligns with a funding cycle etc.

2. **Access Permission/Ownership/Right of Way.** Rights for construction and operation of the crossing can be obtained that are permanently dedicated for the intended use (non-revocable).

3. **Maintenance and Operation.** An entity can be identified to take responsibility for maintenance/operation and a maintenance/operation agreement can be worked out between operator and land owner(s).

4. **Public, Stakeholder, and Partner Support. Partner agencies, stakeholders, and** the public and their representatives support the preferred alternative.

Table 1: Summary Chart of Design and Evaluation Criteria

DESIGN CRITERIA FOR WILDLIFE CROSSINGS	DESIGN CRITERIA FOR TRAIL CROSSINGS
1. **Proximity to wildlife corridor** – as close as possible	
2. **Appropriate dimensions and design features** to meet the needs of mountain lions and deer	1. **Accommodate the full range of potential regional trail users.** (hikers, mountain bikers, equestrians, dog owners [1], road cyclists, people using wheelchairs and other mobility devices, and others who would need of prefer a paved trail connection).
3. **Habitat connectivity** – the most continuous habitat possible; balance of openness and vegetation	2. **Provide as direct a connection as possible to the existing regional trail alignments.** (east west and north south), ideally accessing the ridge overlooking the Santa Clara Valley
4. **Line of sight** – good through visibility when entering and exiting	3. **Provide a safe and enjoyable trail.** (minimal exposure to traffic and maximum exposure to natural open space and views)
5. **Less human exposure** – includes measures to deter unauthorized access	4. **Provide connection to a feasible trail route** (at minimum an unpaved "back country" trail typical of other regional trail segments in steep terrain).
6. **Species of special status** – accommodate use by western pond turtle, California giant salamander and California red legged frog, bats. Includes proximity and path of travel to riparian habitat/water.	5. **Emergency and maintenance vehicle access.** Access for authorized vehicles – pickup size.

Undercrossing Dimensions (in feet) — Wildlife Crossings

	Length	Width	Height	Slope	Slope (approach ramps)	Skew
Minimum		16'	10'	Min		Min
Maximum					3:1	
Recommended	Min	>25'	15'	None	Min	None

Undercrossing Dimensions (in feet) — Trail Crossings

	Length	Width	Height	Slope	Slope (approach ramps)	Skew
Minimum		12'	10'	Min		Min
Maximum					8.33:1	
Recommended	Min	>12'	12'	None	5%	None

Overcrossing Dimensions — Wildlife Crossings

	Length	Width	Height	Slope	Slope (approach ramps)	Skew
Minimum	Min	20'	N/A	Min		3'
Maximum					3:1	
Recommended	<120'	>50'	N/A	None	Min	4-6'

Overcrossing Dimensions (preferred for light and space) — Trail Crossings

	Length	Width	Height	Slope	Slope (approach ramps)	Skew
Minimum	Min	12'	N/A			8' A.C. path
Maximum				5%	8.33:1	10' A.C. path with 4' trail
Recommended	<200'	>20'	N/A	None	5%	

Other Considerations – Shared Criteria

Constructability/Cost	Implementation/Feasibility
1. **Location with fill or cut embankments preferable**	1. **Project Readiness/Funding identified**
2. **Environmental impact** – avoid streams or removal of native trees and vegetation	2. **Access Permission/Ownership/Right of Way**
3. **Soils and geology feasible for construction**	3. **Maintenance and Operations**
4. **Can be designed to meet Caltrans highway and structural design standards**	4. **Public, Stakeholder and Partner Support**
5. **Minimal impact on existing facilities and operations** – highway traffic, water and dam facilities	
6. **Lower relative cost**	

[1] The Bay Area Ridge Trail Council defers to the public land manager regarding dog access on the Ridge Trail that traverses public lands, so this access depends on specific policies and decisions of land owners and managers regarding dog access.

6. Evaluation Methodology

The objective of the evaluation was not to select the preferred alternative(s), but to consider, compare and contrast them, in part to see if there were "fatal flaws" that should eliminate any from further consideration. The evaluations also facilitated public, stakeholder, and internal team comments that resulted in refinement of the alternatives from the first stage of public and stakeholder input. All the recommended alternatives will be further evaluated during the Caltrans PSR-PDS review process, and the subsequent formal environmental, engineering, and right-of-way review.

The evaluation summary tables prepared for the 2016 *Preliminary Alternatives Report* have been updated based on new information about regional trail route feasibility. The portions that changed are highlighted in yellow in the Alternatives Evaluations in Appendix B.

Each alternative was evaluated against each criterion described above by the respective consultant team expert(s) in that category. The basis for the judgment of relative performance between the alternatives is summarized in Table 5 in the main report.

A set of symbols was developed to represent the "score" of the alternative crossing locations and associated conceptual designs under each criterion. This provides an "at a glance" sense (the darker the circle, the higher the score) of how the alternatives compare, but it is the description of the basis for the score that is most important.

The scoring and the overall ranking were developed through discussion and consensus of the Study consultant team, and thoroughly reviewed by Midpen staff, partner or advisory agencies, the public, stakeholders, and decision-makers.

Symbol	Associated Scoring Level
●	High performance/score
◐	Medium performance/score
○	Low performance/score
	Not applicable/no score

Table 2: Evaluation Scoring Format

7. Alternatives Analysis: Existing Crossing Facilities

There are several existing drainage culverts that cross under the highway and a single bridge that crosses over the highway in the Study Area. These facilities were studied and constraints and opportunities to improve them as wildlife crossings or trail crossings were identified. They were not formally evaluated against the detailed criteria used for the new alternatives because it was apparent they could not meet the primary objectives for the crossings and would be additional, rather than primary, crossing opportunities.

7.1. Existing Culverts

There are a total of nine significant Caltrans-owned drainage culverts that pass under the highway in the Study Area, or to the south of the Study Area. One low-elevation cross-connection culvert between the main body of Lexington Reservoir and a western arm of the reservoir below the highway is also present and is part of the reservoir facilities. The facilities in the Study Area were interpreted from the circa 1950 "as-built" plans from the original construction of the highway. Per engineering practice they are located on the plans relative to 100' interval "stations" overlaid on the centerline of the road, plus the number of feet toward the next station. Moving south to north per Caltrans stationing practice, the culverts include:

South of the Study Area:

1. At Aldercroft Creek, located approximately mile south of the Bear Creek Road Overcrossing; a 11', 1" wide by 11', 7" tall arched concrete culvert approximately 100' long.
2. At Briggs Creek, located approximately ½ mile south of the Bear Creek Road Overcrossing; a concrete pipe culvert with an opening roughly 4 feet wide by 8 feet tall.
3. At an unnamed drainage, Station 188+82 – a 30" diameter by 252' Reinforced Concrete Pipe (RCP).

In the Study Area:

4. At Black Creek, Station 203+48 – a 48" diameter x 464' RCP.
5. The "Lexington Culvert" at Station 216+80 – a 10' diameter corrugated steel pipe that is a high-level cross-connection between the two arms of the reservoir.
6. A very long low-elevation reservoir cross-connection that is normally below the water line of Lexington Reservoir even when the level is low.
7. At Montevina and Alma Bridge Roads, Station 235+37.5 – a 30" diameter x 136' RCP.
8. The "Trout Creek Culvert", Station 250+25 – a 4' x 4' x approximately 333' Concrete Box Culvert.
9. The "Ravine Culvert", Station 255+33 - a 4' x 4' x approximately 372' Concrete Box Culvert

<u>Improvement Concepts for Existing Culverts</u>

Though the existing culverts cannot be improved sufficiently to meet the primary criteria for either a deer/mountain lion wildlife crossing or a multi-use trail crossing, it is worth considering improving them to accommodate smaller wildlife, which is a secondary objective of the Study.

General Culvert Recommendations:

- Clear debris from inlets and outlets;
- Clear vegetation that may completely screen the entrances from view, while retaining enough for wildlife cover;
- Provide directional fencing to encourage animals toward the opening;
- Provide exclusion fencing to deter animals from entering the highway. Ideally this would be as continuous as possible to direct animals toward the proposed improved crossings.

The Lexington Culvert is in a special category due to its large 10 foot diameter, the fact that it is already used informally as an unapproved trail connection, and because it is used more frequently by wildlife than the other existing culverts, although use by mountain lions and deer has not been recorded. This culvert is not passable during periods of high water as it carries flows from the west to the main body of Lexington Reservoir.

7.2. Lexington Culvert Assessment

The current size of the Lexington Culvert could not meet the criteria for a desirable trail or target wildlife species crossing, but the potential that the existing culvert could be replaced by a larger undercrossing was considered. This alternative was eliminated early in the process due to the hydrologic conditions of the culvert, and the fact that it functions as an overflow between the two arms of the reservoir, as well as the significant distance from the desirable crossing corridor for both target wildlife species and existing trail connections.

Geologic/Hydrologic Conditions

The existing Lexington culvert (see Figure 10) lies very near the mapped contact between the fill embankment supporting the highway, and geologically recent alluvial (stream) deposits to the south at the intersection of Black Road and Montevina Road. We suspect that the culvert is constructed entirely within fill, although it may have been sited near the south margin of a north-facing graded (cut) slope dating from the time of embankment construction.

The watershed hydrology potentially affecting the Lexington culvert is a slightly more complex picture. A relatively large watershed (Lyndon Canyon) west of the Hwy 17 embankment contributes runoff to the western arm of Lexington Reservoir. However, there is hydraulic connection between the western arm of the reservoir and the main body of the reservoir east of the Highway 17 embankment, via a culvert located near the valley axis (J. Sparkman, SCVWD, oral communication May 2016). As a result, the reservoir surface elevation in the western arm is a function of reservoir operations (by SCVWD) and all the watersheds contributing to Lexington Reservoir, not just the watershed west of the culvert and embankment.

The existing Lexington culvert has an invert elevation of approximately 656 feet msl (based on GoogleEarth topography), which is approximately the maximum operating elevation of Lexington Reservoir. Since the Lexington culvert is not located in the axis of a drainage, it thus appears to carry water only in the event that the reservoir surface elevation reaches the culvert inlet elevation, and its function is more one of equalization of water surface elevation on either side of the Highway 17 embankment (J. Sparkman, SCVWD, oral communication May 2016).

Trail and Wildlife Use Considerations

While the culvert is owned and maintained by Caltrans, it functions as a part of the reservoir system, and SCVWD is not comfortable with the existing culvert being formally designated as a public trail connection, or with the concept of its conversion to a larger trail/wildlife undercrossing (S. Tippets, SCVWD, oral communication May 2016). These factors, combined with a location that is well south of the desired crossing point for trails or wildlife, eliminated this location from further consideration as a crossing alternative. Though it is not a viable alternative for the target deer and mountain lion species, Lexington Culvert offers good potential to accommodate the special status species (western pond turtle, California giant salamander and California red legged frog) that are potentially present in the Study Area, which reinforces the value of potential improvements at that culvert to target these species.

Figure 10: High water flowing through Lexington Culvert (January 13, 2017)

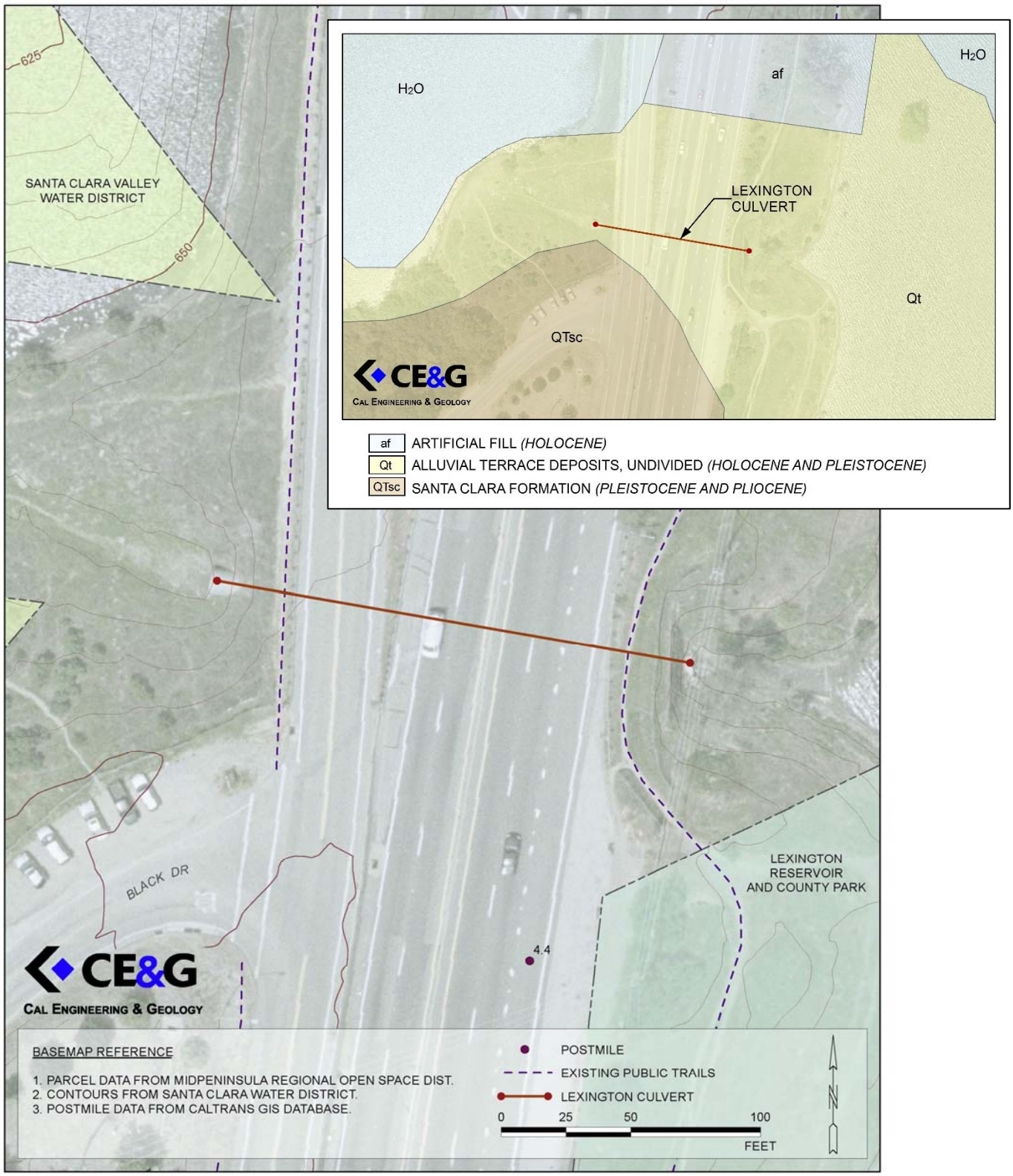

Figure 11: Lexington Culvert Site and Geology

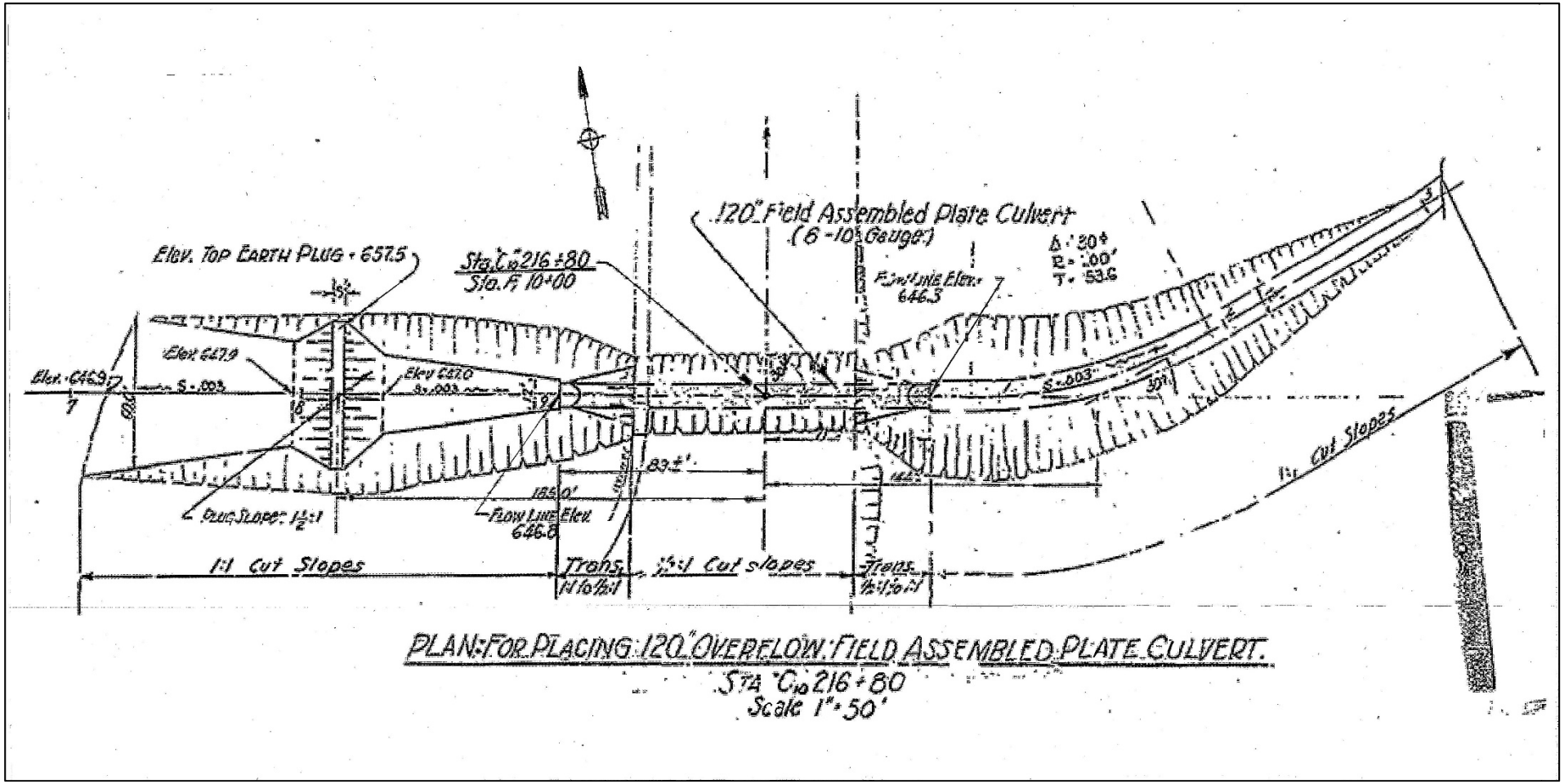

Figure 12: Lexington Culvert As-Built Plan

7.3. Existing Overcrossing: Bear Creek Road/Alma Bridge Road

The Bear Creek Road Overcrossing was not considered as a potential wildlife crossing; there is too much vehicle traffic and too many paved lanes and conflicting on/off ramps to attract or accommodate wildlife. It could be basically functional as a crossing for hikers and mountain bicyclists. Although it was designed to allow equestrian use, requiring that the horses are led across, it is not a comfortable equestrian route due to the need to cross the on/off ramps at each end and negotiate the bridge with only a 5' sidewalk and low railings.

Figure 13: Bear Creek Road/Alma Bridge Road Overcrossing

Appendix B: Crossing Alternatives Evaluation

Contents

Figures

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Appendix B: Crossing Alternatives Evaluation

1. New Crossing Alternatives

The consultant team evaluated a total of seven alternative locations and configurations of wildlife/trail crossings, as illustrated in Figure 1. The consultant team developed siting and design concepts and evaluated the alternatives based on field reconnaissance, engineering and environmental analysis, and input from the public and stakeholder agencies and organizations.

1.1. Existing Culverts Investigated

Due to the configuration of the Highway relative to the steep topography, opportunities to go under or above the highway are limited. Both for wildlife and a multi-use trail it would be less functional or practical to build a ramp to get up or down to an over- or under- crossing. Thus the most feasible locations will either have the highway elevated with an embankment on both sides, or in a cut, with embankments descending down to the highway. The existing culverts are pertinent in this regard because they typically occur in locations where the highway was built on fill. For this reason some of the alternative new crossing locations are near to existing culverts. A total of nine existing culverts that run under the highway were studied for their potential function as wildlife crossings, as detailed in Appendix A. None of the existing culverts was feasible for use or improvement as a mountain lion/deer crossing or a regional trail crossing, but three of the culvert locations; Ravine Culvert, Trout Creek Culvert, and Lexington Culvert, were considered for potential siting of a new crossing. The Lexington Culvert alternative was eliminated early in the process as detailed in Appendix A. Replacing the existing culverts in a manner that would continue to convey storm water (their intended purpose) as well as accommodate wildlife and/or recreational trail users would require significantly more site disturbance and be more challenging to design and construct than to install additional culvert(s) higher in the fill prism.

1.2. Summary of Alternatives Reviewed

There are five alternative crossing locations; three for undercrossing and two for overcrossings. A three of these locations crossing configurations were considered for either combined trail and wildlife, or trail only, for a total of eight alternative locations and configurations. The 2016 Preliminary Alternatives Report originally considered four alternatives.

- A wildlife only undercrossing near the existing Ravine Culvert (Alternative 1);
- A wildlife only undercrossing near the existing Trout Creek Culvert (Alternative 2);
- A combined wildlife and recreational trail overcrossing just north of the Highway 17 junction with Alma Bridge Road (Alternative 3); and
- A combined wildlife and recreational trail undercrossing between Montevina Road and Alma Bridge Road (Alternative 4).

This Revised Alternatives Report considers an additional four alternatives, including one new location with two configuration alternatives:

- Alternatives 3a and 4a are design options (smaller/narrower recreational trail only crossings) at the same locations as a proposed combined wildlife and trails overcrossing (Alternative 3) and a proposed combined wildlife and trails undercrossing (Alternative 4).
- Alternatives 5 and 5a, the Northern Overcrossing Wildlife/Trail combination and Trail Only version, respectively, have good proximity to potential west side regional trail connections.

All recreational trail alternatives may necessitate improvements along Alma Bridge Road where there is limited space for recreational users to share the roadway with vehicle traffic, including large quarry trucks.

All shared crossing alternatives (3, 4 and 5) have less suitability for wildlife than Alternative 1- Ravine Creek or Alternative 2- Trout Creek Undercrossing, even with additional measures to accommodate wildlife.

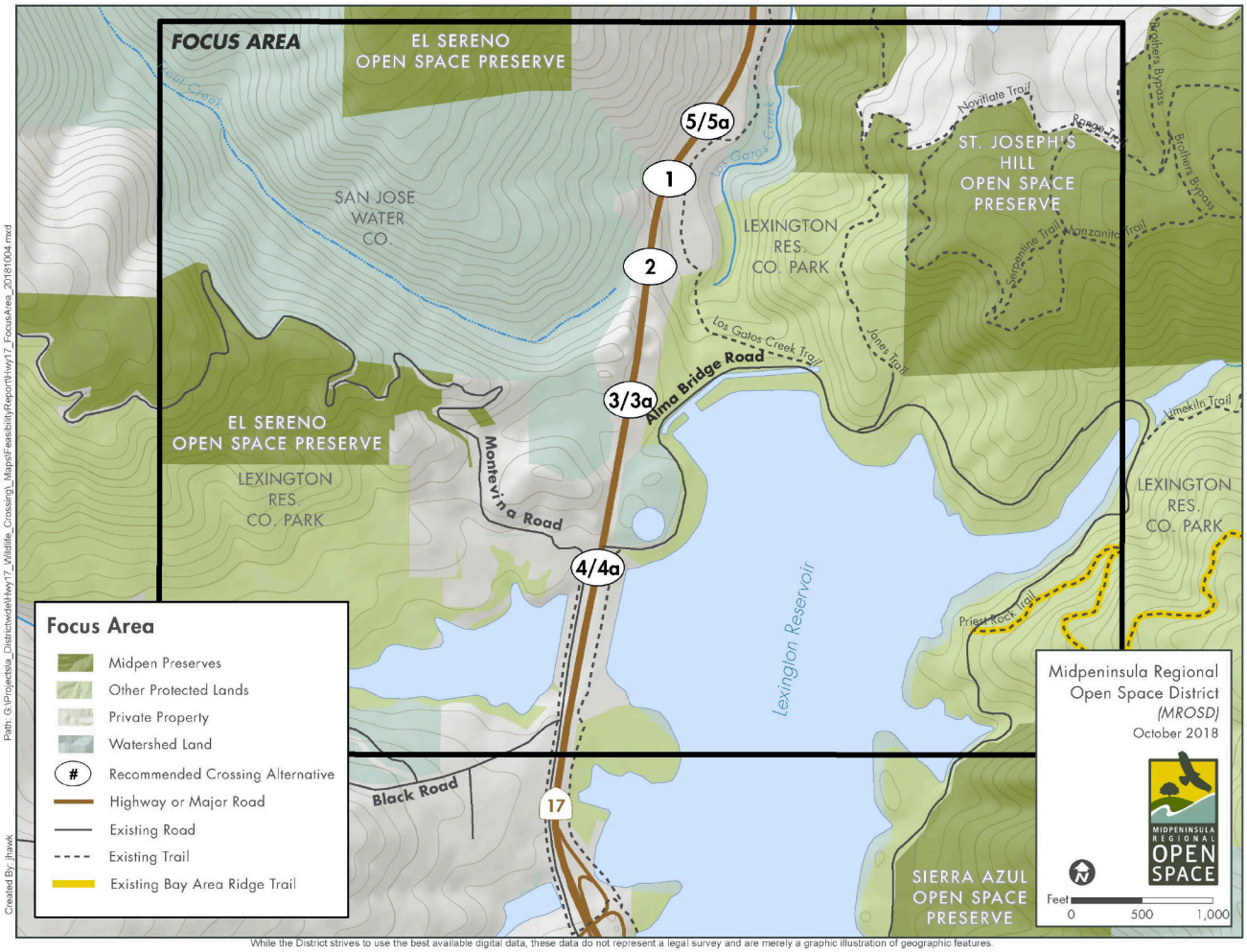


Figure 1: Alternative Crossing Locations

2. Alternative 1 –Ravine Culvert Wildlife Undercrossing

2.1. Site Conditions

Ravine culvert is located approximately at post mile 5.1 (Figure 2), about 500 feet north of the Trout Creek Culvert. There is a relatively small area of roughly level terrain west of Highway 17 north of the inlet; otherwise steep slopes descend on every side. Currently, there is not a safe location to pull off the highway near the existing inlet. The Ravine culvert collects runoff from an unnamed (on USGS 7.5' topographic quadrangle maps) small watershed; the inlet is at the western toe of the Highway 17 embankment. The outlet of the culvert is presumably in Los Gatos Creek – 372' to the east per the as-built plans; the outlet could not be found during field investigations for the crossing study. In any case the prospective new crossing would need to avoid interfering with the existing culvert. It would be located south of the existing culvert and would feature an opening on the east side just to the south of a retaining wall along the Los Gatos Creek Trail (see Figure 4).

The opening to the undercrossing would be near the top of a steep embankment that slopes down to a paved access road that functions as the Los Gatos Creek Trail. There is an existing large diameter SJWC water line located below the surface of the road beyond the prospective opening. A ramp and unpaved road into the undercrossing would be needed for construction and maintenance access. This would also improve access for small animals, and would be necessary for any trail/non-motorized access and maintenance/inspection access.

2.2. Geologic/Hydrologic Conditions

Bedrock in this area is mapped by McLaughlin and others (2001) as primarily mélange, which consists of blocks of various rock types enclosed in a sheared matrix. Mélange does not contain bedded rock; its strength is typically low and internally variable. Landslide deposits are mapped as occupying the core of the Ravine drainage, with the toe of landslide deposits just reaching the highway corridor. Geomorphic expression of this landsliding suggests that it is confined to surficial material (colluvium). Detailed mapping performed in connection with Lenihan Dam improvements supplies additional detail regarding the extent of sheared rock, and the extent of inferred shallow landsliding along the east-facing slope between Highway 17 and the Lenihan Dam spillway.

The watershed that drains into the existing "Ravine" (unnamed on USGS 7.5' topographic maps) culvert is small and poorly defined, totaling approximately 0.23 km^2, or 32 acres in area. It gathers runoff from a largely planar, east-facing slope that is corrugated by relatively shallow topographic swales. The watershed is quite steep longitudinally, dropping from approximate elevation 1500 ft msl (above mean sea level) at the ridgeline, to approximately 630 ft msl at the culvert inlet, over a distance of approximately 2460 feet (elevations and areas derived from USGS 7.5' quadrangle topography).

Surface water flow through the Ravine culvert is perennial. There are no definable deposits of alluvium in this watershed. We do not have information regarding whether there is a history of culvert blockage by debris flow and/or landslide debris, but it appears to be functioning currently.

2.3. Structural Design/Construction Concept

As previously described, the structural design concept is based on discussions with Caltrans staff of a method that would allow traffic access through the construction site along Highway 17 and would prevent complete closures. This method of construction directly correlates to the type of structure that will be used, namely precast pre-stressed concrete slabs. The slabs will create a vehicular bridge superstructure along Highway 17, allowing the soil beneath to be excavated to create a passage below with an earth bottom. The foundation supports at each end of the bridge would be segmentally constructed across the width of Highway 17 first, then the bridge superstructure would be put into place, and finally the soil below would be excavated and the walls and surface finished. The designs of all bridge and culvert elements would meet current Caltrans' standards.

Depending on the existing highway surface elevation relative to the adjacent terrain at any given location the final bottom elevation of the finished culvert crossing can vary, but the goal is to have a clear height of at least 12 feet. Given this goal, at the Ravine Culvert location the bottom of the new crossing would be located approximately at the same elevation as the existing inlet. It would be difficult to prevent the drainage from the hillside from entering the undercrossing rather than the culvert, and there would likely be an impact on the riparian habitat in the drainage.

On the east side the opening of the undercrossing would be about half way up the embankment between the Los Gatos Creek Trail and the highway. For construction and ongoing maintenance access, as well as to accommodate access by small animals, a ramp and road into the undercrossing would need to be constructed on the east side.

2.4. Functionality for Wildlife

The Ravine Culvert location is situated near the center of the identified corridor for mountain lion crossings and camera-recorded investigations by deer and clustering of related road kill records. It is close to the riparian habitat of Los Gatos Creek and requires only crossing the Los Gatos Creek Trail and climbing a short embankment to enter the crossing, at which point a view through the crossing would be available. While proximity to humans is generally undesirable for wildlife crossings, there is an ongoing issue with homeless encampments within the Los Gatos Creek drainage, and the visibility of the prospective undercrossing from the trail may be a deterrent for its use by homeless. The fact that the animals mainly are active at night would help to mitigate the proximity to the trail traffic.

The west side connection to the main habitat corridor is not as direct as at Trout Creek. Large animals could easily make the connection across the slope, but smaller animals such as the special status species western pond turtle, Santa Cruz black salamander, California giant salamander, and California red legged frog would be challenged, but less so than crossing Highway 17 which they must do now

2.5. Functionality for Trail Use

While the crossing would connect right above the Los Gatos Creek Trail on the east, the access on the west is extremely steep, rocky and wooded and does not provide a suitable trail connection. The Ravine Culvert crossing location is not considered feasible for a trail crossing location because trail connections are very challenging, and the desired ADA-compliant paved connection to a public road virtually impossible. Considered along with the impact human access would have on the functionality for wildlife, this crossing location is considered a wildlife crossing alternative only.

2.6. Environmental Resources and Potential Impacts

The only area where the crossing is likely to impact sensitive resources is in the drainage on the west side. Though not a "blue line stream", this drainage does have mature riparian vegetation, and as discussed above, the undercrossing opening would require the removal or modification of the south bank of the drainage.

2.7. Construction Staging and Traffic Control

The construction work windows will most likely be during periods of low traffic volumes and during night time hours, with final determination coming from coordination with Caltrans permitting staff. The segmental approach to the construction of each bridge end support allows at least one lane of travel to remain open in each direction at all times. During peak travel times, no construction would be allowed and all lanes would remain open. Night time lane closures would be strongly considered and would allow more flexibility in the construction of the bridge supports as well as the superstructure. In the event of night time closures, it might be possible for one direction of Highway 17 to be completely closed off and worked on while travel is shifted onto the other side creating two temporary opposing travel lanes. Final determination of this approach would also rest with Caltrans permitting staff and would involve advanced detour signage, lane separation equipment, and other traffic control measures.

There is good access and available staging area for construction near the site off the Los Gatos Greek Trail on the east side, but construction access and staging area on the west side is extremely constrained. The east side access and staging for construction could result in temporary closures and/or detours of the Los Gatos Creek Trail.

2.8. Relationship to Adjacent Facilities

This alternative has minimal impact on other facilities or operations. There is a large diameter water line along the Los Gatos Creek Trail, but it is underground at this point. No changes to existing fencing or access areas are required (other than wildlife directional and exclusion fencing) and there are no other apparent facilities in the vicinity, except for overhead utility lines along the east side of the Los Gatos Creek Trail and high-tension electrical lines that pass directly overhead east-west high above the site. These are not likely to be a constraint for construction.

2.9. Maintenance and Management Considerations

This undercrossing would be located 600 feet north of the Trout Creek culvert and closer to the service road/Los Gatos Creek Trail. There is a large flat area along the trail that could be used as a construction staging area for Ravine Creek Undercrossing and parking area for future monitoring, maintenance and management of a new structure. Access would be primarily from the existing Los Gatos Creek Trail. A large water line is buried in this area, and would need to be protected to ensure that it was not damaged during construction. The haul route for excavated material would be the same as for the Trout Creek Undercrossing. The close proximity to frequent public use on the Los Gatos Creek Trail may be a deterrent to unauthorized use. There would be easy access for maintenance and inspection. The structure itself should be very low maintenance.

2.10. Cost Considerations

The Ravine Culvert Wildlife Undercrossing Alternative is estimated to cost $8.51 million in 2018 dollars, as detailed in the table below, and $11.4 million in 2024 dollars. At least half of this cost pertains to the requirements to construct the structure in this challenging setting on a busy highway and in a sensitive habitat area with an adjacent popular public trail and limited construction access.

Table 9: Conceptual Cost Estimate, Alternative 1 – Ravine Wildlife Undercrossing

Prepared 10-2-2018				
ROADWAY & STRUCTURE ITEMS	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Clearing and Grubbing	1	LS	$60,000	$60,000
Grading and Drainage	1	LS	$120,000	$120,000
Temporary Construction Access/Staging Area*	1	LS	$60,000	$60,000
Undercrossing Structure (90'x42.5'x12')	1	LS	$2,590,000	$2,590,000
Wildlife Fencing and Features	1	LS	$120,000	$120,000
Habitat Site Preparation	1	LS	$120,000	$120,000
Traffic Control Systems	1	LS	$180,000	$180,000
Traffic Management Plan	1	LS	$60,000	$60,000
Water Pollution Control and Treatment BMPs	1	LS	$60,000	$60,000
Environmental Mitigation	1	LS	$120,000	$120,000
Misc. Minor Items (20%)	1	%	$700,000	$700,000
Mobilization (10%)	1	%	$400,000	$400,000
Contingency (25%)	1	%	$880,000	$880,000
			TOTAL CONSTRUCTION	**$5,500,000**
RIGHT OF WAY:	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Misc. Utilities	1	LS	60,000	**60,000**
Caltrans PID Cost	1	LS	120,000	**120,000**
Other Permits and Fees	1	LS	120,000	**120,000**
			RIGHT OF WAY SUBTOTAL	**300,000**
ENGINEERING SUPPORT				
Engineering Studies (6%)				**$330,000**
Environmental Studies (3%)				**$170,000**
Design Engineering (15%)				**$830,000**
Construction Staking (2%)				**$110,000**
Construction Support (3%)				**$170,000**
Construction Management (20%)**				**$1,100,000**
			ESTIMATED PROJECT COSTS	**$8,510,000**
* Includes permanent maintenance access/trail access				
** Assume Caltrans AAA Construction Contract				

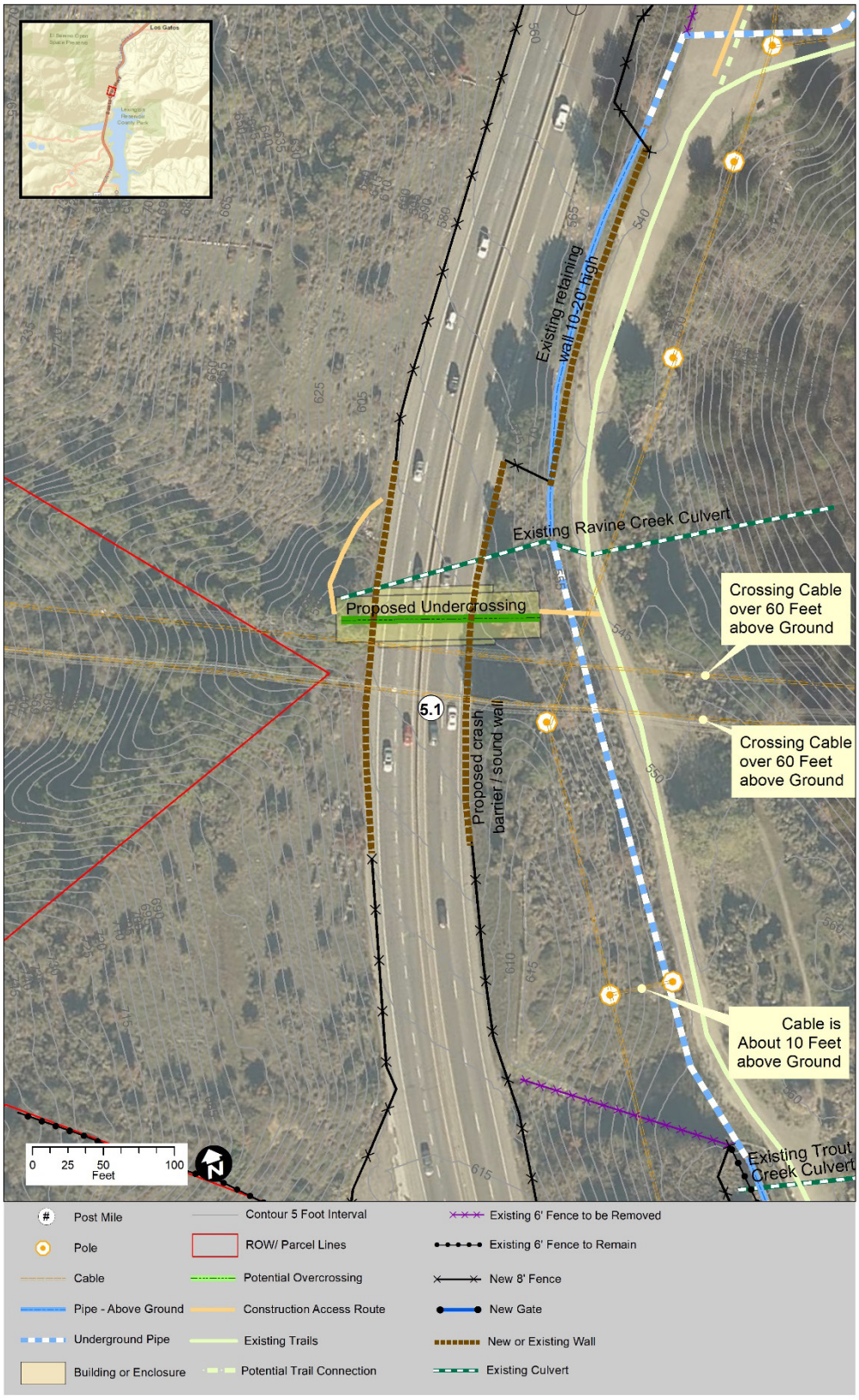


Figure 2: Ravine Culvert Wildlife Undercrossing Site Plan

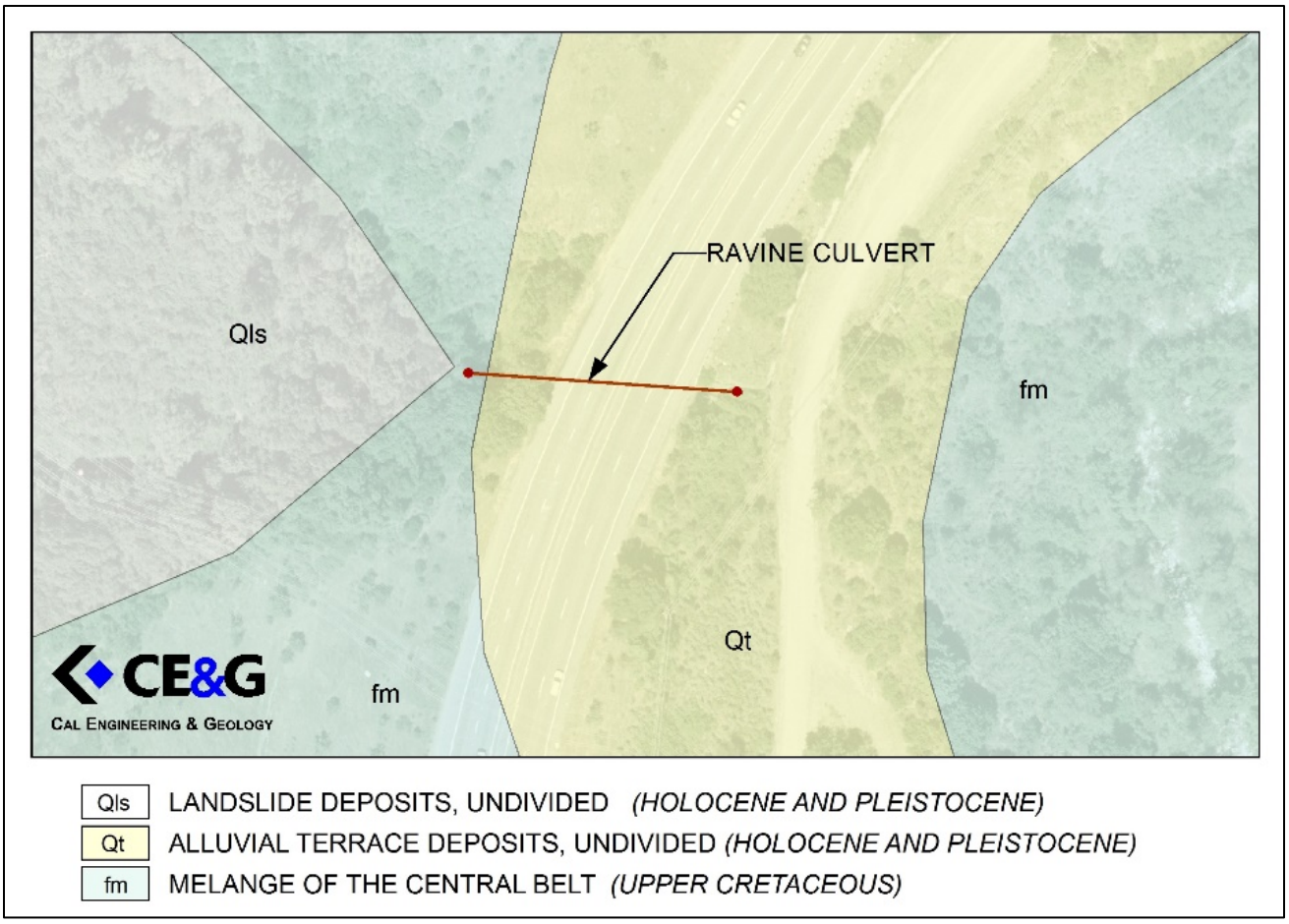


Figure 3: Ravine Culvert Site and Geology

Figure 5: Ravine Culvert Wildlife Crossing Site View

Figure 4: Ravine Culvert Inlet

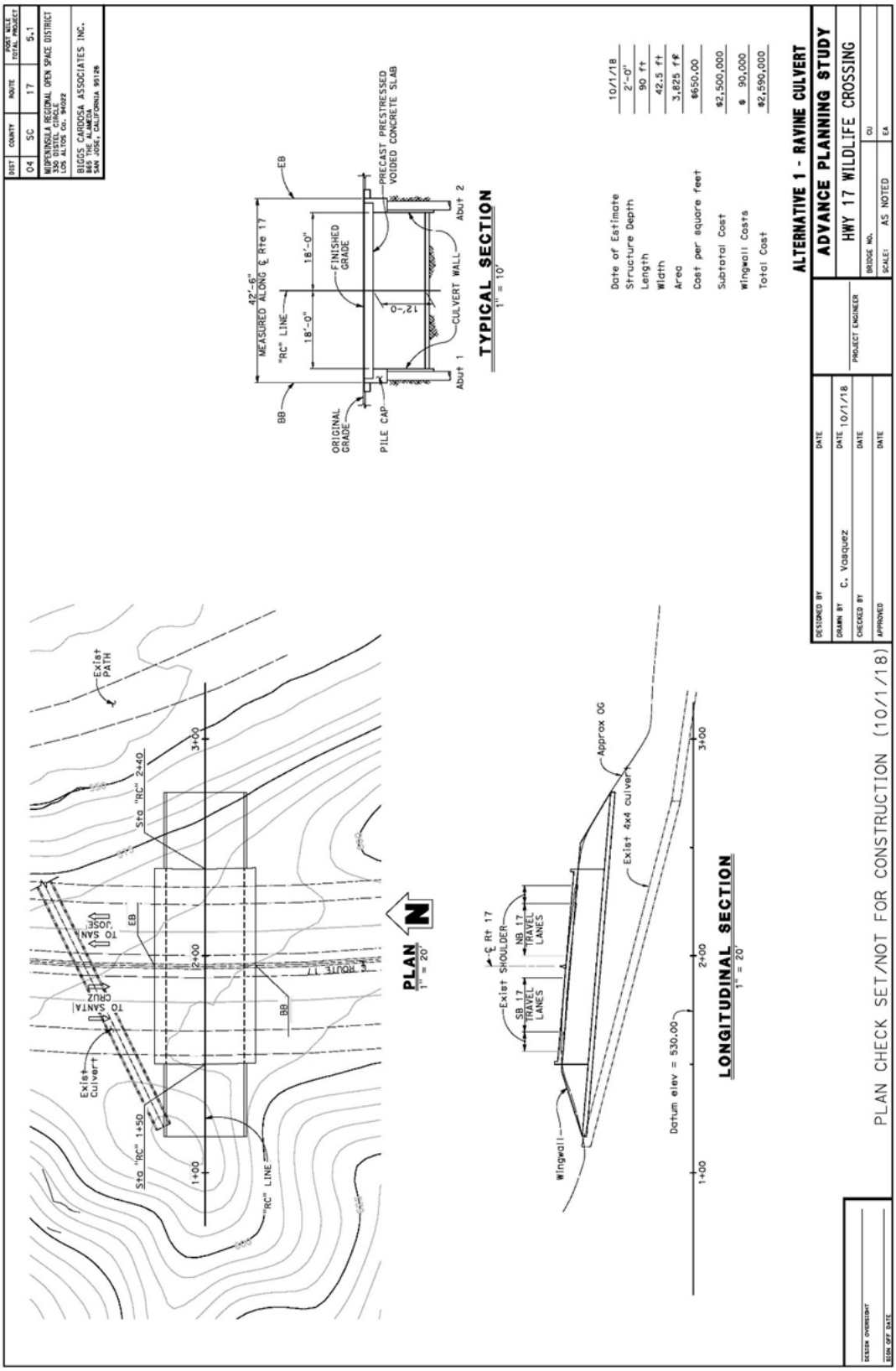


Figure 6: Ravine Culvert Wildlife Crossing Conceptual Plan

2.11. Evaluation: Alternative 1 – Undercrossing at Ravine Culvert Location

A set of symbols was developed to score the alternative crossing locations and associated conceptual designs. This provides an "at a glance" sense of how the alternatives compare, but it is the description of the basis for the score that is most important.

(Location and design same as Prelim. Alts. Report; some criteria and evaluations added or changed as highlighted)

Symbol	Associated Scoring
●	High performance/score
◐	Medium performance/score
○	Low performance/score
	Not applicable/no score

Functionality for Wildlife

1. Proximity to wildlife corridor: The location is close to attempted and successful crossings and to the path of travel of collared mountain lions and close to Los Gatos Creek.	**High**	●
2. Appropriate dimensions and design features: The location offers the opportunity to build to the maximum dimensions.	**High**	●
3. Habitat connectivity: The site has continuous forested cover on the west side and is close to Los Gatos Creek on the east side, though the Los Gatos Creek Trail separates.	**High**	●
4. Line of sight: The new structure can be designed to ensure clear line of sight from one end of structure to the other.	**High**	●
5. Less human exposure: The site is directly exposed to Los Gatos Creek Trail traffic but this is offset by the visibility of the undercrossing to deter homeless or other unauthorized use.	**Medium**	◐
6. Species of special status: The location may offer many opportunities to accommodate use by species of special status found in main stem Los Gatos Creek that cannot currently access the west side of Ravine Creek without crossing Highway 17.	**Medium**	◐

Functionality for Regional Trail Use

7. Accommodate the full range of potential regional trail users: No feasible west side trail connection to public road or ADA compliant path of travel due to steep slopes.	**Low**	○
8. Provide as direct a connection as possible to the existing regional trail alignments. Immediately adjacent to Los Gatos Creek Trail and connections to east. Close to potential west side regional trail connections but due to topography no feasible trail connection was identified.	**Low**	○
9. Provide a safe and enjoyable trail. Due to topography, no feasible west side trail connection was identified.	**Low**	○

10. Provide connection to a feasible trail route. Relatively close to potential west side connection but due to topography no feasible west side trail connection was identified.	**Low**	○
11. Provide emergency and maintenance vehicle access. No feasible way to create access for emergency or maintenance vehicles to the west side of the highway.	**Low**	○

Constructability/Cost

12. Location with fill or cut embankments: Embankments exist on both sides into which undercrossing could be constructed, but no level space south of inlet on the west side and the depth of inlet relative to the highway surface is minimal for constructing an undercrossing.	**Medium**	◐
13. Environmental impact - avoid streams or removal of native trees and vegetation: At least one native tree would have to be removed on the west side and there would be some impact on the bank and bed of a minor tributary drainage to Los Gatos Creek.	**Medium**	◐
14. Soils and geology feasible for construction: Shallow landsliding on slopes above likely deposits debris very near to west end; limited space for debris catchment. Excavation conditions through mélange underlying the highway could be variable	**Medium**	◐
15. Can be designed to meet standards. Only apparent challenge is proximity to existing culvert on the west.	**High**	●
16. Feasible construction staging and traffic impact. Affords good construction staging on the east; west side is limited. Construction will interfere with Los Gatos Creek Trail. Impact on highway traffic will be relatively limited.	**Medium**	◐
17. Minimal impact on existing facilities and operations. Ongoing operation would require little or no change to existing facilities or impact on them.	**High**	●
18. Lower relative cost: The undercrossing would be relatively short and has good access on the east, but limited access on the west, proximity to existing culvert and need for wing walls may increase cost.	**Medium**	◐

Future Decision Factors

1. Project Readiness/Funding identified. **2. Access Permission/Ownership/Right of Way.** **3. Maintenance and Operation Arrangements.** **4. Public, Stakeholder and Partner Support.**		

3. Alternative 2 – Trout Creek Wildlife Undercrossing

3.1. Site Conditions

Trout Creek is a major tributary of Los Gatos Creek. Most of the watershed on the west side of Highway 17 is owned by SJWC, which has protected the watershed (though this does not guarantee it is protected in perpetuity). As with the Ravine Culvert crossing location, the SJWC land abuts El Sereno Open Space Preserve, creating a substantial habitat corridor in the canyon and along the ridge. Further to the west Montevina Road and a series of rural residences interrupt the continuous habitat.

The existing culvert is in a deep gully with a fill embankment for the adjacent highway descending above it (see Figure 6). There is a large level area and access road north of the culvert that accesses a service road into the watershed that is fenced and gated. Illegal dumping has been a problem at this site. SJW has facilities in the vicinity of this crossing. The potential undercrossing opening on the west side would be south of and above the inlet of the existing culvert, exiting into the creek along a steep, rocky, wooded slope to the south of the creek.

On the east side the opening to the undercrossing would be near the top of a steep embankment that slopes down to a paved access road that is gated just north of this point, beyond which it functions as the Los Gatos Creek Trail. There is an existing large diameter water line located along the edge of the roads below the prospective opening. This water line would need to be protected during construction and for ongoing service access to the undercrossing structure. An unpaved road into the undercrossing from the nearby staging area would improve access for animals, and would be necessary for any non-motorized access.

The entire footprint area for the undercrossing is in Caltrans ROW, although connection to it for construction and ongoing access would involve SJW and SCVWD and approvals or agreements with them.

3.2. Geologic/Hydrologic Conditions

Bedrock in this area is mapped by McLaughlin and others (2001) as primarily mélange, which consists of blocks of various rock types enclosed in a sheared matrix. Mélange does not contain bedded rock; its strength is typically low, and internally variable. A NW-SE trending fault zone is mapped as passing just south of the Trout Creek culvert vicinity. The fault separates the mélange from less extensively sheared sandstone and shale to the south. This fault is likely associated with a zone of more extensively sheared rock. Detailed mapping performed in connection with Lenihan Dam improvements supplies additional detail regarding the extent of sheared rock, and the extent of inferred shallow landsliding along the east-facing slope between Highway 17 and the Lenihan Dam spillway.

The watershed that contributes flow to the existing Trout Creek culvert is relatively limited, measuring approximately 3.13 km^2, or 774 acres in area. It is a steep watershed, with elevations near the headwaters (along Montevina Road) of approximately 2520 feet msl, dropping over a distance of approximately 2.16 miles to elevations at the existing culvert of approximately 640 ft msl (elevations and areas developed from USGS 7.5' quadrangle topography).

The existing Trout Creek culvert carries perennial flow. We do not have current information regarding the condition of this approximately 330-foot-long culvert, the alignment of which incorporates a vertical

and horizontal bend. We are not aware of anecdotal reports that would indicate that the flow capacity of this culvert has been exceeded. Accumulations of debris near the inlet indicate that there is a potential for partial blockage of the culvert inlet during high flow events. A trash rack has been constructed a approximately 35 feet upstream from the inlet.

The proposed Trout Creek undercrossing alignment would have an inlet at a higher elevation than the existing culvert, and therefore would only carry surface water flow in the event that the existing Trout Creek culvert was insufficient for its design flows, or became plugged.

3.3. Structural Design/Construction Concept

The design and construction concept for the Trout Creek location is a pile-supported precast concrete bridge structure nearly identical to the Ravine Culvert crossing, described above. The notable difference is that at this site, the final elevation of the new culvert crossing would be much higher than the existing Trout Creek Culvert inlet and creek bed. The environmental impacts would be much less as a result of the higher elevation.

3.4. Construction Staging and Traffic Control

The staging and traffic control measures would be similar to those described above for the Ravine Culvert Undercrossing.

3.5. Functionality for Wildlife

The Trout Creek location is situated near the center of the identified corridor for mountain lion crossings and camera-recorded investigations by deer and related road kill records. The opening on the east side requires crossing open areas, following the Los Gatos Creek Trail and climbing the embankment to the crossing entrance before a view through the crossing could be seen, and is thus less connected to habitat than the east side of the Ravine Culvert location. The concept includes directional fencing and habitat enhancements to encourage animals to get to the opening. On the west side of the crossing the animals would be in high quality continuous habitat in Trout Creek Canyon.

3.6. Functionality for Trail Use

Any trail that passes through Trout Creek Canyon, would depend on securing access rights from SJWC. There are also significant topographic challenges to building a trail through the canyon. The location for a crossing would be on the south side of Trout Creek, which would terminate at steep slopes on the west side. While animals can navigate this step terrain successfully, the steep slopes and the need to avoid nearby water infrastructure made this location not suitable for a trail use.

The improvement of this crossing for broader non-motorized transportation including road bicycles and ADA-compliant access is a virtual impossibility due to the extremely steep terrain, environmental resources, elevation of the opening on the east side and distance from public roads. Considered along with the impact human recreation access would have on the functionality for wildlife, this crossing location is considered a wildlife crossing alternative only.

3.7. Environmental Resources and Potential Impacts

The only area where the crossing is likely to impact sensitive resources is in the drainage on the west side. The fact that the undercrossing opening will be on the slope above the bed and bank of the creek should avoid significant impacts, although protective measures would probably be required during construction to ensure this.

3.8. Relationship to Adjacent facilities

The undercrossing would require some revision to existing fencing and access, and modifications for maintenance access and wildlife habitat/access improvement in proximity to water infrastructure. There are overhead utilities above the east side of the crossing, but these should not be a constraint or conflict. The operation as a wildlife crossing should not have any significant impact on adjacent facilities or uses. The improvement and operation as a trail/non-motorized crossing would have more significant impacts on adjacent facilities and operations, which is part of the reason that option is considered infeasible.

3.9. Maintenance and Management Considerations

There is an existing construction staging area on the east side of Highway 17 south of Trout Creek (Figure 6). The south end of this staging area is located approximately 375 feet south of the proposed undercrossing. This approximately 0.8 acre area is accessed from a short driveway off Alma Bridge Road. It also connects to a service road that extends along the west side of the spillway. A road constructed along the ridge at the highway ROW line could provide access to the location of the proposed undercrossing entrance near the top of the hill. The existing water line at the base of the slope below the undercrossing would need to be protected during construction, perhaps by constructing a temporary or permanent structure to bridge over it, so that rock and soil excavated from the undercrossing could be moved to trucks waiting on the service road. Permanent burial of this water line, which goes underground just north of this segment, would improve wildlife passage to the new undercrossing, but would not be required if fencing were used to direct wildlife to where the pipe goes underground just north of the proposed crossing location. The truck haul route could extend down the service road/Los Gatos Creek Trail to the existing service access ramp onto Highway 17 located approximately 1,200 feet to the north.

The construction access road extending south from the existing staging area could remain as the inspection and maintenance access route for vehicles to the proposed undercrossing. The structure could also be accessed by climbing up the steep embankment from the existing service road/Los Gatos Creek Trail.

Construction access on the west side would be via the existing ramp roadway and gate. A temporary bridge structure will be needed to cross and protect the steep banks and bed of Trout Creek and the opening of the existing culvert. There is no room for acceleration of vehicles, especially heavily-laden trucks, onto the highway at this point, which is compounded by a steep hill. Most of the excavation of the undercrossing may therefore need to occur from the eastern side, with the material moved down slope to trucks waiting on the service road.

3.10. Cost Considerations

The Trout Creek Crossing Alternative is estimated to cost $8.37 million in 2018 dollars, as detailed in the table below, and $11.22 million in 2024 dollars. At least half of this cost pertains to the requirements to construct the structure in this challenging setting on a busy highway and in a sensitive habitat area with limited construction access. The fact that construction access on the west side of Highway 17 is better than at the Ravine location primarily accounts for the difference in cost.

Table 10: Conceptual Cost Estimate, Alternative 2 – Trout Creek Undercrossing

Prepared 10-2-2018				
ROADWAY & STRUCTURE ITEMS	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Clearing and Grubbing	1	LS	$60,000	$60,000
Grading and Drainage	1	LS	$60,000	$60,000
Temporary Construction Access/Staging Area*	1	LS	$120,000	$120,000
Undercrossing Structure (90'x42.5'x12')	1	LS	$2,590,000	$2,590,000
Wildlife Fencing and Features	1	LS	$120,000	$120,000
Habitat Site Preparation	1	LS	$60,000	$60,000
Traffic Control Systems	1	LS	$180,000	$180,000
Traffic Management Plan	1	LS	$60,000	$60,000
Water Pollution Control and Treatment BMPs	1	LS	$60,000	$60,000
Environmental Mitigation	1	LS	$60,000	$60,000
Misc. Minor Items (20%)	1	%	$700,000	$700,000
Mobilization (10%)	1	%	$400,000	$400,000
Contingency (25%)	1	%	$850,000	$850,000
			TOTAL CONSTRUCTION	**$5,400,000**
RIGHT OF WAY:	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Misc. Utilities	1	LS	60,000	**60,000**
Caltrans PID Cost	1	LS	120,000	**120,000**
Other Permits and Fees	1	LS	120,000	**120,000**
			RIGHT OF WAY SUBTOTAL	**300,000**
ENGINEERING SUPPORT				
Engineering Studies (6%)				**$330,000**
Environmental Studies (3%)				**$170,000**
Design Engineering (15%)				**$810,000**
Construction Staking (2%)				**$110,000**
Construction Support (3%)				**$170,000**
Construction Management (20%)**				**$1,080,000**
			ESTIMATED PROJECT COSTS	**$8,370,000**
* Includes permanent maintenance access/trail access				
** Assume Caltrans AAA Construction Contract				

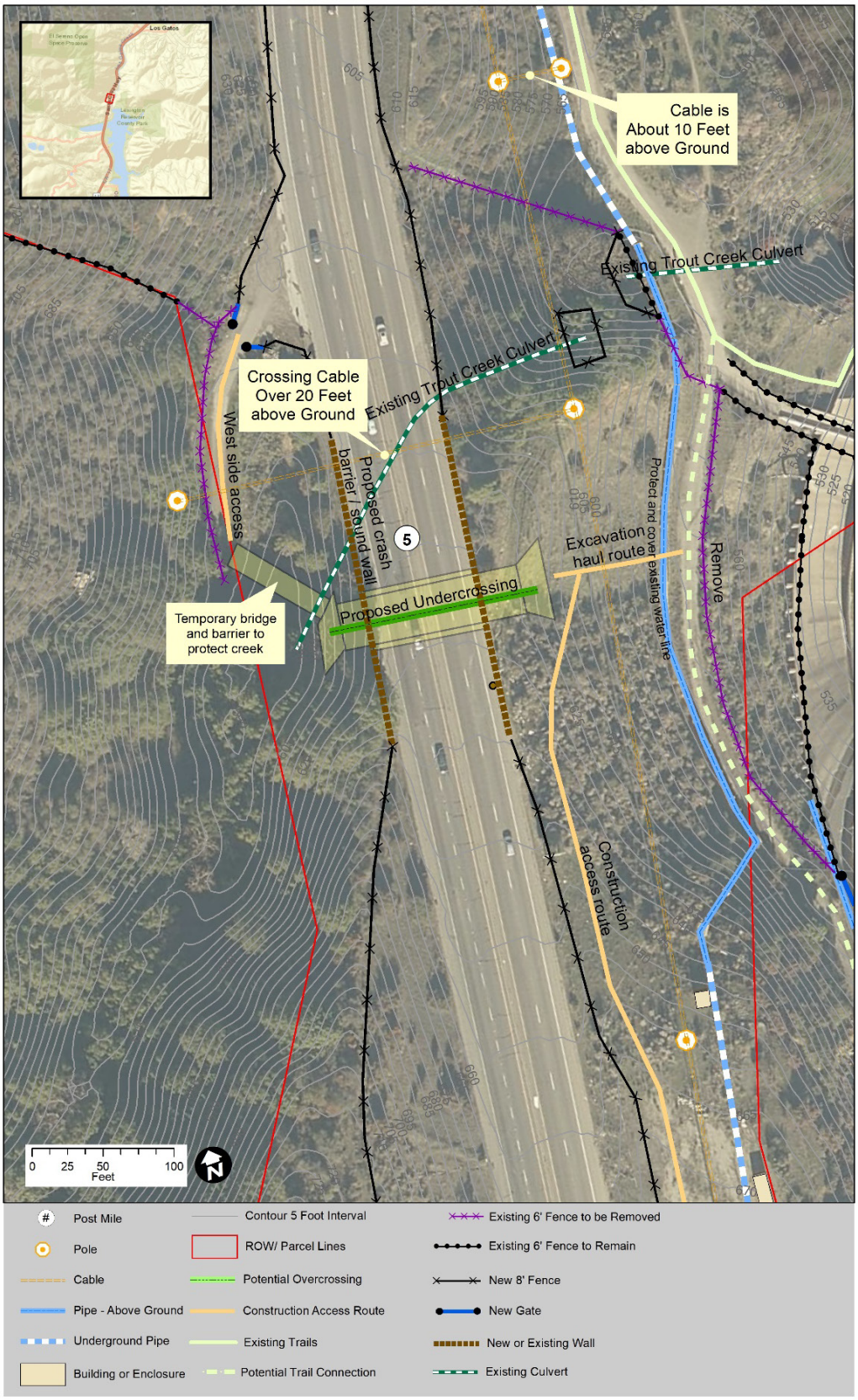


Figure 7: Trout Creek Undercrossing Site Plan

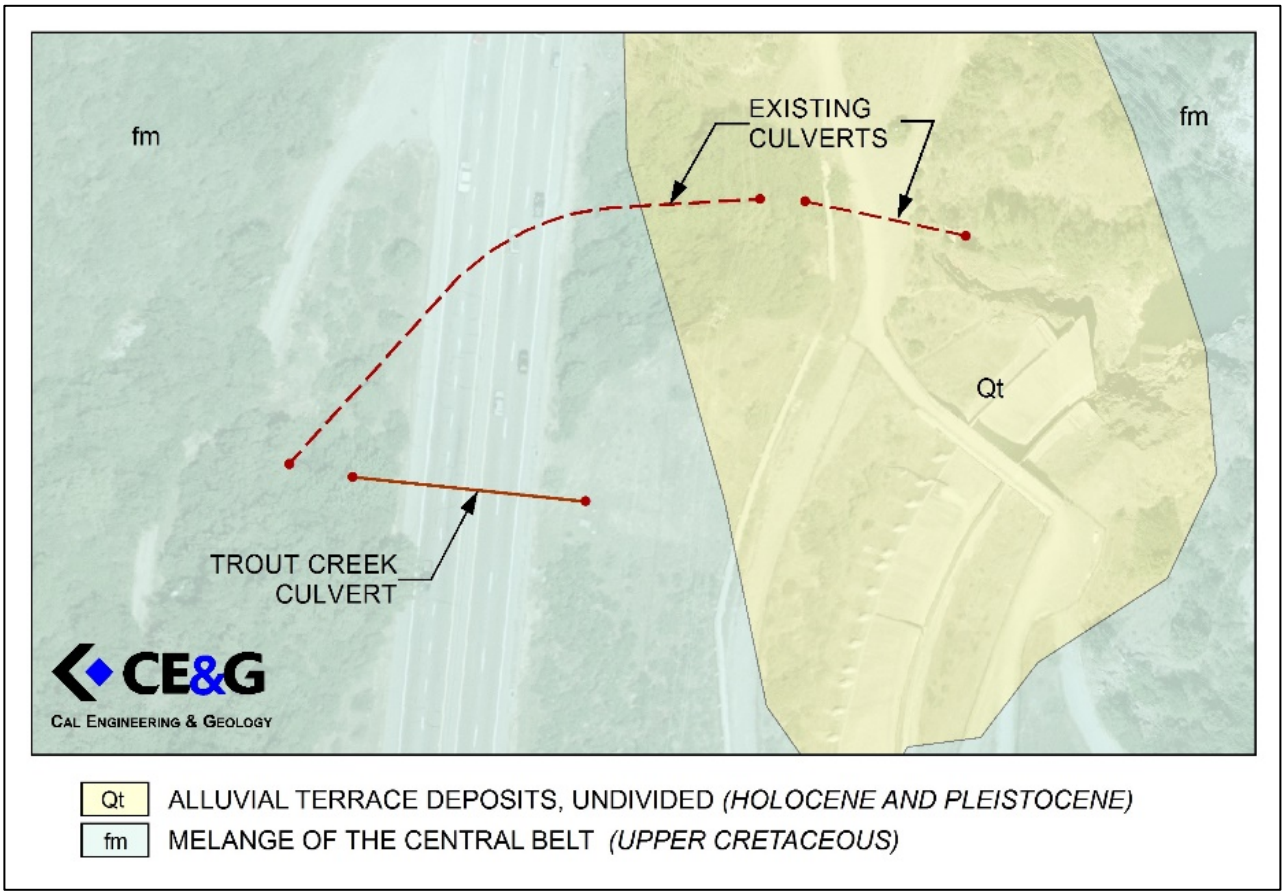
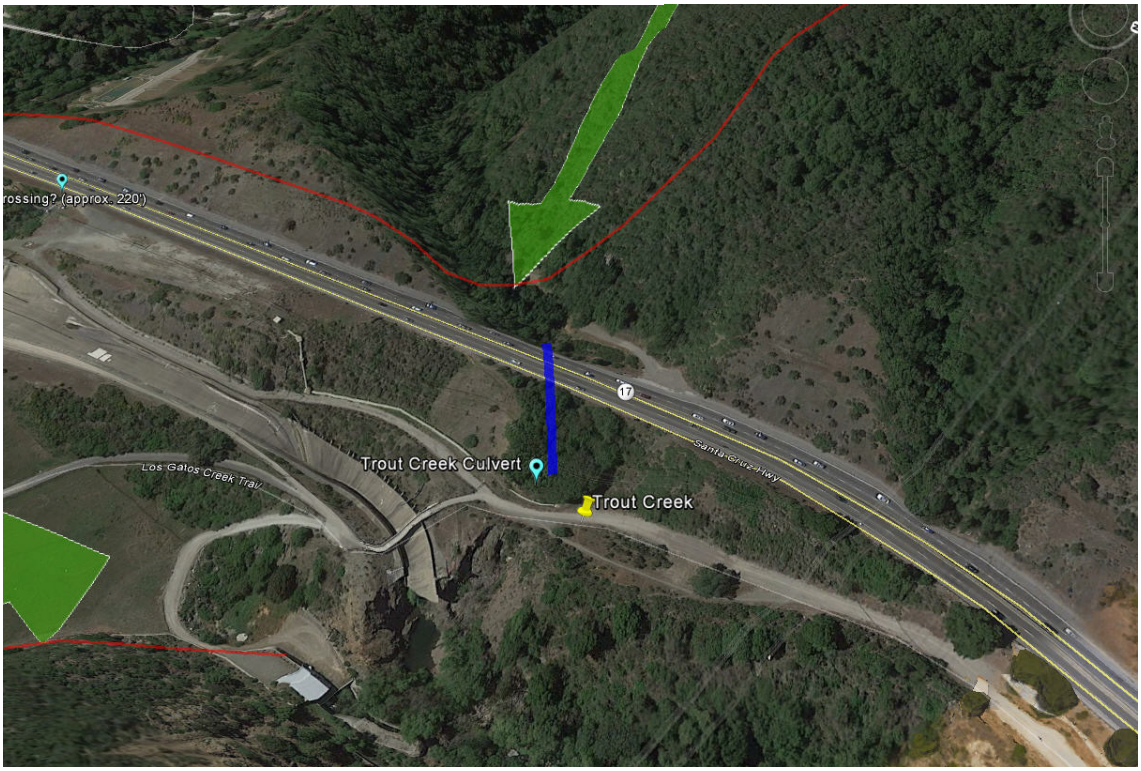


Figure 8: Trout Creek Crossing Site and Geology

Approximate conceptual opening (near top of photo) location on east side

Existing culvert inlet on west side



Trout Creek Canyon looking northwest – green arrows approximate wildlife path of travel (blue line is the existing culvert location - does not reflect the bend in the culvert)

Figure 9: Trout Creek Site Photos

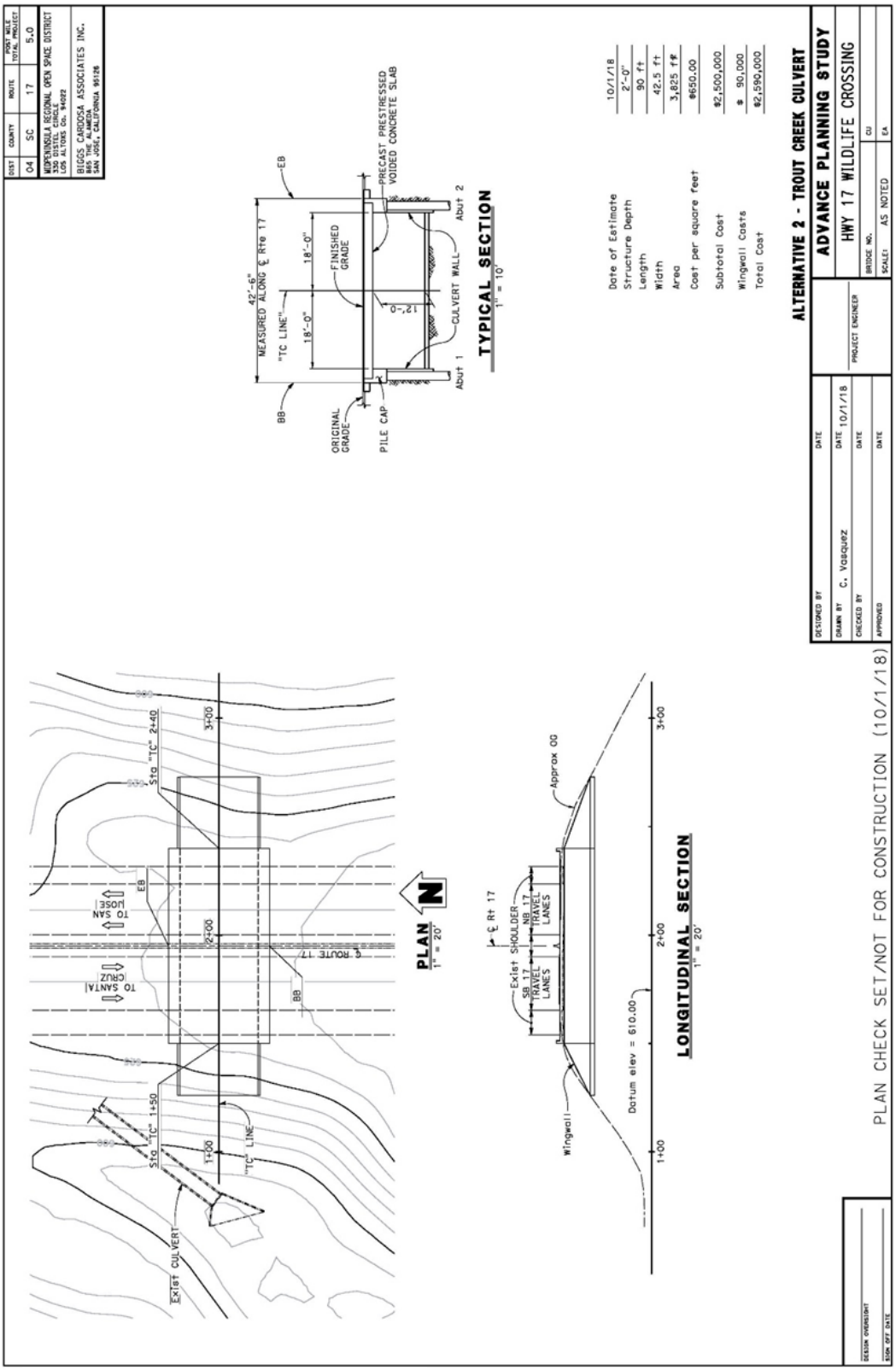


Figure 10: Trout Creek Crossing Conceptual Plan

3.11. Evaluation: Alternative 2 – Undercrossing at Trout Creek

A set of symbols was developed to score the alternative crossing locations and associated conceptual designs. This provides an "at a glance" sense of how the alternatives compare, but it is the description of the basis for the score that is most important.

(Location and design same as Prelim. Alts. Report; some criteria and evaluations added or changed as highlighted)

Symbol	Associated Scoring Level
●	High performance/score
◐	Medium performance/score
○	Low performance/score
	Not applicable/no score

Functionality for Wildlife

1.	**Proximity to wildlife corridor:** The location is close to the center of the identified corridor for mountain lion crossings, related road-kill records, and camera-detected approaches by deer and mountain lion**.**	**High**	●
2.	**Appropriate dimensions and design features:** The location offers the opportunity to build to the recommended dimensions.	**High**	●
3.	**Habitat connectivity:** The west side consists of continuous forested habitat within Trout Creek Canyon. Some low density housing and roads occur to the south and outside the Canyon. The east side is open habitat, but within a short distance connects to Los Gatos Creek and core habitat of St Joseph's Hill OSP.	**High**	●
4.	**Line of sight:** The new structure can be designed to ensure clear line of sight from one end of structure to the other.	**High**	●
5.	**Less human exposure:** The site is indirectly exposed to Los Gatos Creek Trail traffic – within a fenced off area and not immediately visible from the trail. The west side is located in proximity to utility facilities that are visited regularly by operations staff.	**Medium**	◐
6.	**Species of special status:** The location may offer many opportunities to accommodate use by species of special status found in main stem Los Gatos Creek that cannot currently access the west side of Trout Creek without crossing Highway 17.	**Medium**	◐

Functionality for Regional Trail Use

7.	**Accommodate the full range of potential regional trail users.** No feasible west side trail connection to public road or ADA compliant path of travel due to steep slopes and existing infrastructure.	**Low**	○
8.	**Provide as direct a connection as possible to the existing regional trail alignments.** Immediately adjacent to Los Gatos Creek Trail and connections to east. Close to potential west side regional trail connections but due to topography and existing infrastructure no feasible trail connection from the crossing was identified.	**Low**	○
9.	**Provide a safe and enjoyable trail.** Due to topography and existing infrastructure, no feasible west side trail connection was identified.	**Low**	○

10. Provide connection to a feasible trail route. Relatively close to potential west side connection but due to topography and existing infrastructure no feasible west side trail connection was identified.	**Low**	○
11. Provide emergency and maintenance vehicle access. No feasible way to create access for emergency or maintenance vehicles to the west side of the highway.	**Low**	○

Constructability/Cost

1. Location with fill or cut embankments: There are embankments on both sides into which the undercrossing could be constructed.	**High**	●
2. Environmental impact - avoid streams or removal of native trees and vegetation: At least one native tree would have to be removed on the west side and there would be some impact on the bank of a major tributary drainage to Los Gatos Creek.	**Medium**	◐
3. Soils and geology feasible for construction: Undercrossing is at an elevation higher than existing culvert, much of the undercrossing may pass through embankment fill.	**High**	●
4. Can be designed to meet standards. Appears that undercrossing can be built to comply with Caltrans standards.	**High**	●
5. Feasible construction staging and traffic impact. Affords good construction staging on both sides. Site on east side is outside current Los Gatos Creek Trail. Impact on highway traffic will be relatively limited; should not require highway closure, efforts to minimize impacts to west side utility access would be required.	**Medium**	◐
6. Minimal impact on existing facilities and operations. Ongoing operation would require bridging over the existing large water line on the east and changing the current fencing; efforts to minimize impacts to west side utility access would be required.	**Medium**	◐
7. Lower relative cost: The undercrossing would be relatively short and has good access on east, but limited access on west, proximity to existing culvert and need for wing walls may increase cost.	**Medium**	◐

Future Decision Factors

1. Project Readiness/Funding identified. **2. Access Permission/Ownership/Right of Way.** **3. Maintenance and Operation Arrangements.** **4. Public, Stakeholder and Partner Support.**		

4. Alternative 3: Southern Overcrossing Combined Trail/Wildlife, or 3a: Trail Only Overcrossing

Two options were developed and evaluated at this location because two separate crossings may be warranted to provide wildlife an opportunity to cross uninterrupted by recreational trail users and vice-versa. A narrower recreational trail bridge would be a less expensive option to provide recreational trail users with their own dedicated crossing if wildlife were provided a dedicated wildlife crossing elsewhere in the vicinity. The combined trail/wildlife crossing configuration option was retained in case some of the more desirable wildlife crossing options prove to be infeasible in subsequent more detailed studies.

4.1. Site Conditions

The team considered a new wildlife overcrossing at a location approximately 5000 feet south of the existing Trout Creek culvert. This is the only location in the Study Area where there are cut slopes and hills on both sides of the highway (see Figure 10). The terrain immediately to the west of the shoulder along Highway 17 at this location is a steep cut slope, but there is a level "bench" area located two thirds of the way up the slope providing an obvious end point for the overcrossing. On the east side of Highway 17 there is a smaller hill with a wider landing area, however it is approximately 25 feet lower than the west landing elevation. The entire footprint area for the overcrossing is in Caltrans ROW, although connection to it for construction and ongoing access would involve SJWC and SCVWD and approvals or agreements with them.

Access to the eastern landing point would be from Alma Bridge Road and a large relatively level area that has been used for other construction staging in the past. There is a steep oak-studded knoll south of this area that is accessible by a set of steep railroad tie steps. There are cell towers and utility enclosures on this knoll, as well as an electric/utility line that parallels the highway about 20 to 24 feet back from the edge of the embankment.

4.2. Geologic/Hydrologic Conditions

An inferred inactive fault with a NW-SE trend passes through this general area, separating mélange (to the north) from sheared sandstone and shale (to the south). The sheared sandstone and shale is mapped as containing remnant intact bedding, with layering in an orientation that would likely be adverse for NE-facing slopes, and neutral with respect to west-facing slopes. The western abutment and eastern abutment both would be located in areas of existing bedrock cut.

The overcrossing location is elevated and removed from any significant drainage areas and would not be affected by drainage except direct rainfall onto the structure and the immediate approaches. Drainage from the structure itself would be conducted to drain facilities that discharged on the shoulders of the highway or at the eastern landing, where water could potentially be conveyed to the reservoir or Los Gatos Creek.

4.3. Structural Design/Construction Concept

This overcrossing would be a reinforced concrete bridge meeting Caltrans standards. At each bridge end, the proposed supports would most likely consist of drilled piles supporting concrete cap abutments. Caltrans typically requires that a highway overcrossing have a minimum vertical clearance of 16.5 feet

over the entire width of traveled way (including shoulders) to the soffit (underside) of the structure. However, pedestrian-only structures must have a greater height of 18.5 feet of vertical clearance per Caltrans requirements. This is a safety requirement to provide a greater margin of clearance for trucks from the pedestrian structures, which tend to be less robust than vehicular bridges.

The existing interior shoulder widths on either side of the concrete barrier located along the center of Highway 17 might allow sufficient room for placement of a center support creating a two span overcrossing, however the barrier would need to be modified at each approach to the support column. Alternatively, support columns could be located outside of the exterior shoulders allowing for a 3 span structure with the center segment clear spanning Highway 17 shown in Figures 14 and 15.

There is an approximate 25 foot elevation drop between the bench on the west side of the highway and the knoll on the east (about a 10% gradient for the 245 foot span) and 25 feet between the top of the knoll and the level staging area to the north (about a 33% gradient that would require the construction of a long earth ramp for access to the knoll), as well as a road from the staging area to Alma Bridge Road that likely exceeds the goal of a 5% gradient for non-motorized access and a relatively level approach for a wildlife crossing.

The combined trail/wildlife overcrossing would be designed to accommodate maintenance and emergency vehicles, the “live load” of potentially heavy trail traffic, including horses, and to also to function as a wildlife crossing, the weight of soil to be placed on the structure to allow growth of continuous habitat. The combined trail and wildlife crossing would also require sound walls on the structure to encourage use by wildlife.

4.4. Functionality for Wildlife

The overcrossing location is south of the identified desirable location for a wildlife crossing. On the east there is more open, disturbed ground to cross, more climbing and more barriers to be negotiated. On the west the bench in the cut slope and adjacent undisturbed forested areas in the Caltrans ROW could provide relatively direct access to Trout Creek or the western arm of Lexington Reservoir. The overcrossing might be more attractive to deer than an undercrossing, but this is likely to be offset by the habitat connectivity deficit.

4.5. Functionality for Trail Use

The proximity of the overcrossing to the dam spillway would allow a trail connection that bypasses the narrow and winding portion of Alma Bridge Road to the south, which would be desirable from a traffic conflict reduction standpoint. Also an overcrossing is more desirable from a user experience standpoint than an undercrossing. However, the grade differential that would have to be overcome may be a “fatal flaw” for this alternative, especially when combined with the challenge of completing a trail connection to Montevina Road

4.6. Environmental Resources and Potential Impacts

There are no apparent sensitive resources in the footprint of or close proximity to this alternative, with the exception of some oak trees and other native vegetation on the knoll on the east side that might be impacted. The trail connection from the west side would entail passing through oak woodlands and over stream channels that will require environmental assessment to determine impacts. The bridge structure

would result in a potentially substantial visual change to the highway setting, especially in the view of motorists. This will need to be evaluated as part of future environmental analysis (though the view impact may not necessarily be negative, depending on the design of the structure, and given the steep cut slopes made for the highway at this point).

4.7. Construction Staging and Traffic Control

Would be similar to the previous alternatives, and potentially requiring less lane closure, depending on whether a center support column was included in the design.

There is ample construction staging area on the east in the area previously used for the water treatment plant improvement project. Access to the construction areas for the footings and abutments along the highway shoulders would be very constrained, as would the access to the landing on the bench on the west. Access to the knoll on the east would require construction of an access ramp – a significant project in its own right.

4.8. Relationship to Adjacent Facilities

This alternative would require construction in close proximity to the existing overhead utility lines, and communication facilities, which may be a significant constraint. Construction access to the crossing would occupy or be adjacent to part of the staging area that is used for SJWC and SCVWD projects, and could have ongoing conflict with such construction staging use. It would introduce public access close to cell towers and utility enclosures within an area that is currently off-limits to the public requiring new security fencing and complicating the protection of and service access to those existing facilities.

4.9. Maintenance and Management Considerations

Assuming the improvements to accommodate non-motorized access were implemented, there would be easy access for inspection and maintenance. The overcrossing structure would entail significantly more elements than an undercrossing, and thus require more maintenance, such as the railings and debris screens. If a paved route that is drivable by service vehicles was constructed as part of this alternative it could have access benefits to SJWC and SCVWD, as currently access to facilities on the other side of the highway requires a circuitous route down to the Town of Los Gatos and back.

4.10. Cost Considerations

The Trail/Wildlife Overcrossing Alternative is estimated to cost $15.26 million in 2018 dollars, as detailed in the table below, and $20.45 million in 2024 dollars. The Trail Only Overcrossing Alternative is estimated to cost $6.64 million in 2018 dollars, as detailed in the table below, and $8.9 million in 2024 dollars. These costs reflect the fact that an overcrossing will be a much longer and more substantial structure than an undercrossing, and for the combined alternative, the costs of making the overcrossing sufficiently wide, with a planted soil surface, to attract wildlife use. A significant part of the cost pertains to the requirements to construct the structure in this challenging setting on a busy highway with significant utility conflicts and limited construction access.

Table 11: Conceptual Cost Estimate, Alternative 3 – Trail/Wildlife Overcrossing

Prepared 10-2-2018				
ROADWAY & STRUCTURE ITEMS	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Clearing and Grubbing	1	LS	$60,000	$60,000
Grading and Drainage	1	LS	$120,000	$120,000
Temporary Construction Access/Staging Area*	1	LS	$120,000	$120,000
Bridge Overcrossing Structure (245'L x 32'W)	1	LS	$5,490,000	$5,490,000
Wildlife Fencing and Features	1	LS	$180,000	$180,000
Habitat Site Preparation	1	LS	$60,000	$60,000
Traffic Control Systems	1	LS	$180,000	$180,000
Traffic Management Plan	1	LS	$60,000	$60,000
Water Pollution Control and Treatment BMPs	1	LS	$60,000	$60,000
Environmental Mitigation	1	LS	$60,000	$60,000
Misc. Minor Items (20%)	1	%	$1,300,000	$1,300,000
Mobilization (10%)	1	%	$700,000	$700,000
Contingency (25%)	1	%	$1,600,000	$1,600,000
			TOTAL CONSTRUCTION	**$10,000,000**
RIGHT OF WAY:	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Misc. Utilities	1	LS	120,000	**120,000**
Caltrans PID Cost	1	LS	120,000	**120,000**
Other Permits and Fees	1	LS	120,000	**120,000**
			RIGHT OF WAY SUBTOTAL	**360,000**
ENGINEERING SUPPORT				
Engineering Studies (6%)				**$600,000**
Environmental Studies (3%)				**$300,000**
Design Engineering (15%)				**$1,500,000**
Construction Staking (2%)				**$200,000**
Construction Support (3%)				**$300,000**
Construction Management (20%)**				**$2,000,000**
			ESTIMATED PROJECT COSTS	**$15,260,000**
* Includes permanent maintenance access/trail access				
** Assume Caltrans AAA Construction Contract				

Table 12: Conceptual Cost Estimate, Alternative 3a – Trail-Only Overcrossing

Prepared 10-2-2018				
ROADWAY & STRUCTURE ITEMS	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Clearing and Grubbing	1	LS	$60,000	$60,000
Grading and Drainage	1	LS	$120,000	$120,000
Temporary Construction Access/Staging Area*	1	LS	$120,000	$120,000
Bridge Overcrossing Structure (245'L x 14'W)	1	LS	$1,715,000	$1,715,000
Wildlife Fencing and Features	1	LS	$180,000	$180,000
Habitat Site Preparation	1	LS	$60,000	$60,000
Traffic Control Systems	1	LS	$180,000	$180,000
Traffic Management Plan	1	LS	$60,000	$60,000
Water Pollution Control and Treatment BMPs	1	LS	$60,000	$60,000
Environmental Mitigation	1	LS	$60,000	$60,000
Misc. Minor Items (20%)	1	%	$600,000	$600,000
Mobilization (10%)	1	%	$300,000	$300,000
Contingency (25%)	1	%	$660,000	$660,000
			TOTAL CONSTRUCTION	**$4,200,000**
RIGHT OF WAY:	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Misc. Utilities	1	LS	120,000	**120,000**
Caltrans PID Cost	1	LS	120,000	**120,000**
Other Permits and Fees	1	LS	120,000	**120,000**
			RIGHT OF WAY SUBTOTAL	**360,000**
ENGINEERING SUPPORT				
Engineering Studies (6%)				**$260,000**
Environmental Studies (3%)				**$130,000**
Design Engineering (15%)				**$630,000**
Construction Staking (2%)				**$90,000**
Construction Support (3%)				**$130,000**
Construction Management (20%)**				**$840,000**
			ESTIMATED PROJECT COSTS	**$6,640,000**
* Includes permanent maintenance access/trail access				
** Assume Caltrans AAA Construction Contract				

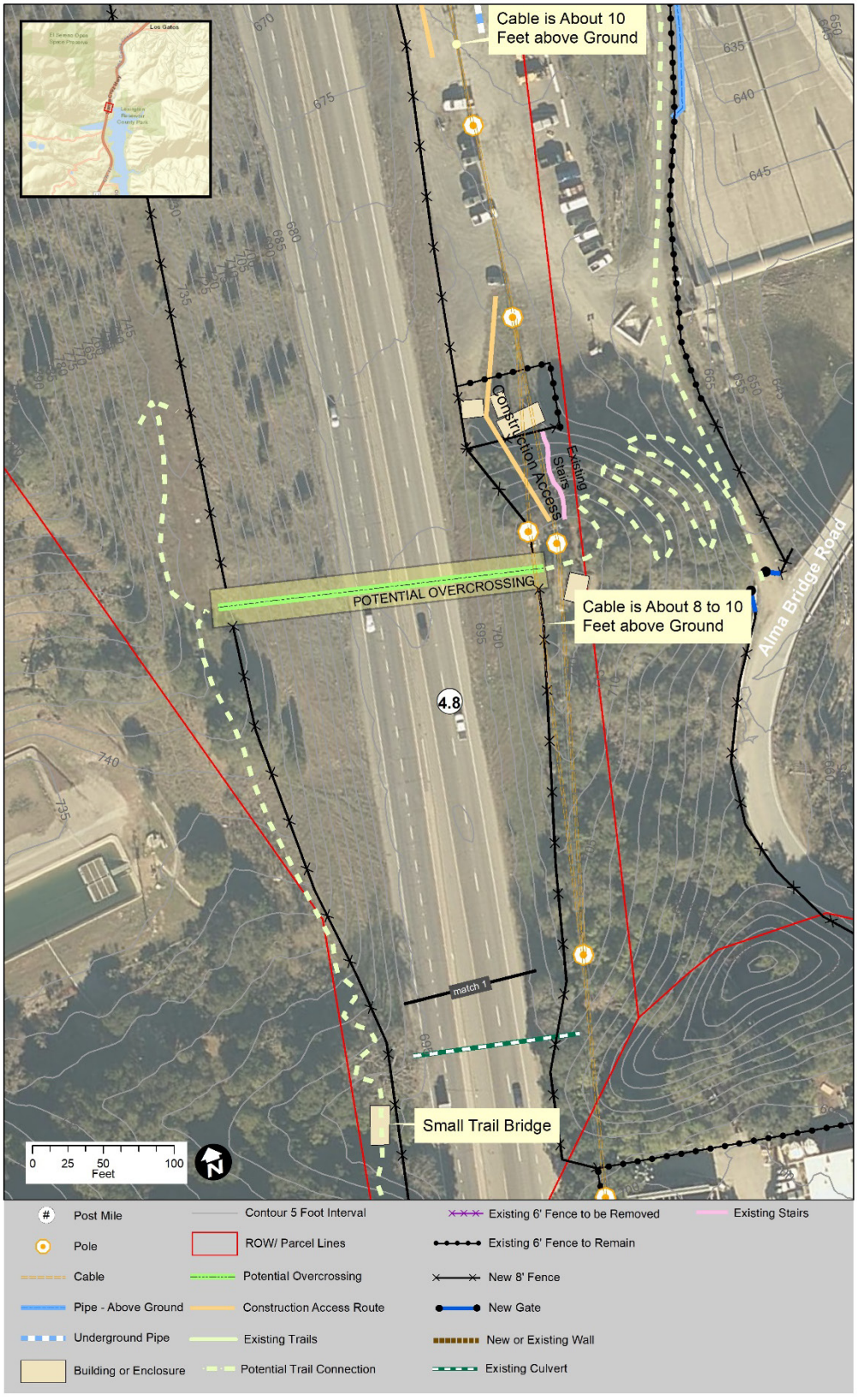


Figure 11: Southern Overcrossing Site Plan

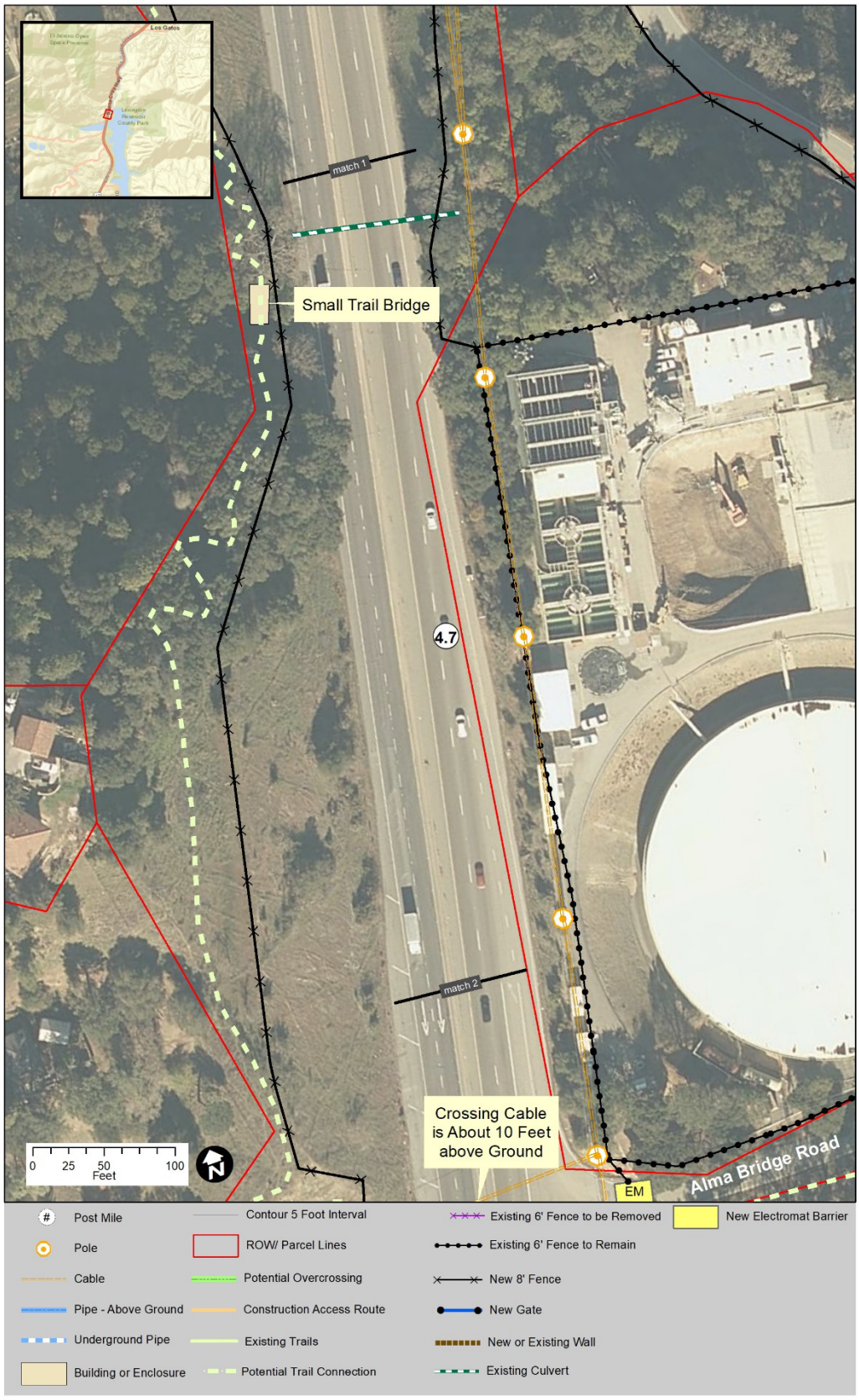


Figure 12: Southern Overcrossing Trail Connection

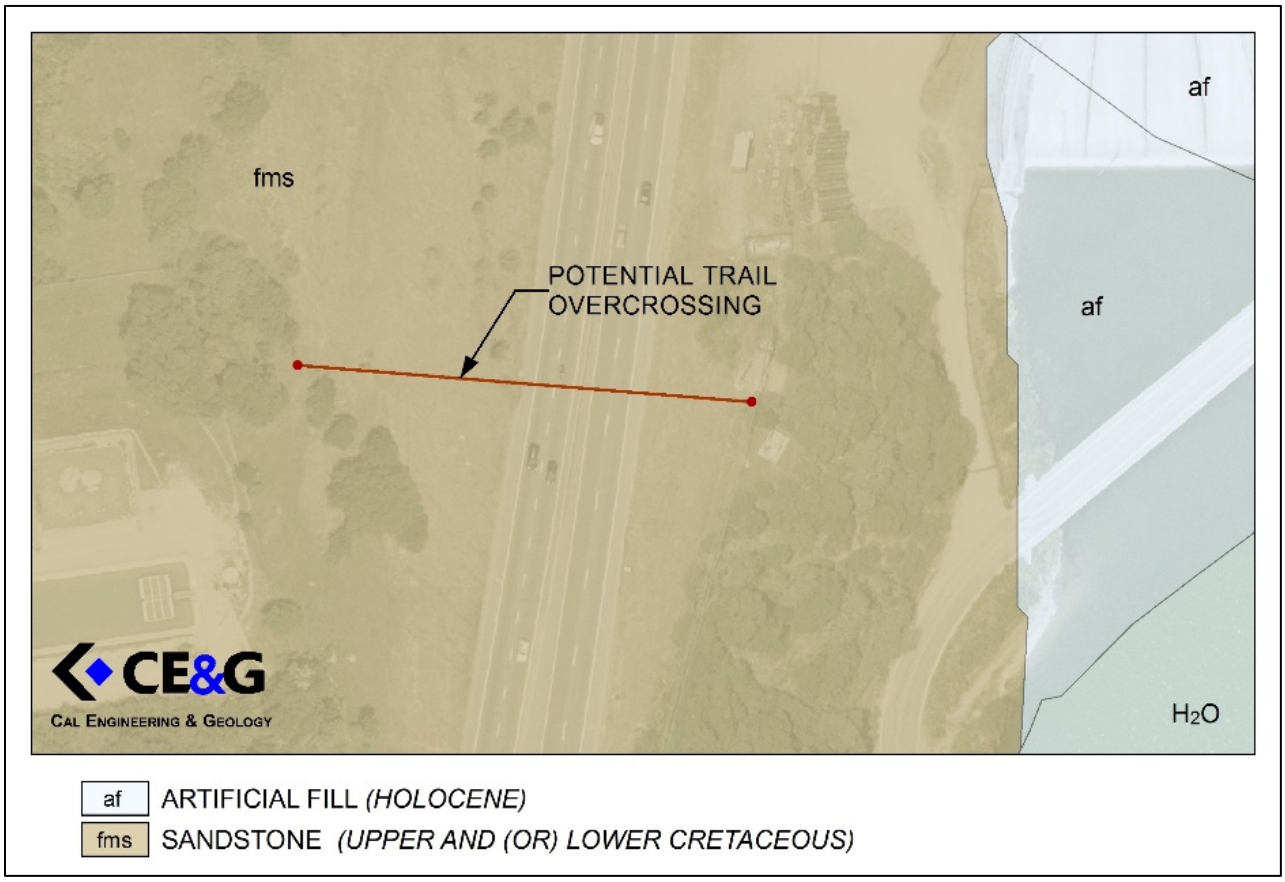
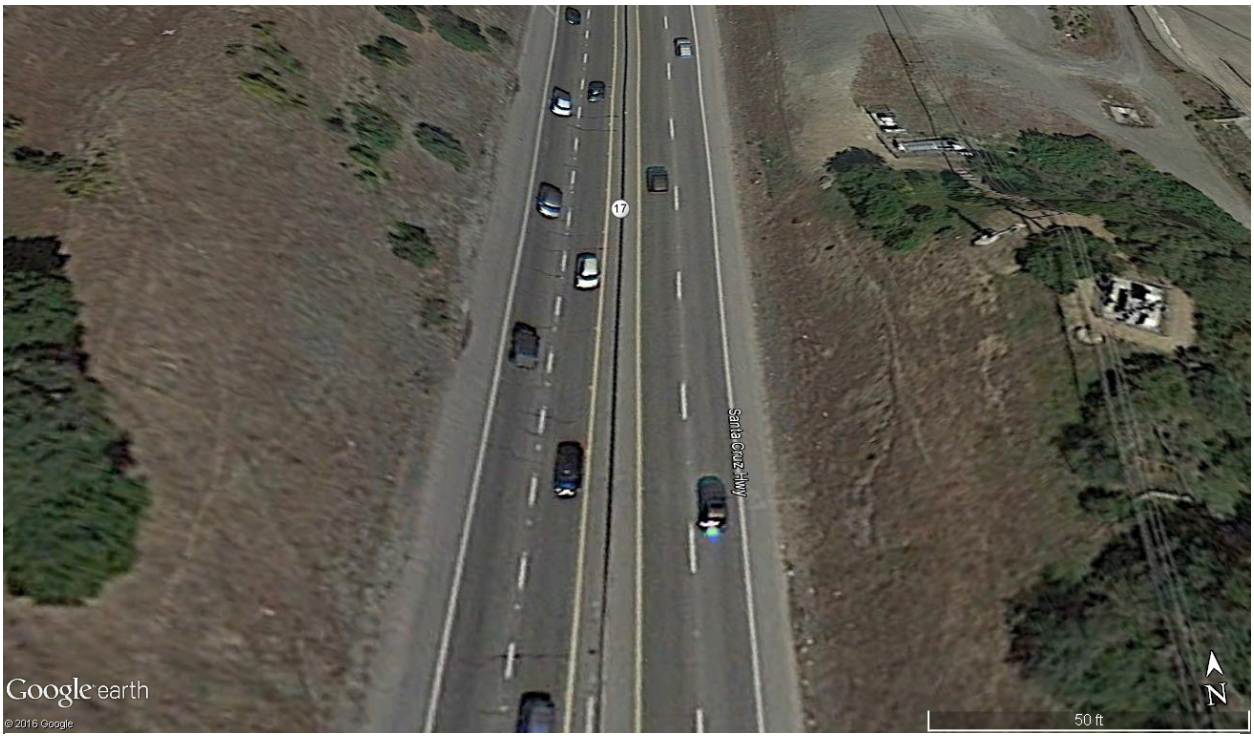


Figure 13: Overcrossing Site and Geology



Potential overcrossing site looking north

View of east landing area looking south west – note utilities and cell towers

View from east side south toward potential landing area – note utilities and cell towers

Figure 14: Overcrossing Site Photos

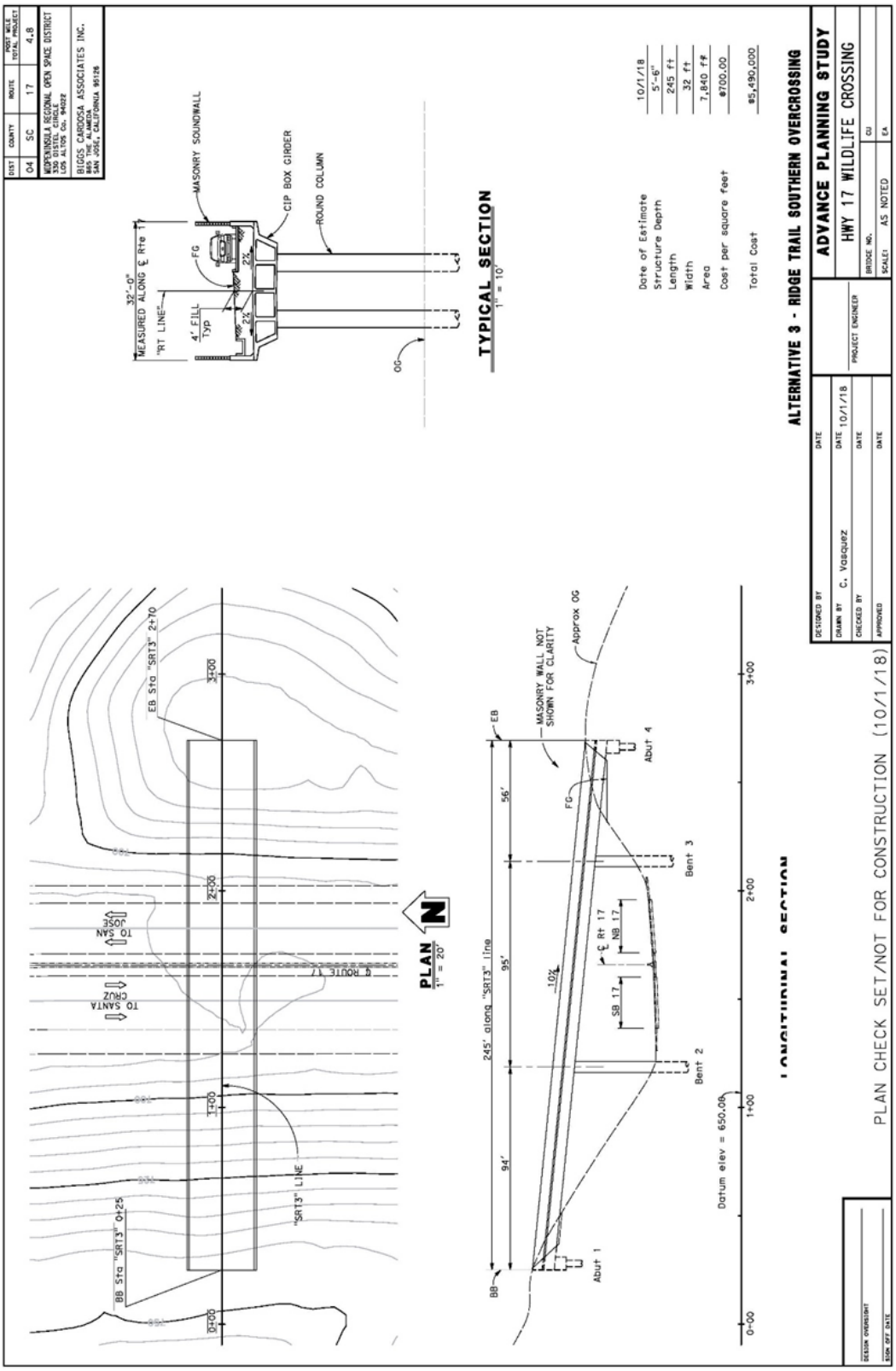


Figure 15: Alt. 3 Trail/Wildlife Overcrossing Conceptual Plan

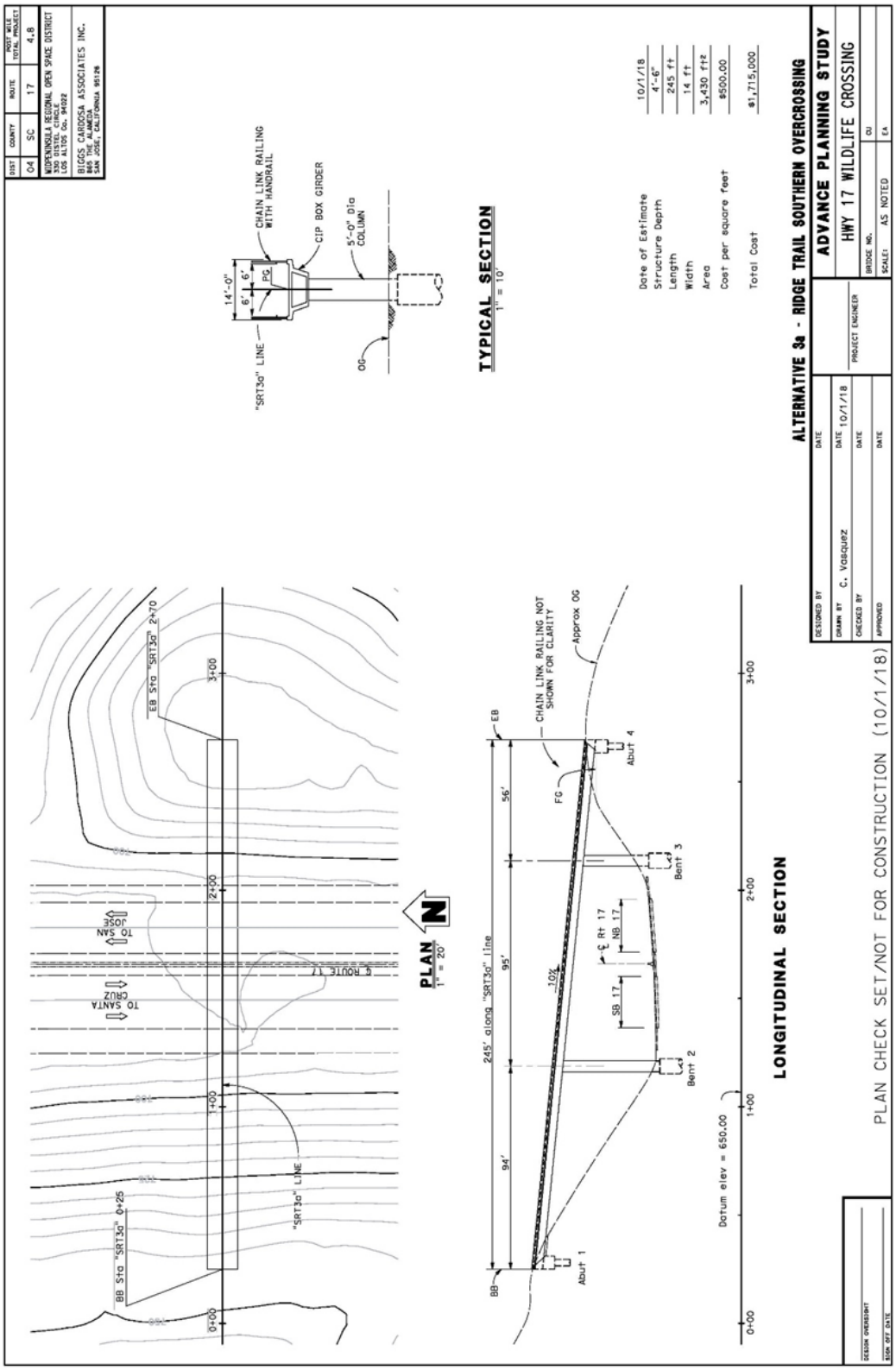


Figure 16: Alt. 3a Trail-Only Overcrossing Conceptual Plan

4.11. Evaluation: Alternative 3 – Southern Trail/Wildlife Overcrossing

A set of symbols was developed to score the alternative crossing locations and associated conceptual designs. This provides an "at a glance" sense of how the alternatives compare, but it is the description of the basis for the score that is most important.

(Location and design same as Prelim. Alts. Report; some criteria and evaluations added or changed as highlighted)

Symbol	Associated Scoring Level
●	High performance/score
◐	Medium performance/score
○	Low performance/score
	Not applicable/no score

Functionality for Wildlife

1. **Proximity to wildlife corridor:** The location is south of attempted and successful crossings and movements of radio-collared mountain lions.	**Medium**	◐
2. **Appropriate dimensions and design features:** The structure does not meet primary criteria for mountain lions, but is more aligned with criteria for deer and small mammal species (foxes, raccoons,).	**Medium**	◐
3. **Habitat connectivity:** There is low habitat connectivity at the site. The east side is a steep, open cut slope, while the west side has low amounts of cover that will provide some access to Trout Creek Canyon.	**Low**	○
4. **Line of sight:** Once wildlife reaches the structure there would be direct line of sight.	**Medium**	◐
5. **Less human exposure:** The east side wildlife connections would pass the Los Gatos Creek Trail and through staging and operations areas for the dam and water system utilities located on both sides.	**Low**	○
6. **Species of special status:** The location does not offer any opportunities to accommodate use by special status species.	**Low**	○

Functionality for Regional Trail Use

1. **Accommodate the full range of potential regional trail users.** Overcrossing would provide ample space for a trail. Could potentially connect to a "back country" trail, but no feasible connection to public road or ADA compliant path of travel on either side.	**Medium**	◐
2. **Provide as direct a connection as possible to the existing regional trail alignments.** West side connection relies on road cut "benches" above the highway and a steep lengthy trail to connect to west side regional trails. East side connection to Alma Bridge Road would require "backtracking" downhill or a new recreational trail bridge over the Lenihan Dam spillway.	**Medium**	◐

3. **Provide a safe and enjoyable trail.** Eastern connection would require switchbacks up steep slope. Western portions could connect Montevina Road to the south but involves switchbacks. A step back country trail to connect to trails in El Sereno OSP could be developed and would provide good separation from traffic and good views. East side trail connections along Alma Bridge Road would be exposed to vehicle and truck traffic.	**Medium**	◐
4. **Provide connection to a feasible trail route.** Moderately close to potential west side connections but access permission challenges and steep slopes.	**Medium**	◐
5. **Provide emergency and maintenance vehicle access.** Potential access for small maintenance and emergency vehicles to either side, but steep slopes constrain. No feasible way to create access for full size emergency or maintenance vehicles.	**Low**	○

Constructability/Cost

1. **Location with fill or cut embankments:** There are cut embankments on both sides into which the overcrossing could be constructed, but the 25 foot elevation difference from west to east is a challenge for access.	**Medium**	◐
2. **Environmental impact - avoid streams or removal of native trees and vegetation:** There are no riparian resources nearby; top of eastern knoll with oak woodland would be disturbed by construction of trail switchbacks.	**Medium**	◐
3. **Soils and geology feasible for construction:** Both overcrossing abutments would likely be founded in bedrock, already largely exposed by existing cuts.	**High**	●
4. **Can be designed to meet standards.** The elevation difference will create a challenge.	**Medium**	◐
5. **Feasible construction staging and traffic impact.** Affords good construction staging on the east; west side is limited. Construction will not interfere with Los Gatos Creek Trail.	**Medium**	◐
6. **Minimal impact on existing facilities and operations.** The overhead utility lines and communications equipment on the east will be a constraint. Ongoing operation would limit the ability to use the current staging area for other projects. Introducing trail use in proximity to water facilities is of concern.	**Low**	○
7. **Lower relative cost:** An overcrossing will be significantly more expensive than an undercrossing (higher cost = lower score)	**Low**	○

Future Decision Factors

1. Project Readiness/Funding identified. **2. Access Permission/Ownership/Right of Way.** **3. Maintenance and Operation Arrangements.** **4. Public, Stakeholder and Partner Support.**		

4.12. Evaluation: Alternative 3a – Southern Overcrossing Trail-Only

A set of symbols was developed to score the alternative crossing locations and associated conceptual designs. This provides an "at a glance" sense of how the alternatives compare, but it is the description of the basis for the score that is most important.

Symbol	Associated Scoring Level
●	High performance/score
◐	Medium performance/score
○	Low performance/score
	Not applicable/no score

(New alternative design and evaluation)

Functionality for Wildlife

1. **Proximity to wildlife corridor:** The location is south of attempted and successful crossings and movements of radio-collared mountain lions.	**Medium**	◐
2. **Appropriate dimensions and design features:** The structure does not meet primary criteria for mountain lions. Is more aligned with criteria for deer and small mammal species (foxes, raccoons), but narrow width and lack of vegetation and sound buffering reduces functionality.	**Low**	○
3. **Habitat connectivity:** There is low habitat connectivity at the site. The east side is adjacent to the Lenihan Dam spillway, which is a large barrier to wildlife, while the west side provides some access to Trout Creek Canyon.	**Low**	○
4. **Line of sight:** Once wildlife reaches the structure there would be direct line of sight.	**Medium**	◐
5. **Less human exposure:** The east side wildlife connections would pass the Los Gatos Creek Trail and through staging and operations areas for the dam and water system utilities located on both sides.	**Low**	○
6. **Species of special status:** The location does not offer any opportunities to accommodate use by special status species.	**Low**	○

Functionality for Regional Trail Use

1. **Accommodate the full range of potential regional trail users.** Overcrossing would provide ample space for a trail. Could potentially connect to a "back country" trail, but no feasible connection to public road or ADA compliant path of travel on either side.	**Medium**	◐
2. **Provide as direct a connection as possible to the existing regional trail alignments.** West side connection relies on road cut "benches" above the highway and a steep lengthy trail to connect to west side regional trails. East side connection to Alma Bridge Road would require "backtracking" down hill or a new recreational trail bridge over the Lenihan Dam spillway.	**Medium**	◐

3. Provide a safe and enjoyable trail. Eastern connection would require switchbacks up steep slope. Western portions could connect Montevina Road to the south but involves switchbacks. A step back country trail to connect to trails in El Sereno OSP could be developed and would provide good separation from traffic and good views. East side trail connections along Alma Bridge Road would be exposed to vehicle and truck traffic.	**Medium**	◐
4. Provide connection to a feasible trail route. Moderately close to potential west side connections but access permission challenges and steep slopes.	**Medium**	◐
5. Provide emergency and maintenance vehicle access. Potential access for small maintenance and emergency vehicles to either side, but steep slopes constrain. No feasible way to create access for full size emergency or maintenance vehicles.	**Low**	○

Constructability/Cost

1. Location with fill or cut embankments: There are cut embankments on both sides into which the overcrossing could be constructed, but the 25 foot elevation difference from west to east is a challenge for access.	**Medium**	◐
2. Environmental impact - avoid streams or removal of native trees and vegetation: There are no riparian resources nearby; top of eastern knoll with oak woodland would be disturbed by construction of trail switchbacks.	**Medium**	◐
3. Soils and geology feasible for construction: Both overcrossing abutments would likely be founded in bedrock, already largely exposed by existing cuts.	**High**	●
4. Can be designed to meet standards. The elevation difference will create a challenge.	**Medium**	●
5. Feasible construction staging and traffic impact. Affords good construction staging on the east; west side is limited. Construction will not interfere with Los Gatos Creek Trail.	**Medium**	◐
6. Minimal impact on existing facilities and operations. The overhead utility lines and communications equipment on the east will be a constraint. Ongoing operation would limit the ability to use the current staging area for other projects.	**Low**	○
7. Lower relative cost: An overcrossing will be significantly more expensive than an undercrossing (higher cost = lower score)	**Medium**	◐

Future Decision Factors

1. Project Readiness/Funding identified. **2. Access Permission/Ownership/Right of Way.** **3. Maintenance and Operation Arrangements.** **4. Public, Stakeholder and Partner Support.**		

5. Alternative 4: Montevina Trail/Wildlife Undercrossing, or 4a: Montevina Trail Only Undercrossing

Two options were developed and evaluated at this location because two separate crossings may be warranted to provide wildlife an opportunity to cross uninterrupted by recreational trail users and vice-versa. A narrower recreational trail undercrossing would be a less expensive option to provide recreational trail users with their own dedicated crossing if wildlife were provided a dedicated wildlife crossing elsewhere in the vicinity. The combined trail/wildlife undercrossing configuration option was retained in case some of the more desirable wildlife crossing options prove to be infeasible in subsequent more detailed studies.

5.1. Site Conditions

Approximately 500 feet to the south of where Montevina Road and Alma Bridge Road respectively turn west and east away from the highway, the highway transitions southward from being located in a bedrock cut to being constructed atop a fill embankment. An undercrossing could potentially be built to connect from Montevina Road on the west to the existing trail on the east, and a connection could be made along the trail north to Alma Bridge Road (see Figure 16). There is approximately 12 to 15 feet of elevation difference between the surface of the highway and the adjacent road or trail beyond the embankments. It should be noted that when the Bear Creek Road overcrossing was designed and permitted in the 1990s frontage road connecting trails were included to connect to a future pedestrian crossing at or near to Montevina/Alma Bridge Roads.

The west side features an approximately 2:1 sloped embankment about 25 feet wide between Montevina Road and the highway, while the east side features a slightly steeper and taller embankment adjacent to an unpaved road/trail that is used as a trail connection along the shore of Lexington Reservoir.

5.2. Geologic/Hydrologic Conditions

Bedrock in this vicinity is mapped as sheared sandstone and shale bedrock similar to that mapped at the proposed overcrossing site. As noted above, in this vicinity, the highway passes southward from a cut through bedrock onto a fill embankment, and the proposed undercrossing location would be within this fill embankment section. The exact subsurface geometry of the contact between the fill embankment (to the south) and the presumably benched bedrock cut (to the north) against/on which the embankment sits is not known.

The proposed trail undercrossing would provide an additional penetration beneath Highway 17. The proposed alignment under consideration is approximately the same elevation as the existing Lexington culvert, although the invert elevation has yet to be determined. If the inlet invert elevation is lower than the Lexington culvert, reservoir operations will determine the maximum reservoir surface elevation and thus will control whether the undercrossing invert would be dry under those conditions. If the invert elevation is higher than the Lexington culvert, reservoir water could not reach the culvert.

5.3. Structural Design/Construction Concept

This undercrossing would be a pile-supported precast concrete bridge structure similar to that described for the Ravine Culvert location or Trout Creek. At approximately 150 feet it would be longer than either of those locations due to the need to cross the off-ramp lane to Alma Bridge Road in addition to the four highway lanes. A trail undercrossing would only need to be a minimum of 12 feet wide, greater width would increase the light and general comfort level in the undercrossing and increase its performance as a wildlife crossing, so a width of 32 feet has been assumed in the conceptual plan for the combined crossing. An improved connection to Alma Bridge Road is an inherent feature of this concept both for construction access and to accommodate non-motorized connections. The shallow depth of the embankment that supports Highway 17 is a potential constraint for design of this crossing. A solution may be to construct the opening on the west slightly lower than the elevation of Montevina Road, and slope the undercrossing to the east, where the toe of the embankment is significantly lower than the surface of the highway. The existing trail is wide enough to construct a one lane road, but a two-way construction access, especially accommodating large trucks, and a permanent connection accommodating both a paved trail/service road and an unpaved trail, would require construction of a retaining wall west of the trail/road to create the additional space.

5.4. Construction Staging and Traffic Control

The space and access on the east side is limited, but there would be limited interference with trail or dam operations traffic on this unpaved connector trail. Access to the east side from Alma Bridge Road would be a significant challenge because it would have to enter and exit near a sharp corner with limited sight distance where there is frequent truck traffic to the Lexington Canyon Quarry and occasional truck traffic to the water treatment plant, as well as heavy public vehicle traffic, though that would mostly be outside of construction hours. There would be fairly ample access and staging space on the west as there is a large, relatively level space just to the north left from when there was a road connection onto the highway at this point.

5.5. Functionality for Wildlife

This location is well south of the “hotspot” for attempted and successful mountain lion crossings, which is north of the dam, but there have been several deer and a turtle killed in the highway recently at this location. [1] Large wildlife would have to travel along Alma Bridge Road or the shoreline of the reservoir and across Montevina Road to get to continuous habitat areas. Although the dimensions could be achieved, this alternative would not meet the primary criteria for location of a wildlife crossing, and habitat connectivity. It is considered primarily as a Ridge Trail/ non-motorized crossing alternative that would be a back-up opportunity for deer and mountain lions. However, due to its’ location between the main body of Lexington Reservoir and the arm that drains Lyndon Creek, this location may offer opportunities to accommodate aquatic species, including the special status western pond turtle, California red legged frog, and giant salamander. The need to cross Montevina Road is still a barrier that could potentially be addressed through mitigation (i.e. a small animal/amphibian undercrossing).

[1] Tanya Diamond, Pathways for Wildlife, oral communication, June 2016.

5.6. Functionality for Trail Use

There is adequate shoulder space along the portions of Montevina Road that parallels Highway 17 to accommodate trail access, although a new road/trail crossing would be needed (limited sight distance due to the curve in the road may not allow for this, without reconfiguration). The access along Alma Bridge Road is a greater concern because there are minimal to no shoulders, a sharp curve with limited sight visibility, and heavy truck traffic, as well as public vehicles at times when trail use is likely to be high. Santa Clara County Roads and Airports Department staff expressed concern about this issue, and preferred crossing options that did not add trail traffic to Alma Bridge Road in this segment. This alternative should be linked to a project that would provide an improved trail connection along Alma Bridge Road toward the Los Gatos Creek Trail, the County Parks boat ramp and parking area to the east, and the continuation of the Ridge Trail on the Priest Rock Trail on the east side of the reservoir

5.7. Environmental Resources and Potential Impacts

There would be relatively low potential for environmental impacts for this alternative because the construction would occur entirely within/under existing highway improvements and adjacent disturbed areas. However, proximity to the reservoir may create potential for aquatic species to enter the construction area without exclusion measures in place.

5.8. Relationship to Adjacent Facilities

This alternative would have minimal, if any direct ongoing impact on dam, water system or highway/road facilities, except that it would increase the amount of trail traffic on Montevina Road and Alma Bridge Road. If a paved route that is drivable by service vehicles could be constructed through the undercrossing, it could have access benefits to SJWC and SCVWD, as currently access to facilities on the other side of the highway requires a circuitous route down to the Town of Los Gatos and back. Such a paved path/road connection would be consistent with the objectives to accommodate as wide a range of non-motorized access as possible, and to be ADA compliant.

5.9. Maintenance and Management Considerations

This crossing location and configuration would have good access and visibility for maintenance and management. The undercrossing would be relatively dark given its length, so though lighting is generally not desired by the Ridge Trail, for the purposes of broader non-motorized transportation access, it may be desirable; possibly using solar-powered LED fixtures.

5.10. Cost Considerations

The combined trail/wildlife undercrossing alternative is estimated to cost $9.56 million in 2018 dollars, as detailed in the table below, and $12.81 million in 2024 dollars. The Trail Only Undercrossing alternative is estimated to cost $5.39 million in 2018 dollars, as detailed in the table below, and $7.22 million in 2024 dollars. The structure is similar to the other undercrossings; these relatively low costs reflect the fact that the site is not in a riparian corridor, does not have significant utility conflicts, and has relatively good construction access. A significant part of the cost pertains to the requirements to construct the structure in this challenging setting on a busy highway. The proximity to the reservoir on the east side also adds to the costs.

Table 13: Conceptual Cost Estimate, Alternative 4 – Montevina Trail/Wildlife Undercrossing

Prepared 10-2-2018				
ROADWAY & STRUCTURE ITEMS	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Clearing and Grubbing	1	LS	$60,000	$60,000
Grading and Drainage	1	LS	$60,000	$60,000
Temporary Construction Access/Staging Area*	1	LS	$180,000	$180,000
Undercrossing Structure (104'x42.5'x12')	1	LS	$3,240,000	$3,240,000
Wildlife Fencing and Features	1	LS	$12,000	$12,000
Habitat Site Preparation	1	LS	$60,000	$60,000
Traffic Control Systems	1	LS	$180,000	$180,000
Traffic Management Plan	1	LS	$60,000	$60,000
Water Pollution Control and Treatment BMPs	1	LS	$60,000	$60,000
Environmental Mitigation	1	LS	$60,000	$60,000
Misc. Minor Items (20%)	1	%	$800,000	$800,000
Mobilization (10%)	1	%	$400,000	$400,000
Contingency (25%)	1	%	$1,000,000	$1,000,000
			TOTAL CONSTRUCTION	**$6,200,000**
RIGHT OF WAY:	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Misc. Utilities	1	LS	60,000	**60,000**
Caltrans PID Cost	1	LS	120,000	**120,000**
Other Permits and Fees	1	LS	120,000	**120,000**
			RIGHT OF WAY SUBTOTAL	**300,000**
ENGINEERING SUPPORT				
Engineering Studies (6%)				**$380,000**
Environmental Studies (3%)				**$190,000**
Design Engineering (15%)				**$930,000**
Construction Staking (2%)				**$130,000**
Construction Support (3%)				**$190,000**
Construction Management (20%)**				**$1,240,000**
			ESTIMATED PROJECT COSTS	**$9,560,000**
* Includes permanent maintenance access/trail access				
** Assume Caltrans AAA Construction Contract				

Table 14: Conceptual Cost Estimate, Alternative 4a – Montevina Trail Only Undercrossing

Prepared 10-2-2018				
ROADWAY & STRUCTURE ITEMS	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Clearing and Grubbing	1	LS	$60,000	$60,000
Grading and Drainage	1	LS	$60,000	$60,000
Temporary Construction Access/Staging Area*	1	LS	$180,000	$180,000
Undercrossing Structure (104'x18.5'x12')	1	LS	$1,290,000	$1,290,000
Wildlife Fencing and Features	1	LS	$12,000	$12,000
Habitat Site Preparation	1	LS	$60,000	$60,000
Traffic Control Systems	1	LS	$180,000	$180,000
Traffic Management Plan	1	LS	$60,000	$60,000
Water Pollution Control and Treatment BMPs	1	LS	$60,000	$60,000
Environmental Mitigation	1	LS	$60,000	$60,000
Misc. Minor Items (20%)	1	%	$500,000	$500,000
Mobilization (10%)	1	%	$300,000	$300,000
Contingency (25%)	1	%	$510,000	$510,000
			TOTAL CONSTRUCTION	**$3,400,000**
RIGHT OF WAY:	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Misc. Utilities	1	LS	60,000	**60,000**
Caltrans PID Cost	1	LS	120,000	**120,000**
Other Permits and Fees	1	LS	120,000	**120,000**
			RIGHT OF WAY SUBTOTAL	**300,000**
ENGINEERING SUPPORT				
Engineering Studies (6%)				**$210,000**
Environmental Studies (3%)				**$110,000**
Design Engineering (15%)				**$510,000**
Construction Staking (2%)				**$70,000**
Construction Support (3%)				**$110,000**
Construction Management (20%)**				**$680,000**
			ESTIMATED PROJECT COSTS	**$5,390,000**
* Includes permanent maintenance access/trail access				
** Assume Caltrans AAA Construction Contract				

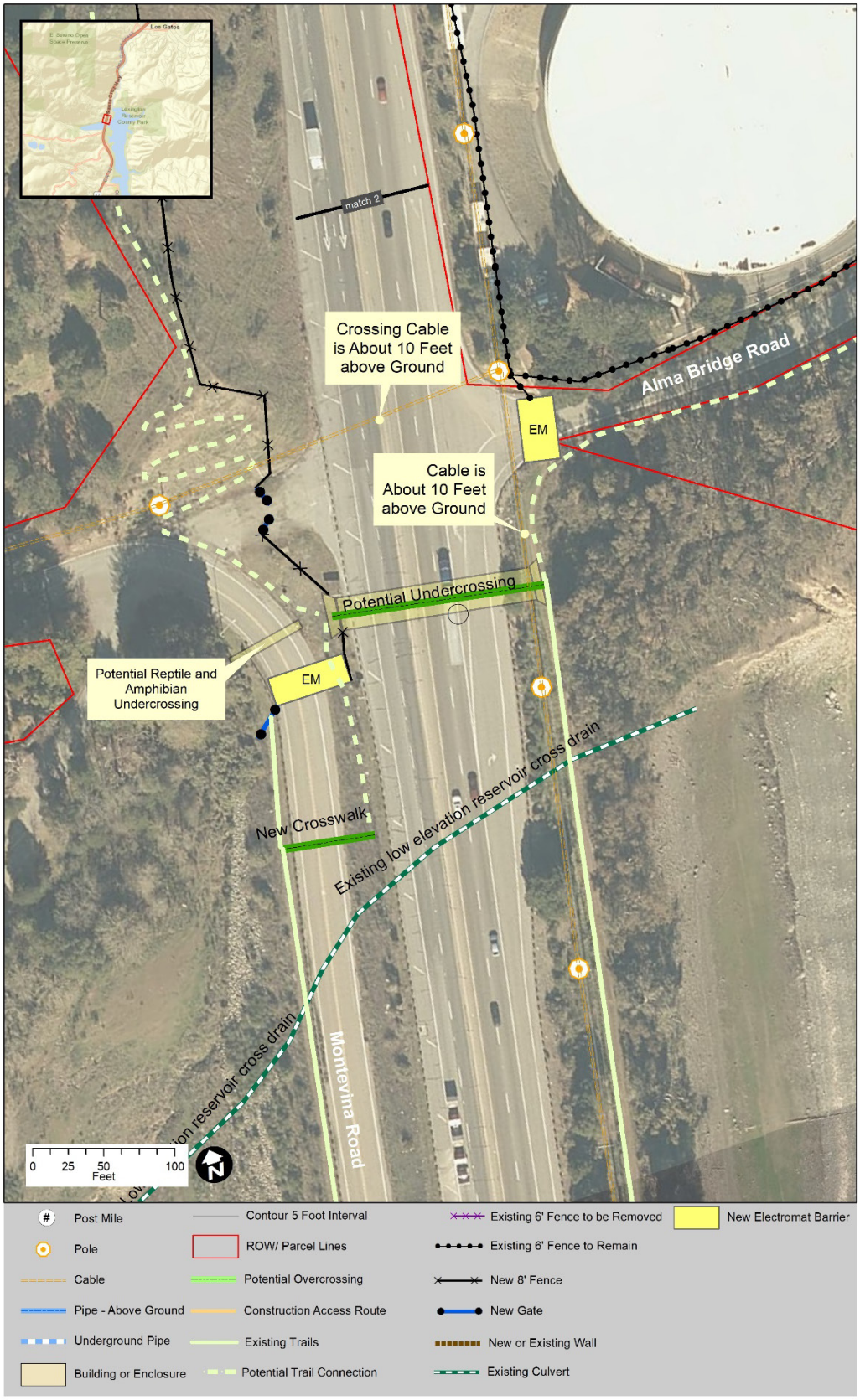


Figure 17: Montevina Trail/Wildlife Undercrossing Site Plan

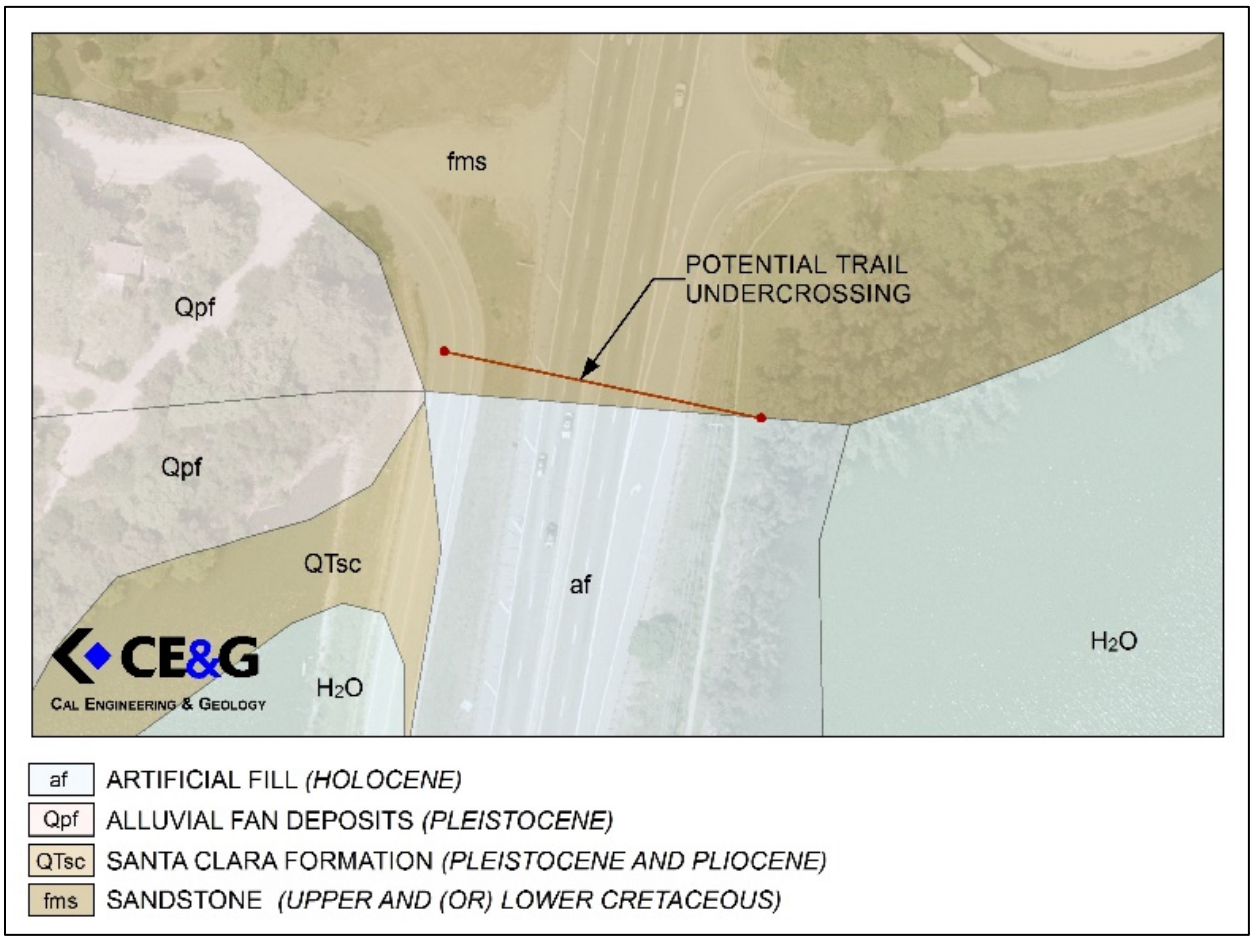


Figure 18: : Montevina Undercrossing Site and Geology

Potential undercrossing opening location – west side; about at "curve ahead" sign

Potential undercrossing opening location – east side

Figure 19: Montevina Undercrossing Site Photos

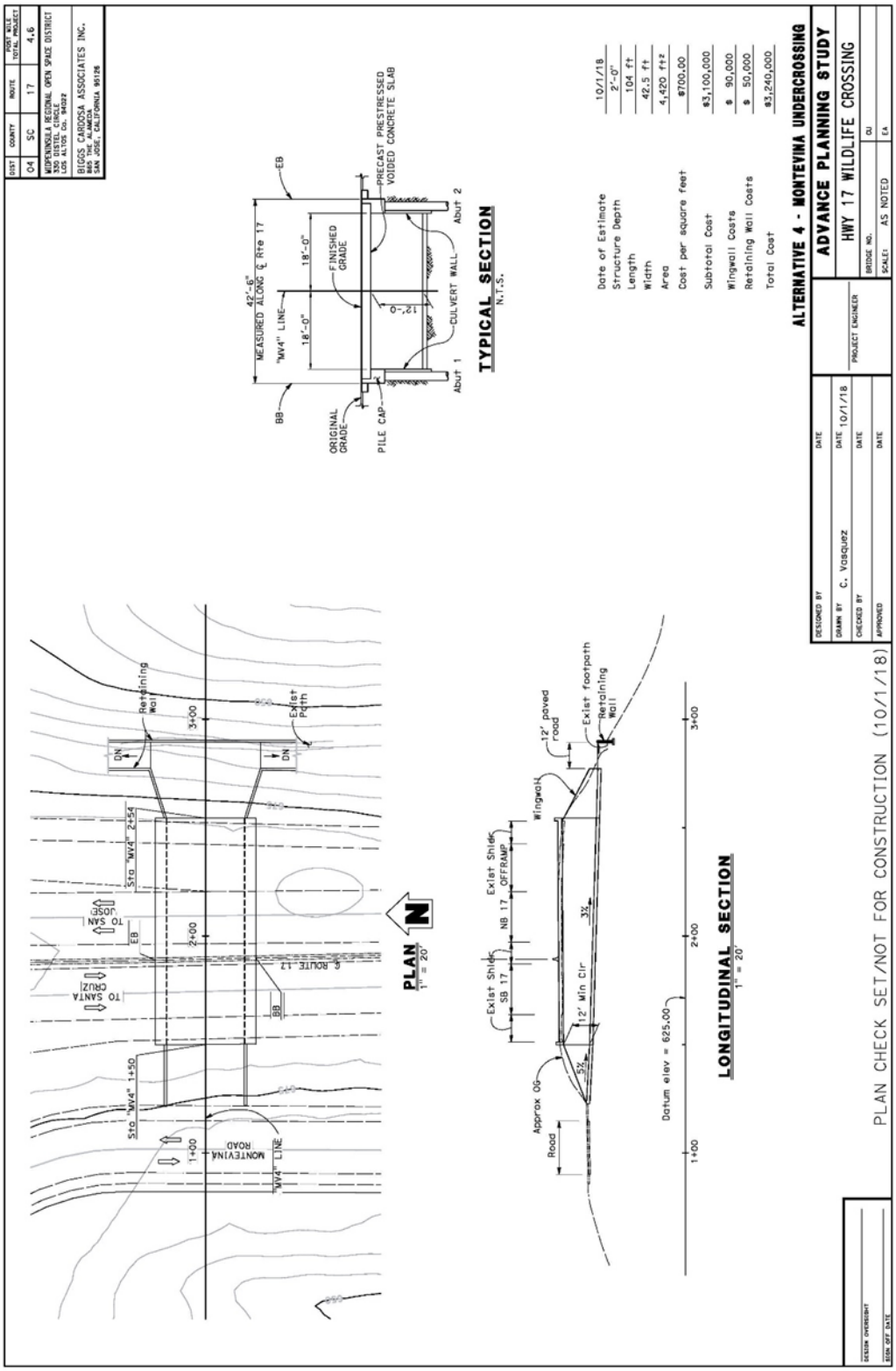


Figure 20: Montevina Trail/Wildlife Undercrossing Conceptual Plan

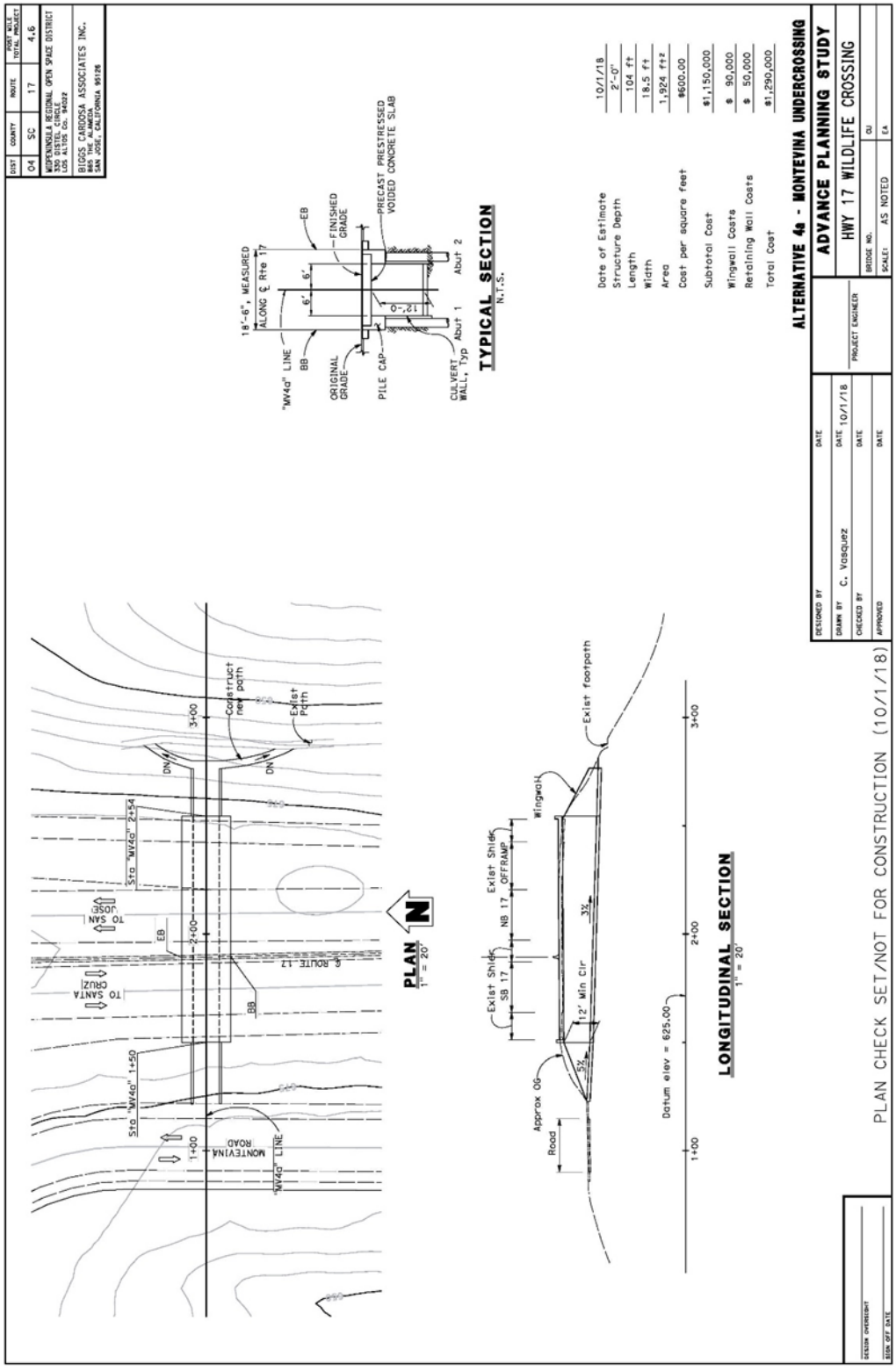


Figure 21: Montevina Undercrossing Trail Only Conceptual Plan

5.11. Evaluation: Alternative 4 – Montevina Trail/Wildlife Undercrossing,

A set of symbols was developed to score the alternative crossing locations and associated conceptual designs. This provides an "at a glance" sense of how the alternatives compare, but it is the description of the basis for the score that is most important.

Symbol	Associated Scoring Level
●	High performance/score
◐	Medium performance/score
○	Low performance/score
	Not applicable/no score

(Location same as Prelim. Alts. Report but new configuration; some criteria and evaluations added or changed as highlighted)

Functionality for Wildlife

1. **Proximity to wildlife corridor:** The location is south of the roadkill hotspot centered at Trout Creek.	**Medium**	◐
2. **Appropriate dimensions and design features:** The site could accommodate recommended dimensions for a deer/mt. lion crossing, but given the potential for human disturbance This location only provides separation from vehicles on Highway 17, not Montevina Road, which animals would still need to cross to reach the structure. Longer than other proposed undercrossings is less desirable.	**Medium**	◐
3. **Habitat connectivity:** The site does not connect to continuous habitat on the east side, animals would need to make their way along the exposed edge of Lexington reservoir or busy Alma Bridge Road. The west side habitat is fragmented by roads and housing.	**Low**	○
4. **Line of sight:** The design will allow for clear line of sight.	**High**	●
5. **Less human exposure:** The site is in close proximity to housing and recreational activity in the vicinity of Lexington Reservoir and Los Gatos Creek Trail and County Park parking area.	**Low**	○
6. **Species of special status**: May offer opportunities to accommodate aquatic species due to location between main body of Lexington Reservoir and arm that drains Lyndon Creek, however need to cross Montevina Road is still a barrier but could potentially be addressed through mitigation (i.e. a small animal/amphibian undercrossing).	**Medium**	◐

Functionality for Regional Trail Use

1. **Accommodate the full range of potential regional trail users.** Undercrossing would provide ample space for a trail. Could have an Ada compliant path of travel on both sides. Could potentially connect to a "back country" trail to reach El Sereno OSP, and has a direct connection to public road and potential trail to Bear Creek Redwoods.	**High**	●
2. **Provide as direct a connection as possible to the existing regional trail alignments.** Immediately adjacent to Lexington Reservoir trail on east and potential connections on west, but eastern connection requires use or	**Medium**	◐

	improvement of narrow Alma Bridge Road. West side connection relies on road cut "benches" above the highway and a steep lengthy trail to connect to west side regional trails.		
3.	**Provide a safe and enjoyable trail.** Assuming that trail connection could be developed, would provide close connection on west side, but may require crossing Montevina Road. On the east side, a cantilevered trail along Alma Bridge Road and a new bridge across the Lenihan Dam spillway would be needed.	**Medium**	◐
4.	**Provide connection to a feasible trail route.** Moderately close to potential west side regional trail connections but access permission challenges and steep slopes. A cantilevered trail along Alma Bridge Road and a new bridge across the Lenihan Dam spillway would be needed.	**Medium**	◐
5.	**Provide emergency and maintenance vehicle access.** Potentially a route for emergency or maintenance vehicles to cross the highway, but access onto Alma Bridge Road constrained.	**Medium**	◐

Constructability/Cost

1.	**Location with fill or cut embankments:** The highway is built on a fill embankment at the site, but the depth of the opening relative to the highway surface is minimal for constructing an undercrossing.	**Medium**	◐
2.	**Environmental impact - avoid streams or removal of native trees and vegetation:** There is no riparian habitat or native vegetation, but the east side construction would be close to the reservoir.	**Medium**	◐
3.	**Soils and geology feasible for construction:** Subsurface conditions will be more predictable for an undercrossing passing entirely through embankment materials. Subsurface soil moisture conditions are less likely to be problematic for an undercrossing passing through the embankment materials.	**High**	●
4.	**Can be designed to meet standards.** No apparent challenges.	**High**	●
5.	**Feasible construction staging and traffic impact.** Affords good construction staging on the west; east side is limited. Construction traffic access onto Alma Bridge Road will be challenging. Impact on highway traffic will be relatively limited.	**High**	●
6.	**Minimal impact on existing facilities and operations.** Ongoing operation would require little or no change to existing facilities; if through access for maintenance vehicles can be provided that would be a benefit.	**High**	●
7.	**Lower relative cost:** The undercrossing would be relatively longer than the other two prospective undercrossings, but has less constraints.	**High**	●

Future Decision Factors

1. Project Readiness/Funding identified. **2. Access Permission/Ownership/Right of Way.** **3. Maintenance and Operation Arrangements.** **4. Public, Stakeholder and Partner Support.**		

5.12. Evaluation: Alternative 4a – Montevina Trail-Only Undercrossing

A set of symbols was developed to score the alternative crossing locations and associated conceptual designs. This provides an "at a glance" sense of how the alternatives compare, but it is the description of the basis for the score that is most important.

Symbol	Associated Scoring Level
●	High performance/score
◐	Medium performance/score
○	Low performance/score
	Not applicable/no score

(New alternative design and evaluation)

Functionality for Wildlife

1. Proximity to wildlife corridor: The location is south of the roadkill hotspot centered at Trout Creek.	**Medium**	◐
2. Appropriate dimensions and design features: Narrow undercrossing does not meet recommended dimensions for a deer/mt. lion crossing, but would likely attract common generalist species (bobcat, foxes, raccoons, small mammals, reptiles and amphibians).	**Low**	○
3. Habitat connectivity: The site does not connect to continuous habitat on the east side. Animals would need to make their way along the exposed edge of Lexington reservoir or busy Alma Bridge Road. The west side habitat is fragmented by roads and housing.	**Low**	○
4. Line of sight: The design will allow for clear line of sight.	**High**	●
5. Less human exposure: The site is in close proximity to housing and recreational activity in the vicinity of Lexington Reservoir and Los Gatos Creek Trail and County Park parking area.	**Low**	○
6. Species of special status: May offer opportunities to accommodate aquatic species due to location between main body of Lexington Reservoir and arm that drains Lyndon Creek, however need to cross Montevina Road is still a barrier but could potentially be addressed through mitigation (i.e. a small animal/amphibian undercrossing).	**Medium**	◐

Functionality for Regional Trail Use

1. Accommodate the full range of potential regional trail users. Undercrossing would provide ample space for a trail. Could have an ADA compliant path of travel on both sides. Could potentially connect to a "back country" trail to reach El Sereno OSP, and has a direct connection to public road and potential trail to Bear Creek Redwoods.	**High**	●
2. Provide as direct a connection as possible to the existing regional trail alignments. Immediately adjacent to Lexington Reservoir trail on east and potential connections on west, but eastern connection requires use or improvement of narrow Alma Bridge Road. West side connection relies on	**Medium**	◐

road cut "benches" above the highway and a steep lengthy trail to connect to west side regional trails.		
3. Provide a safe and enjoyable trail. Assuming that back country trail connection could be developed, would provide close connection on west side, but may require crossing Montevina Road. On the east side, a cantilevered trail along Alma Bridge Road and a new bridge across the Lenihan Dam spillway would be needed.	**Medium**	
4. Provide connection to a feasible trail route. Moderately close to potential west side regional trail connections but access permission challenges and steep slopes. A cantilevered trail along Alma Bridge Road and a new bridge across the Lenihan Dam spillway would be needed.	**Medium**	
5. Provide emergency and maintenance vehicle access. Potentially a route for small emergency vehicles to cross the highway, but not wide enough for regular use and access onto Alma Bridge Road constrained.	**Medium**	

Constructability/Cost

1. Location with fill or cut embankments: The highway is built on a fill embankment at the site, but the depth of the opening relative to the highway surface is minimal for constructing an undercrossing.	**Medium**	
2. Environmental impact - avoid streams or removal of native trees and vegetation: There is no riparian habitat or native vegetation, but the east side construction would be close to the reservoir.	**Medium**	
3. **Soils and geology feasible for construction:** Subsurface conditions will be more predictable for an undercrossing passing entirely through embankment materials. Subsurface soil moisture conditions are less likely to be problematic for an undercrossing passing through the embankment materials.	**High**	
4. Can be designed to meet standards. No apparent challenges.	**High**	
5. Feasible construction staging and traffic impact. Affords good construction staging on the west; east side is limited. Construction traffic access onto Alma Bridge Road will be challenging. Impact on highway traffic will be relatively limited.	**High**	
6. Minimal impact on existing facilities and operations. Ongoing operation would require little or no change to existing facilities; if through access for maintenance vehicles can be provided that would be a benefit.	**High**	
7. Lower relative cost: The undercrossing would be relatively longer than the other two prospective undercrossings, but has less constraints.	**High**	

Future Decision Factors

1. Project Readiness/Funding identified. **2. Access Permission/Ownership/Right of Way.** **3. Maintenance and Operation Arrangements.** **4. Public, Stakeholder and Partner Support.**		

6. Alternative 5 Northern Trail/Wildlife Overcrossing, or 5a: Northern Trail Only Overcrossing

Alternatives 5 and 5a are located approximately at the merge of an existing service road that provides access onto northbound (NB) Highway 17 from the Los Gatos Creek Trail at approximately post mile 5.25 (see Figure 22). It is currently gated and fenced and primarily used as a turnout by California Highway Patrol (CHP). This area warranted further investigation based on public comment received at the August 2, 2016 meeting. Following field review a potential overcrossing site was confirmed at this location. Two versions of a northern overcrossing were evaluated: Alternative 5- a combined wildlife and trail crossing, and Alternative 5a- a recreation only trail bridge. The combined crossing would have a greater width and a portion of soil surface to support vegetation to encourage use by wildlife. Each version would include an elevated ramp structure located along the existing service access road (Photo 2). A design objective was to maintain sufficient space that the access road onto the highway would be preserved for future use.

6.1. Site Conditions

This site features an elongated north-south bench in the overall eastward-descending slopes that drop to Los Gatos Creek below. The western end of the overcrossing would meet steep southern-facing slopes that descend to the shoulder of Highway 17. These steep slopes have been heavily modified by cuts made for the highway and a former residential structure and associated access driveway.

The service road is located within Caltrans right-of-way, but it is unclear if other entities have easement rights over the existing service road (SCVWD, SJW etc.). This information will be confirmed and clarified during Caltrans review of the project.

Photo 1: Alternatives 5/5a, looking north, View from the access ramp to northbound Highway 17

Photo 2: Alternatives 5/5a, looking south, View south along the access ramp

6.2. Geologic/Hydrologic Conditions

Bedrock near the overcrossing is mapped as Franciscan Complex mélange (Figure 21). By its nature, mélange contains blocks of variable size consisting of various rock types, all harder than the sheared, shaly mélange matrix. Blocks of chert and metavolcanic rocks are mapped nearby. Melange does not contain bedded rock; its strength is typically low and internally variable.

Both Highway 17 and the spur road are mapped as lying on Quaternary to Holocene age (up to approximately two million years old) terrace deposits that extend as far north as the overcrossing location, forming the topographic bench described above. These terrace deposits were deposited by Los Gatos Creek, then abandoned as the creek downcut further, leaving these erosional terraces in place as elongate bodies oriented with long axis roughly parallel to overall slope contour. These Quaternary terrace deposits are elevated above Los Gatos Creek, and are not subject to reworking or flooding by Los Gatos Creek.

Melange is a relatively weak rock type, and the southeastern margin of a large landslide deposit derived from melange is mapped as descending the slope at approximately the overcrossing location. The upslope limits of the landslide deposits are well upslope of the highway, at elevations above 1200 feet. The toe of the landslide complex is essentially at Los Gatos Creek. Based on geomorphic expression, we infer this landslide to be relatively thin, and it of course thins to zero at its southern margin. The regional mapping that identifies this landsliding (McLaughlin and others, 2001) shows it as being crosscut by, hence older than, the alluvial terrace deposits described above. This suggests that the landslide was not considered active, though internal portions could have reactivated.

The overcrossing is not located at a creek or culvert, and there are no well-defined drainage courses on the slopes that descend to the western abutment area. Drainage of the slopes west of the overcrossing has been modified, such as by grading associated with construction of the highway, and possibly with activities on nearby residential properties slightly northwest of the

overcrossing. Based on Google Earth topography, we preliminarily estimate that the area contributing runoff to the crossing vicinity can be no more than about 2.9 hectares (0.03 km^2, or seven acres).

Excavatability of the mélange deposits is likely to be relatively high, except where harder blocks are encountered. Excavatability of the landslide deposits is likely to be similar in that these materials may contain blocks derived from the underlying mélange.

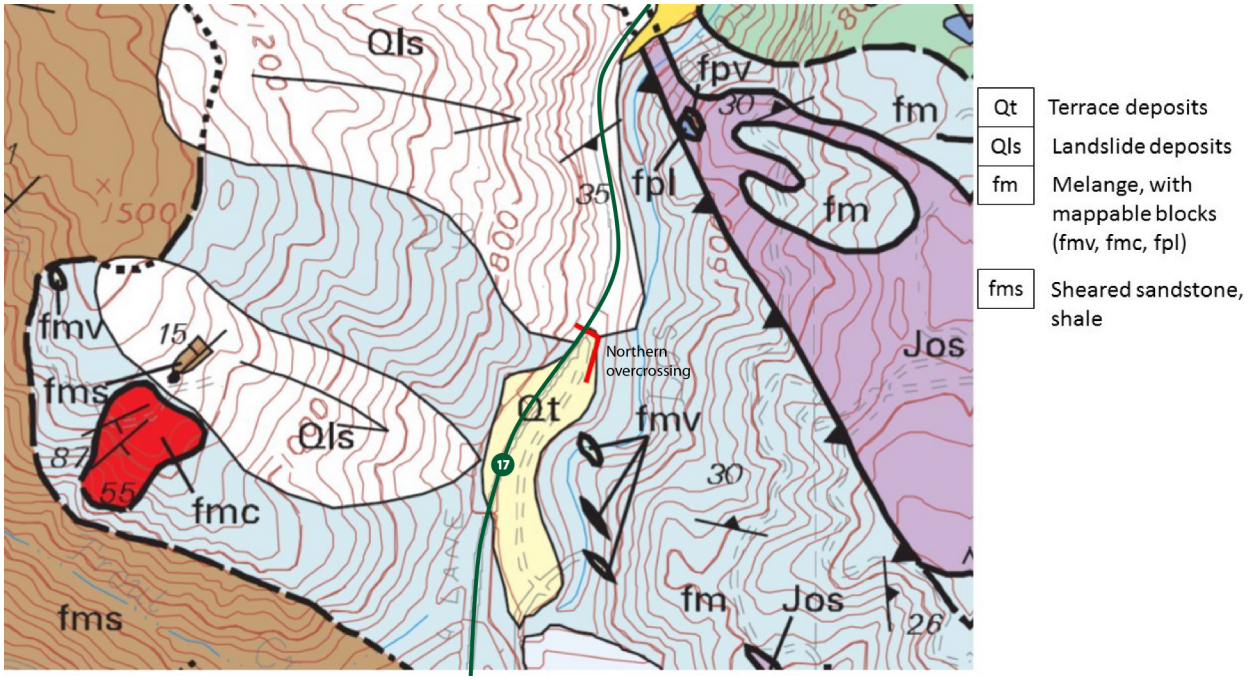


Figure 22: Focused map of geologic conditions surrounding Alternatives 5/5a

6.3. Structural Design/Construction Concept

This overcrossing would be a reinforced concrete bridge meeting Caltrans standards. Caltrans typically requires that a highway overcrossing have a minimum vertical clearance of 16.5 feet over the entire width of traveled way (including shoulders) to the soffit (underside) of the structure. However, pedestrian-only structures must have a greater height of 18.5 feet of vertical clearance per Caltrans requirements. This is a safety requirement to provide a greater margin of clearance for trucks from the pedestrian structures, which tend to be less robust than vehicular bridges.

The eastern support column of the overcrossing structure is located to allow continued access to the existing service access road.

The trail-only crossing would be a minimum clear width of 12 feet. The descending 230-foot elevated ramp structure would be a minimum of 12 feet wide (recreational trail bridge only) at an 8% grade[2] with six five-foot landings (at 2% grade) to conform to the Americans for Disabilities Act (ADA) standards for

[2] Maximum ADA compliant grade is 8.33%, but a more conservative grade of 8% was assumed to account for variances in construction.

accessibility (Figure 23). This trail-only version would require an abutment type support at the east end of the overcrossing as well as two centered support columns at the other two support locations, and a row of centered support columns at approximately 35 feet on center for the elevated ramp.

A combined trail and wildlife crossing would require a larger superstructure minimum of 22 feet wide with sound walls. As with the trail-only version, the overcrossing would require an abutment type support at the east end, however two columns would be used at the other support locations for this wider overcrossing structure. In addition to having the 18.5-foot vertical clearance, a portion of the surface of the structure would include a layer of soil so native vegetation can be planted and established to make the structure more likely to be used by wildlife. These factors necessitate a longer elevated ramp structure; the ramp would be 275 feet long and 18 feet wide at 8% grade with a series of seven five-foot-long landings at 2% grade. Given its length, the ramp may need to bend westward to reduce impacts to the native vegetation and utilities to the east (see Figure 23).

6.4. Functionality for Wildlife

The site layout and topography dictates that any overcrossing at this site must have a long, angled ramp extending to the south. This configuration is not as attractive to wildlife, because a direct (not angled) linear connection is desired between vegetated habitat areas, resulting in the shortest possible crossing distance and a direct line of sight through the crossing. However, mountain lions, deer and other wildlife may learn to use it, especially if funneled to the structure using directional fencing. The functionality for wildlife is also limited by the relatively narrower (22') width of the structure which is in turn constrained by the width of the connecting ramp. The ramp width is limited to 18' due to the topographic, vegetation and utility constraints to the east, and in order to maintain the service/emergency access to the highway on the west.

6.5. Functionality for Trail Use

This location is appealing because it would provide a shorter distance to make a new west side trail connection to existing trails in El Sereno Open Space Preserve (OSP) and because it affords a direct connection to the Los Gatos Creek Trail on the east side. Another value of alternatives at this location is that Alternatives 3, 3a, 4, and 4a all rely on using the existing cut banks above Highway 17 and a lengthier new western trail connection which may not prove feasible during review by Caltrans and/or landowners.

This Alternative 5/5a crossing location also has complications due to potential need for trail connection across private property. Midpen staff scouted the terrain on the west side of the potential structure to verify if a feasible connecting trail approach could be located. The overcrossing terminus would be within Caltrans right-of-way near a bench in the cut slope created by the original highway construction. However, to connect further up the ridge, the trail would need to cross a private parcel to the north. This parcel includes a steep access driveway to a former residence (recently demolished) connecting to Highway 17. The need to acquire this parcel or access rights to cross it complicates the feasibility of the northern overcrossing alternative.

Another downside to this location is that a significant future project would be required on the east side of Highway 17 at Alma Bridge Road (a recreational trail crossing over the existing Lenihan Dam spillway

and a cantilevered walkway between Highway 17 and the spillway) in order to make a dedicated north-south regional trail connection.

6.6. Environmental Resources and Potential Impacts

The potential structures would have little, if any, impact on existing native vegetation and would not be in proximity to any riparian resources. There is an area of oak woodland to the east of the access ramp that would be avoided based on the proposed siting of the structure.

The bridge structure would result in a potentially substantial visual change to the highway setting, especially in the view of motorists. This will need to be evaluated as part of future environmental analysis (though the view impact may not necessarily be negative, depending on the design of the structure, and given the steep cut slopes made for the highway at this point).

6.7. Construction Staging and Traffic Control

This site has very good construction access and staging on the east side because the existing spur road has physical separation and construction access close to but not directly on top of the Los Gatos Creek Trail. Conversely, construction access to build the overcrossing on the west side, and potential impact on highway traffic, is a significant challenge. Slopes are very steep, highly unstable and perched nearly vertically over Highway 17 below; any construction on this slope will require substantial investment in protecting soil, rock, and other material from entering the highway.

Space for constructing the support column(s) would need to be created adjacent to the roadway on the west side, and an access road constructed up the steep, unstable slope to the landing point, all while protecting the highway adjacent and below.

6.8. Relationship to Adjacent Facilities

This site is advantageous for avoiding impact or conflict with existing water, utility or dam facilities. The large diameter water line that follows the Los Gatos Creek Trail is below the surface where the highway access road connects to the Los Gatos Creek Trail, and it is located well to the east and below the proposed structure. There is a constraint from an adjacent series of power poles and overhead lines to the east of the access road.

6.9. Maintenance and Management Considerations

These crossing structures would have excellent access for maintenance and monitoring from the east due to their proximity to the existing highway access road and the Los Gatos Creek Trail. Access for patrol, emergency or maintenance vehicles would not be feasible on the trail-only structure, but would be feasible for pickup-sized vehicles on the wider combined trail/wildlife structure. There would need to be a paved “T” for vehicle turnaround at the west side, and/or if acquisition of intervening private property was accomplished, a patrol/emergency access route might be feasible via the driveway for the former residence to the north.

6.10. Cost Considerations

Conceptual cost estimates were prepared for Alternative 5 (combined wildlife and trails) and Alternative 5a (recreational trail-only), as presented in Tables 15 and 16. These use the same cost per square foot

for the overcrossing structures of Alternative 5 as the overcrossing developed for Alternative 3 in the 2016 Preliminary Alternatives Report. The cost per square foot for the ramp structures is much less than the one used for the overcrossing, a reflection of more manageable constructability issues, which brings the overall cost per square foot of Alternative 5 down significantly. Using the same "lump sum" or percentage allowances for other construction or design-related factors as the prior estimate, the estimated cost for the Trail and Wildlife Overcrossing Alternative is $11.11 million in 2018 dollars, as detailed in the table below, and $14.89 million in 2024 dollars. For the Trail Only Overcrossing Alternative, the estimated cost is $7.4 million in 2018 dollars, as detailed in the table below, and $9.92 million in 2024 dollars. This estimate does not include the cost for property acquisition or access rights across the adjacent private parcel.

Table 15: Conceptual Cost for Alternative 5, Northern Wildlife and Trail Overcrossing

Prepared 10-02-2018				
ROADWAY & STRUCTURE ITEMS	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Clearing and Grubbing	1	LS	$60,000	$60,000
Grading and Drainage	1	LS	$120,000	$120,000
Temporary Construction Access/Staging Area*	1	LS	$60,000	$60,000
Overcrossing Structure (22'x127.5')	1	LS	$1,700,000	$1,700,000
Elevated Ramp Structure (18'x275')	1	LS	$1,980,000	$1,980,000
Wildlife Fencing and Features	1	LS	$180,000	$180,000
Habitat Site Preparation	1	LS	$60,000	$60,000
Traffic Control Systems	1	LS	$180,000	$180,000
Traffic Management Plan	1	LS	$60,000	$60,000
Water Pollution Control and Treatment BMPs	1	LS	$60,000	$60,000
Environmental Mitigation	1	LS	$60,000	$60,000
Misc. Minor Items (20%)	1	%	$1,000,000	$1,000,000
Mobilization (10%)	1	%	$500,000	$500,000
Contingency (25%)	1	%	$1,130,000	$1,130,000
			TOTAL CONSTRUCTION	**$7,200,000**
RIGHT OF WAY:	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Misc. Utilities	1	LS	$120,000	**120,000**
Caltrans PID Cost	1	LS	$120,000	**120,000**
Other Permits and Fees	1	LS	$120,000	**120,000**
			RIGHT OF WAY SUBTOTAL	**360,000**
ENGINEERING SUPPORT				
Engineering Studies (6%)				**$440,000**
Environmental Studies (3%)				**$220,000**
Design Engineering (15%)				**$1,080,000**
Construction Staking (2%)				**$150,000**
Construction Support (3%)				**$220,000**
Construction Management (20%)**				**$1,440,000**
			ESTIMATED PROJECT COSTS	**$11,110,000**
* Includes permanent maintenance access/trail access				
** Assume Caltrans AAA Construction Contract				

Table16: Conceptual Cost for Alternative 5a, Northern Trail Only Overcrossing

Prepared 10-02-2018				
ROADWAY & STRUCTURE ITEMS	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Clearing and Grubbing	1	LS	$60,000	$60,000
Grading and Drainage	1	LS	$120,000	$120,000
Temporary Construction Access/Staging Area*	1	LS	$60,000	$60,000
Overcrossing Structure (14'x125')	1	LS	$1,050,000	$1,050,000
Elevated Ramp Structure (18'x275')	1	LS	$1,100,000	$1,100,000
Wildlife Fencing and Features	1	LS	$180,000	$180,000
Habitat Site Preparation	1	LS	$60,000	$60,000
Traffic Control Systems	1	LS	$180,000	$180,000
Traffic Management Plan	1	LS	$60,000	$60,000
Water Pollution Control and Treatment BMPs	1	LS	$60,000	$60,000
Environmental Mitigation	1	LS	$60,000	$60,000
Misc. Minor Items (20%)	1	%	$600,000	$600,000
Mobilization (10%)	1	%	$300,000	$300,000
Contingency (25%)	1	%	$750,000	$750,000
			TOTAL CONSTRUCTION	**$4,700,000**
RIGHT OF WAY:	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Misc. Utilities	1	LS	$120,000	**120,000**
Caltrans PID Cost	1	LS	$120,000	**120,000**
Other Permits and Fees	1	LS	$120,000	**120,000**
			RIGHT OF WAY SUBTOTAL	**360,000**
ENGINEERING SUPPORT				
Engineering Studies (6%)				**$290,000**
Environmental Studies (3%)				**$150,000**
Design Engineering (15%)				**$710,000**
Construction Staking (2%)				**$100,000**
Construction Support (3%)				**$150,000**
Construction Management (20%)**				**$940,000**
			ESTIMATED PROJECT COSTS	**$7,400,000**
* Includes permanent maintenance access/trail access				
** Assume Caltrans AAA Construction Contract				

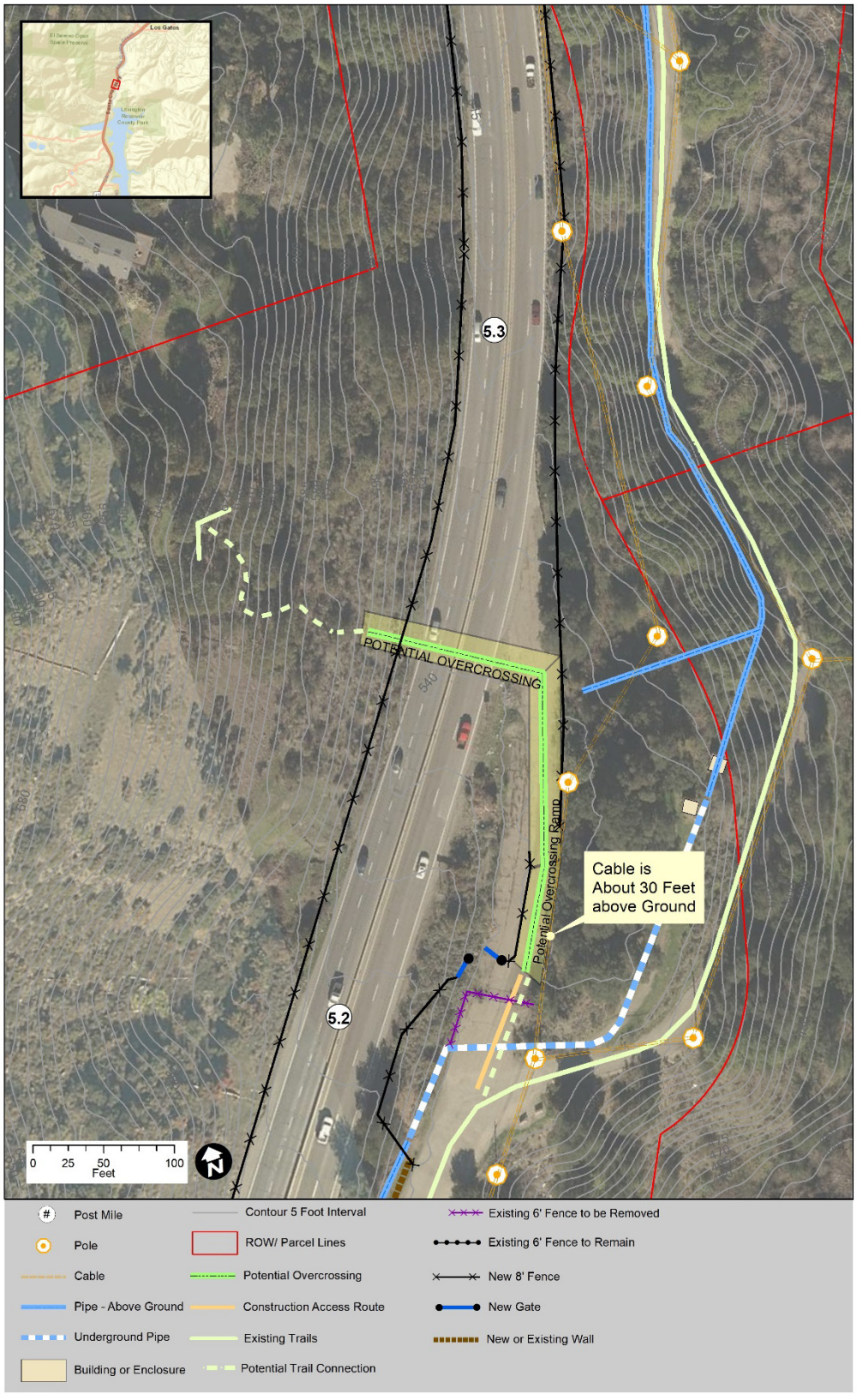


Figure 23: Northern Overcrossing Site Plan

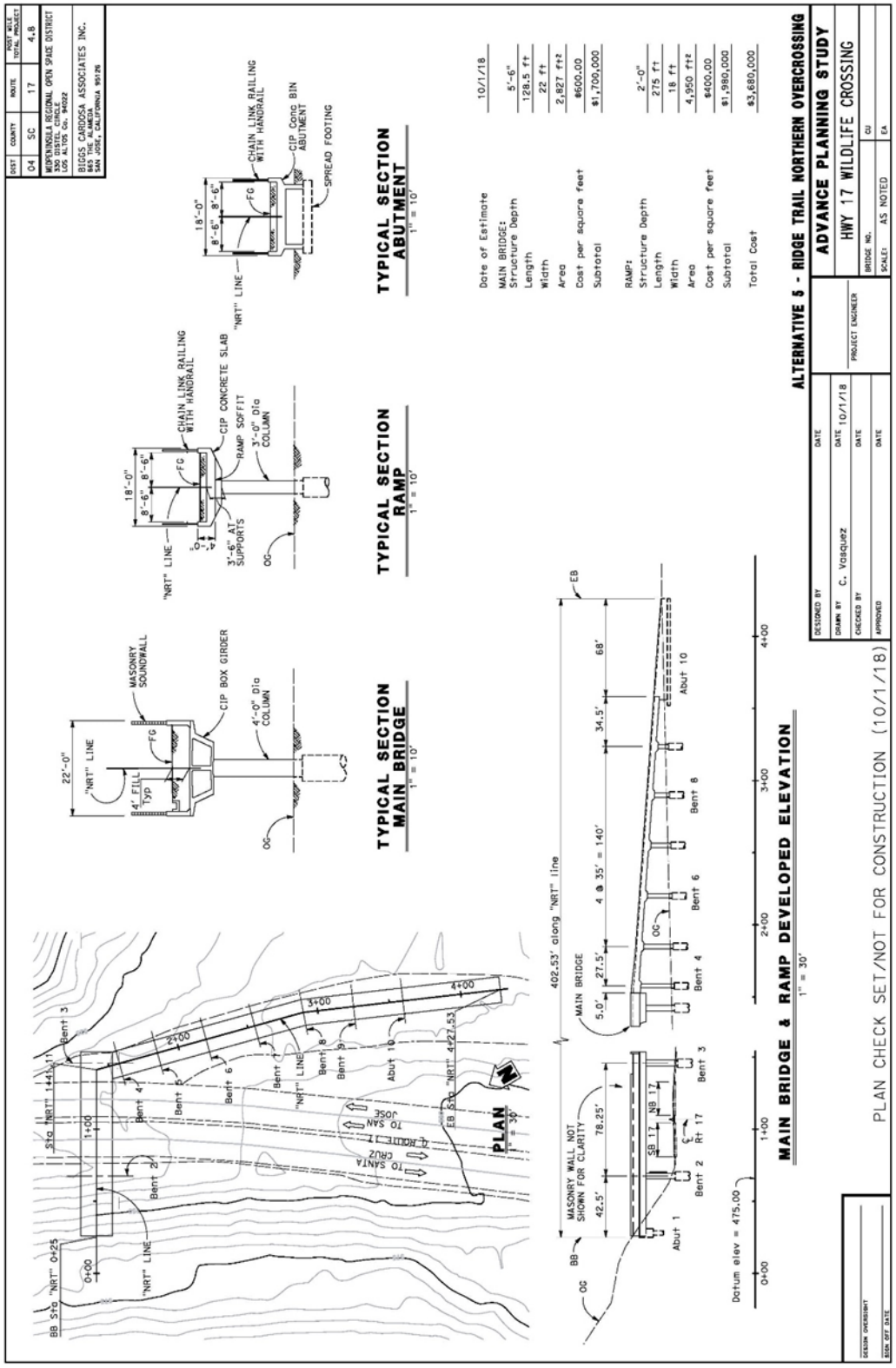


Figure 24: Northern Trail/Wildlife Overcrossing Conceptual Plan

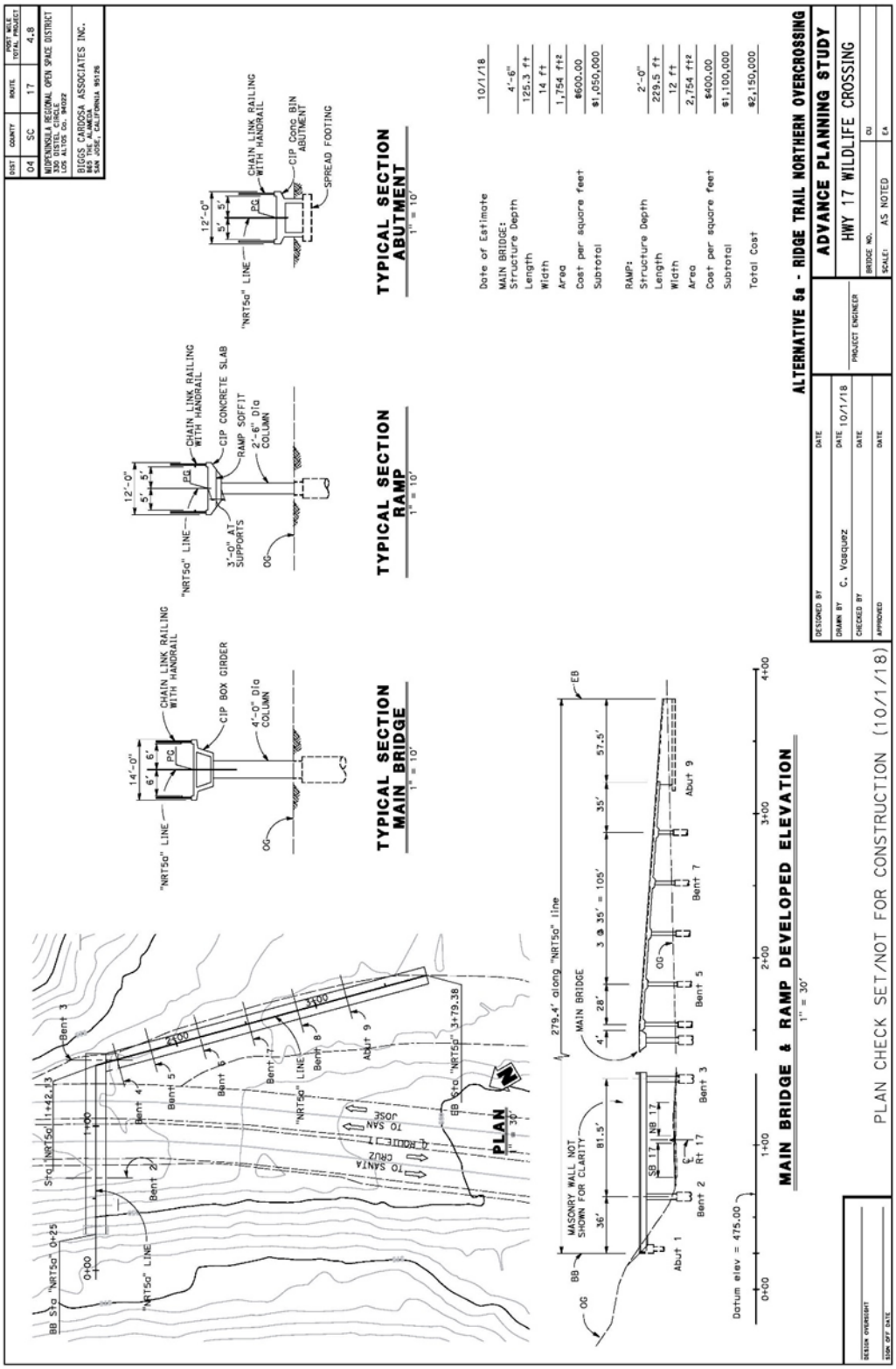


Figure 25: Northern Trail Only Overcrossing Conceptual Plan

6.11. Alternative 5: Northern Trail/Wildlife Overcrossing Evaluation

A set of symbols was developed to score the alternative crossing locations and associated conceptual designs. This provides an "at a glance" sense of how the alternatives compare, but it is the description of the basis for the score that is most important.

(a new alternative and evaluation)

Symbol	Associated Scoring Level
●	High performance/score
◐	Medium performance/score
○	Low performance/score
	Not applicable/no score

Functionality for Wildlife

1. **Proximity to wildlife corridor:** The location is far from attempted and successful crossings of radio-collared mountain lions. Deer, bobcat and raccoon are recorded road-kill in the vicinity.	**High**	●
2. **Appropriate dimensions and design features:** The overcrossing can be designed to the appropriate width for wildlife, but the angled approach ramp will limit wildlife line of sight.	**Low**	○
3. Habitat connectivity: The site connects to a steep cut slope on the west side and is close to Los Gatos Creek on the east side, though the Los Gatos Creek Trail separates.	**Medium**	◐
4. Line of sight: Overcrossing requires a long perpendicular approach ramp therefore limiting line of sight.	**Low**	○
5. Less human exposure: The site is directly exposed to Los Gatos Creek Trail traffic but this is somewhat offset by the visibility of the overcrossing to deter unauthorized use.	**Medium**	◐
6. Species of special status: The location does not offer good opportunities to accommodate use by riparian species of special status.	**Low**	○

Functionality for Regional Trail Use

1. Accommodate the full range of potential regional trail users. Overcrossing would provide ample space for a trail. Could potentially connect to a "back country" trail to El Sereno OSP, but no feasible connection to public rode or ADA compliant path of travel on the west side.	**Medium**	◐
2. Provide as direct a connection as possible to the existing regional trail alignments. Immediately adjacent to Los Gatos Creek Trail and connections to east. Shortest length of new trail required to connect to west side regional trails.	**High**	●
3. Provide a safe and enjoyable trail route. Assuming that back country trail could be developed, would provide good separation from traffic and good views.	**High**	●

4. Provide connection to a feasible trail route. Relatively close to potential west side connection but has steep intervening slopes and access permission challenges.	**Medium**	
5. Provide emergency and maintenance vehicle access. Minimal width for vehicles; not practical for regular patrol. Creating access for small emergency vehicles to the west side would require acquiring access rights and constructing a long access road.	**Low**	

Constructability/Cost

1. Location with fill or cut embankments: cut slope on west side facilitates access, but with steep slopes; east side requires a long ramp.	**Low**	
2. Environmental impact - avoid streams or removal of native trees and vegetation: There is no riparian habitat. Should be able to be designed without the need to remove native trees.	**High**	
3. Soils and geology feasible for construction: Both overcrossing abutments would likely be founded in bedrock, already largely exposed by existing cuts, but potentially unstable surface material.	**Medium**	
4. Can be designed to meet standards: Can be designed to meet standards for a trail crossing.	**High**	
5. Feasible construction staging and traffic impact: Affords good construction staging to the east (access road), but challenging to the west.	**Medium**	
6. Minimal impact on existing facilities and operations. The overhead utility lines on the east will be a constraint. Location and operation may limit the ability to use the current access ramp for other projects. Farthest location from water infrastructure is desirable.	**Medium**	
7. Lower relative cost. Not the most expensive or least expensive combined crossing**.**	**Medium**	

Future Decision Factors

1. Project Readiness/Funding identified. **2. Access Permission/Ownership/Right of Way.** **3. Maintenance and Operation Arrangements.** **4. Public, Stakeholder and Partner Support.**		

6.12. Alternative 5a: Northern Overcrossing Trail Only Evaluation

A set of symbols was developed to score the alternative crossing locations and associated conceptual designs. This provides an "at a glance" sense of how the alternatives compare, but it is the description of the basis for the score that is most important.

Symbol	Associated Scoring Level
●	High performance/score
◐	Medium performance/score
○	Low performance/score
	Not applicable/no score

(New alternative location/design and evaluation)

Functionality for Wildlife

1. Proximity to wildlife corridor: The location is close to attempted and successful crossings and to the path of travel of collared mountain lions and close to Los Gatos Creek.	**High**	●
2. Appropriate dimensions and design features: Not an appropriate width for wildlife, and the angled approach ramp will limit wildlife line of sight.	**Low**	○
3. Habitat connectivity: The site connects to a steep cut slope on the west side and is close to Los Gatos Creek on the east side, though the Los Gatos Creek Trail separates.	**Medium**	◐
4. Line of sight: Overcrossing requires a long perpendicular approach ramp therefore limiting line of sight.	**Low**	○
5. Less human exposure: The site is directly exposed to Los Gatos Creek Trail traffic but this is somewhat offset by the visibility of the overcrossing to deter unauthorized use	**Medium**	◐
6. Species of special status: The location does not offer good opportunities to accommodate use by riparian species of special status.	**Low**	○

Functionality for Regional Trail Use

1. Accommodate the full range of potential regional trail users. Overcrossing would provide adequate space for a trail. Could potentially connect to a "back country" trail to El Sereno OSP, but no feasible connection to public road or ADA compliant path of travel on the west side.	**Medium**	◐
2. Provide as direct a connection as possible to the existing regional trail alignments. Immediately adjacent to Los Gatos Creek Trail and connections to east.**.** Shortest length of new trail required to connect to west side regional trails**.**	**High**	●
3. Provide a safe and enjoyable trail. Assuming that back country trail could be developed, would provide good separation from traffic and good views.	**High**	●

4. Provide connection to a feasible trail route. Relatively close to potential west side connection but steep intervening slopes and access permission challenges.	**Medium**	
5. Provide emergency and maintenance vehicle access. Insufficient width for vehicles. Does not provide emergency or maintenance vehicle access.	**Low**	

Constructability/Cost

1. Location with fill or cut embankments: cut slope on west side facilitates access, but with steep slopes; east side requires a long ramp.	**Low**	
2. Environmental impact - avoid streams or removal of native trees and vegetation: There is no riparian habitat. Should be able to be designed without the need to remove native trees.	**High**	
3. Soils and geology feasible for construction: Both overcrossing abutments would likely be founded in bedrock, already largely exposed by existing cuts, but potentially unstable surface material.	**Medium**	
4. Can be designed to meet standards: Can be designed to meet standards for a trail crossing	**High**	
5. Feasible construction staging and traffic impact: Affords good construction staging to the east (access road), but very challenging to the west.	**Medium**	
6. Minimal impact on existing facilities and operations. The overhead utility lines on the east will be a constraint. Location and operation may limit the ability to use the current access ramp for other projects. Farthest location from water infrastructure is desirable.	**Medium**	
7. **Lower relative cost.** An trail overcrossing will be significantly less expensive than a combined crossing at this location.	**Medium**	

Future Decision Factors

1. Project Readiness/Funding identified. **2. Access Permission/Ownership/Right of Way.** **3. Maintenance and Operation Arrangements.** **4. Public, Stakeholder and Partner Support.**		

7. Alternative 6. Sidehill Viaduct Undercrossing (Eliminated- No Longer an Alternative)

At the August 2, 2016 public workshop, a member of the public pointed out the potential to cross under an existing sidehill viaduct located north of the Alternative 5 site. On October 14, 2016, Midpen staff made a field visit to the viaduct site and evaluated its feasibility against the criteria used for the other alternatives and noted extreme construction access and design constraints. At a meeting with Caltrans District 4 staff on February 10, 2017, Bridge Engineering staff said they would be very resistant to the idea of tunneling under the existing structure in this manner due to potential impacts on its supports. SJW expressed concern about construction and modification in this area limiting access to critical water infrastructure and that some form of casing would likely be required if the water pipe needed to be buried. These factors add both complexity and cost at this location and for these reasons Alternative 6 was eliminated as a feasible alternative.

7.1. Site Conditions

This 96.5 foot long viaduct, or a "sidehill bridge", is a structure that cantilevers out along the steep hill, supporting and carrying most of the highway along this segment. It starts at approximately milepost 5.43 on Highway 17, as shown on Figure 25.

Figure 27, based on Caltrans record drawings, illustrates how the structure is built and relates to the highway. Approximately the eastern two-thirds of all lanes of Highway 17 is built on the structure through this section, with the western third built on grade (earth). The columns and beams illustrated in this cross-section cross the highway at intervals of 25 feet – the space between one set of columns is where the undercrossing would be created.

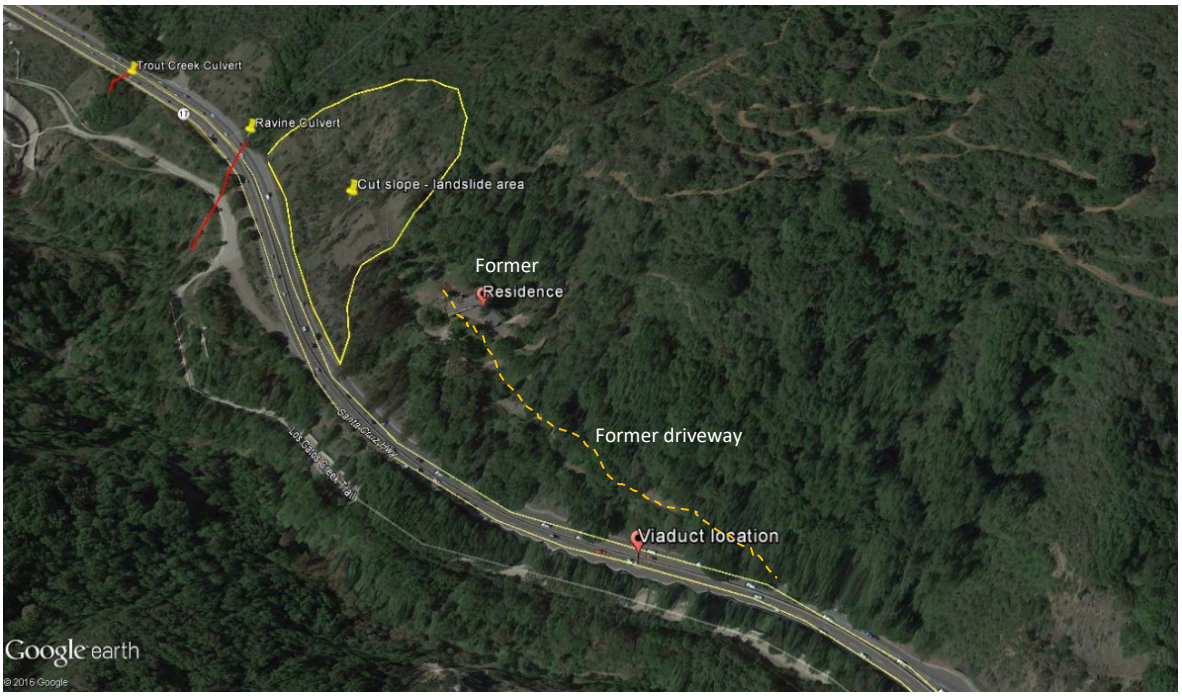


Figure 27: Eliminated Alternative 6, Aerial view of sidehill viaduct location

Figure 26: Eliminated Alternative 6, looking south, view of steep hillside where potential undercrossing would exit

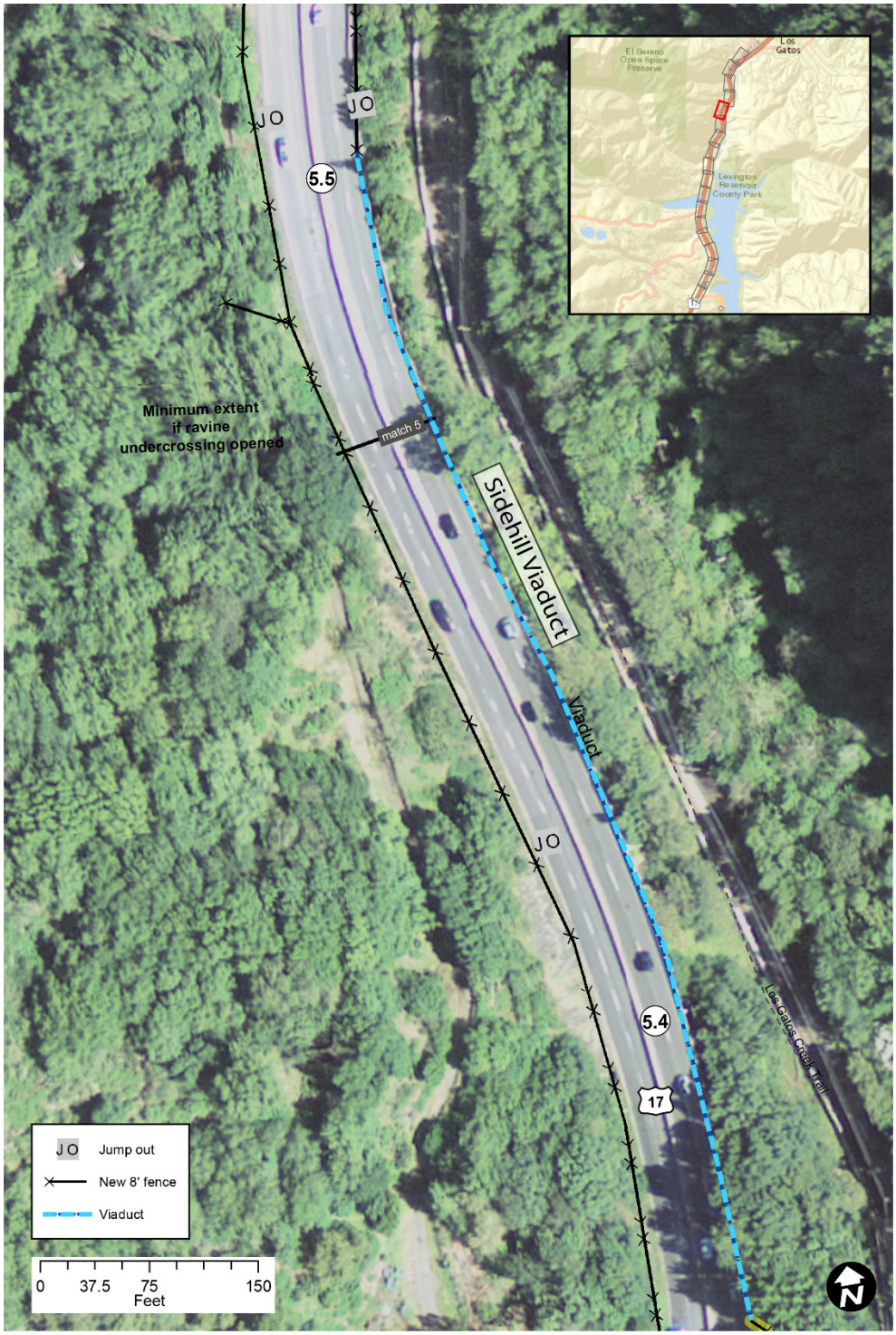


Figure 28: Location of Eliminated Alternative 6- Sidehill Viaduct

Figure 29: Eliminated Alternative 6, looking north, View under viaduct from Los Gatos Creek Trail

7.2. Geologic/Hydrologic Conditions

The Sidehill Viaduct locality lies within the core of a large landslide complex (McLaughlin and others, 2001) mapped from elevations above 1,200 feet down to Los Gatos Creek. This same landslide complex extends southward, thinning to its edge at the northern overcrossing location. Thickness of landslide deposits at the Sidehill Viaduct location is currently not known, based on the documents reviewed for the 2016 Preliminary Analysis Report.

The bedrock underlying the landslide complex near the Sidehill Viaduct Undercrossing is mapped as Franciscan Complex mélange. Mélange contains blocks of variable size consisting of various rock types, all harder than the sheared, shaly mélange matrix. Blocks of chert and metavolcanic rocks are mapped nearby. Melange does not contain bedded rock; its strength is typically low and internally variable.

The conceptual location of the undercrossing is in a location with convex topographic slopes west of SB Highway 17, with the result that most surface water sheds to either side of the undercrossing location, with very little surface runoff flowing directly to the undercrossing. Based on US Geologic Survey (USGS) 7.5-minute topographic maps, the contributing watershed is likely less than 0.3 hectares (0.003 km^2, or less than an acre). Surface runoff from much of the landslide complex, however, is directed to a broad swale area that meets the highway less than about 200 feet away to the north.

At some point during the design phase of Highway 17 Caltrans opted to support this section of the highway roadbed using a viaduct approach, rather than excavate into and support the immediately adjacent steep slopes. Without having all the history and institutional knowledge of the time, the presence of the complicated viaduct construction, which undoubtedly carried a high price tag, strongly suggests that construction of an undercrossing at this location would appear to unavoidably involve extensive excavation into landslide deposits of uncertain stability

This section of Highway 17, in the close vicinity of the Sidehill Viaduct, has a variety of landslide and rockfall mitigation measures already in place along the upslope (western) shoulder of the highway, to mitigate against falling and bounding rocks, and against debris flows. The western portal of an undercrossing along SB Highway 17 would be located within a zone of such potential, which could require additional geologic engineering mitigation.

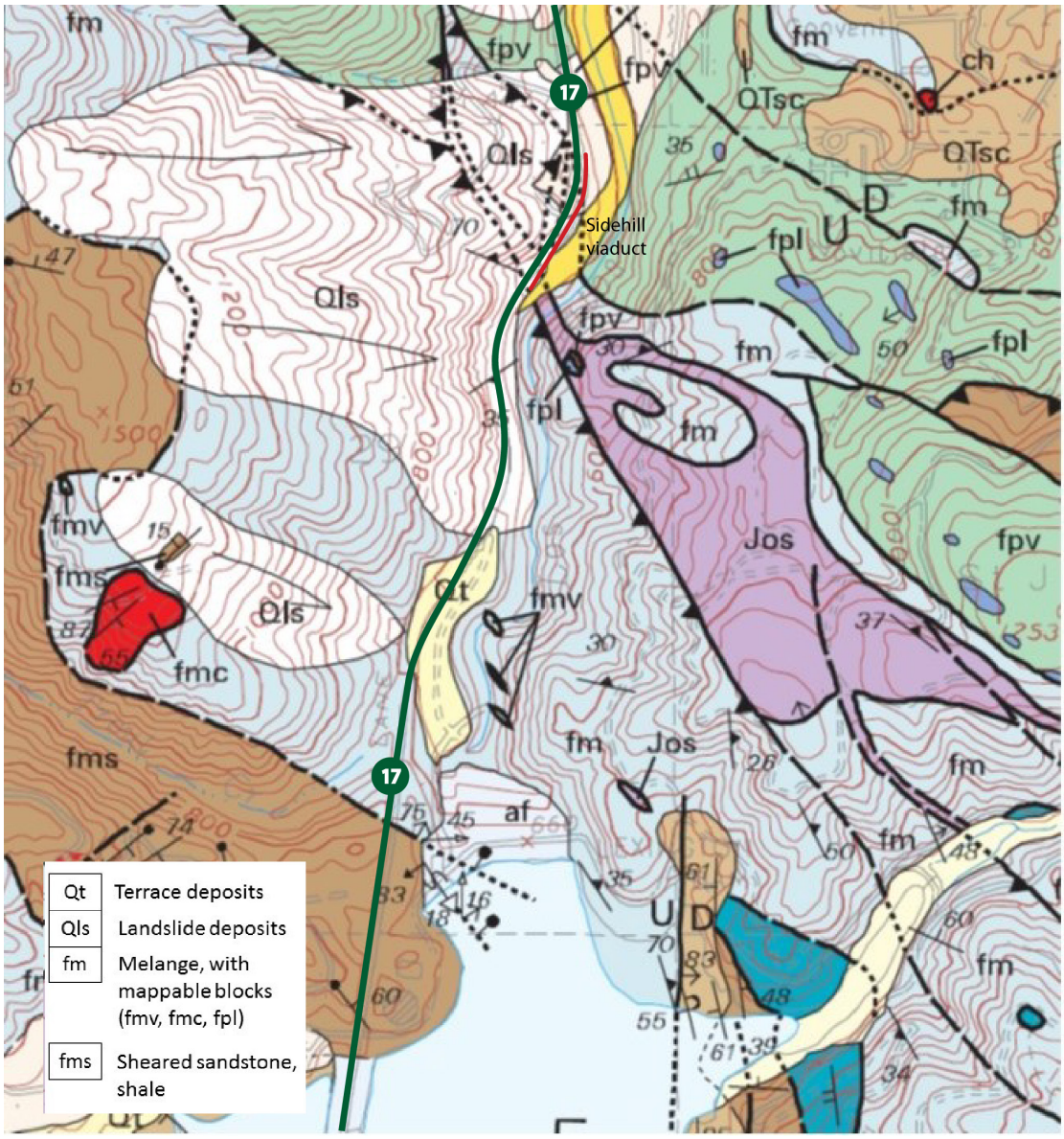


Figure 30: Geologic conditions in the area surrounding Eliminated Alternative 6, the Sidehill Viaduct

7.3. Conceptual Design

To create an undercrossing, the space below the concrete beam at the west side of the viaduct would need to be excavated to a minimum depth of 12 feet. To support the highway and viaduct structure while creating this space, a pile-supported bridge structure and retaining walls would need to be constructed across the west half of the highway, similar to those described for the Ravine Creek undercrossing in the 2016 Preliminary Alternatives Report.

To meet Caltrans standards, the edge of the new structure would have to allow for an eight foot shoulder and a crash barrier before the opening. The west side opening would need to extend at least 12 feet beyond this. A tall retaining wall would need to be built to retain the slope, and a long ramp would be needed to regain the necessary elevation back to the trail. A ramp, probably supported by retaining walls, would be required to get up the steep slope on the east side from the Los Gatos Creek Trail.

This construction project is significantly more constrained than the other crossings being evaluated because there is no existing construction access on either side. The west side adjacent to southbound (SB) Highway 17 is particularly challenging because there is no space to start construction without cutting back and retaining the steep, unstable slope; Photo 4 shows how the slope descends nearly vertically to meet the edge of the highway. It would be extremely expensive and difficult to do this without closing lanes of the highway during commute hours, which is unacceptable to Caltrans. The very steep slope on the east side, and the large water line on the surface at the base of the slope, constrain construction access similar to the Trout Creek undercrossing location, but in this case there is no space or route for construction access to the top of the slope; rather, it is under the viaduct.

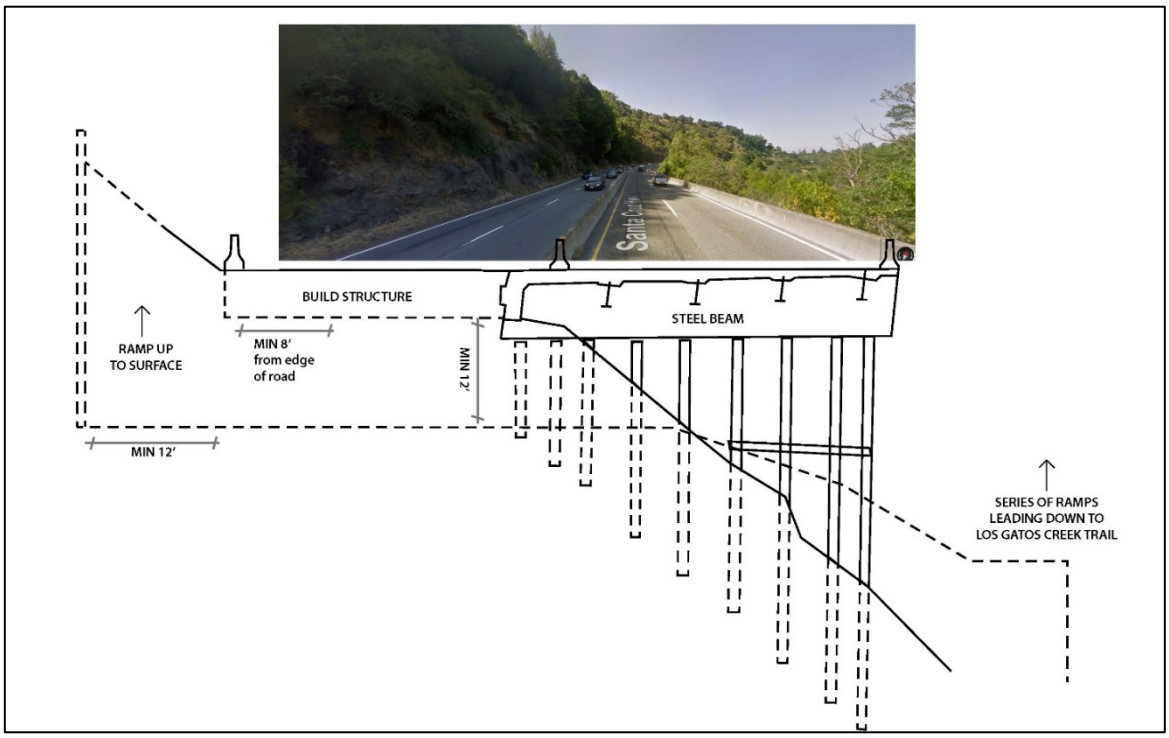


Figure 31: Eliminated Alternative 6, Cross-Section of Sidehill Viaduct, showing potential undercrossing (not to scale)

7.4. Conclusion

The Alternative 6 Sidehill Viaduct Alternative is infeasible because of the constraints for construction access and staging on the west side, because of the complexities of modifying the existing viaduct structure, and because there is not a practical exit point or route on the west side.

Appendix C – Summary of Public and Stakeholder Input

Contents

Appendix C – Summary of Public and Stakeholder Input

Project Website

Midpen maintains a project website (www.openspace.org/Hwy17) that has project information and study products (presentations, reports, etc.) available to the public, stakeholders, and partner agencies. The website hosts project surveys, provides engagement opportunities, and provides ongoing comment opportunities.

Summary of Public Comments from the August 2, 2016 Public Workshop:

A total of 37 persons attended the meeting. Ten public comment cards were received at the meeting and a total of 26 additional comments were received online during the public comment period. The public comment period closed September 6, 2016.

Questions from Public Comment Sheets:

Below is a summary of the questions submitted via the public comment sheets as well as agency responses:

- (ID5Q) Is there an option to extend the crossing over Highway 17 to pedestrians and add a marked bike line? That is an existing bridge, and might be cheaper?
    - (ID5A) The existing Bear Creek Road crossing is accessible to pedestrians (a sidewalk on the north side) and has marked shoulders which may be used by bicyclists. Modifying the existing Bear Creek Road overcrossing was determined not to meet the wildlife needs for the project, but may be improved as a standalone project.

- (ID19Q) My one concern is how to keep [undercrossings] from becoming a place that would be occupied by the homeless and keep out those it was intended to benefit?
    - (ID19A) Constructed crossing(s) will be patrolled to ensure legitimate uses. Sites favored by homeless people are often close to urban areas and developed amenities. None of the alternatives meet this proximity criteria, so potential use by homeless persons is expected to be low.

- (ID25Q) Undercrossings seem much better than an overcrossing. Isn't the Santa Clara County Open Space Authority well into the planning for one? Suggest cooperating with them for a solution really workable?
    - (ID25A) The Santa Clara Open Space Authority (OSA) is evaluating potential wildlife crossings along Highway 101 within Coyote Valley. The Midpen Highway 17 team is in contact with OSA and other agencies throughout the region working on wildlife crossings. Safe crossings for wildlife are needed at multiple locations and it will take many agencies working together.

- (ID33Q) My concern during this time of drought is that there would still be sufficient water available for wildlife in the more populated west side of Bear Creek Road. Presentation Center (1948 B. Creek Road) currently can't draw enough water from Collins Creek to run its emergency

pumping system for fire control. Please work on monitoring how much water is being taken for residential wells.

- (ID33A) The Highway 17 wildlife passage project is not intended to change the hydrologic conditions of the area and will not modify water availability to wildlife. Monitoring residential wells is outside the scope of this project, but this comment has been noted.

Additional Public Comments via Email

The following comments were received through the Hwy17@openspace.org email:

- One person asked for the names and contact information of the Caltrans representatives who were at the August 2, 2016 public meeting. The information was provided and this person was placed on the interested parties list for the project.
- One person asked for more information and was placed on the interested parties list for the project.
- One person stated that they would reach out to their 700 Facebook and Twitter followers to spread the word about the project. An email was sent to thank them for their interest and they were placed on the interested parties list for the project.

Safe on 17 Task Force Meeting – September 14, 2016

The Highway 17 corridor was identified as a high collision corridor in 1998 as a result of analysis of collision data and recommendations of local, regional, county and state agencies. A multi-agency Task Force was formed that meets quarterly to develop collision reducing strategies, which included additional CHP officers patrolling; road improvements including shoulder and lane widening, improved barriers and road drainage, additional warning devices, and tree trimming; and public education efforts to increase safe driving practices. During the last ten years, the coordinated approach of the Safe on 17 program has reduced the number of injuries and fatalities on the Highway 17 corridor by approximately 40%.

Midpen staff attended the September 2016 quarterly meeting of the Safe on 17 Task Force at the Santa Cruz County Regional Transportation Commission offices in Santa Cruz to present the wildlife and trail crossing project, collect input, and begin what is anticipated to be an ongoing coordination process.

Meeting with Santa Clara County Parks and Roads and Airports Departments – October 3, 2016

Midpen staff met with staff from Santa Clara County Parks Department and Santa Clara County Roads and Airports Department to discuss trail connection issues and options. The purpose of the discussion was to identify opportunities and constraints for each route, identify potential discreet projects that would be needed to connect each crossing and prioritize the projects, as applicable.

Of the many potential trail connections under discussion, the two existing trails parallel to Highway 17 and the road segment between the Los Gatos Creek trail and Jones trailhead were deemed high priorities. Lyndon Creek Canyon and interim improvements to Black Road were deemed infeasible trail connections not worth pursuing. As a result, Midpen will continue to explore opportunities along the west side of Highway 17 for a connection to El Sereno OSP.

It was agreed that several trail projects will need to be completed to achieve full build out of significant regional trails connections. Once a final crossing location is selected, the related trail projects can be scoped and prioritized further. During the course of the Highway 17 Wildlife Passage and Regional Trails Crossings project, Midpen will continue to work with these and other important regional trail partners and stakeholders on separate but related Regional Trail Connections Projects to enhance north-south and east-west connectivity to any new (or improved) trail crossings of Highway 17.

Other Early Project Meetings

Midpen staff and consultants organized and attended a series of initial project orientation meetings with local agencies and organizations.

- Caltrans District 4 Meeting, March 16, 2016
- Santa Clara County Parks Meeting, April 19, 2016
- Town of Los Gatos, Bay Area Ridge Trail Council, Santa Clara County Parks, April 19, 2016
- Santa Clara Valley Transportation Agency and Caltrans Meeting, May 3, 2016
- Santa Clara Valley Water District and County Roads Meeting, May 2, 2016
- San Jose Water Company Meeting, May 6, 2016

Caltrans Kick-Off Meeting – February 10, 2017

Caltrans and Midpen had a meeting at Caltrans District 4 Headquarters on February 10, 2017 to kick-off the Wildlife Crossing's Project Study Report – Project Development Support (PSR-PDS) process. TrailPeople presented an overview of the project and alternatives, including findings from the 2016 Preliminary Alternatives Report. Caltrans provided guidance on what is and what is not expected to be included as part of the PSR-PDS process. As an outcome of the meeting, BKF prepared a detailed schedule for the PSR-PDS submittal and review process, and Caltrans provided comments on Midpen's initial project Purpose and Need Statement.

Caltrans suggested that the Project's Purpose and Need statement focus on reducing wildlife-vehicle collisions, rather than motor vehicle collisions more broadly, and that the project's "need" include more quantifiable information such as number of collisions, existing wildlife connections, number of blocked crossings, etc. The revised Purpose and Need statement incorporating this Caltrans feedback is below. As Caltrans has noted, the Purpose and Need statement is a "living document," during the Project Initiation Document (PID) process it may be further revised as the PSR-PDS is being developed.

Revised Project Purpose and Need Statement

Purpose:

The purpose of the proposed project is to improve wildlife passage and regional trail connections in the vicinity of Highway 17 within the study area. Additionally, the project has the following goals;

- Improve motorist safety by reducing the potential for collisions with wildlife (and recreational users).
- Maintain healthy wildlife populations through habitat connectivity.

Need:

The UCSC Mountain Lion Study and Pathways for Wildlife Study have documented numerous road-kill animals on Highway 17 near Lexington Reservoir. In addition to the mortality of the wildlife these collisions present a hazard for drivers on this heavily-travelled mountain highway. This underscores the need for improved wildlife passage at this location. Highway 17 presents a barrier for the Bay Area Ridge Trail, Juan Bautista de Anza Trail, Los Gatos Creek and other future regional multi-use trail connections planned for major public open space and parks, as well for as non-motorized access for local Santa Cruz Mountain residents to the Town of Los Gatos. A separate pedestrian/equestrian/bicycle/non-vehicular commuter crossing would significantly improve recreation and transportation access, and improve safety.

Meeting with San Jose Water Company – March 8, 2017

A meeting was held with the Vice President of Operations and Manager of Water Treatment and Watershed Maintenance to review the project to date and to receive input from San Jose Water Company (SJW). SJW expressed reservations about Alternatives 2, 3 and 4, primarily over concerns of public access very close to SJW facilities and safety of workers in proximity to a designated wildlife crossing. There was also concerns about equestrian and dog waste in an area above a water intake.

Meeting with Santa Clara Valley Water District, Santa Clara County Roads and Airports, and Santa Clara County Parks Department – March 16, 2017

Midpen met with these agencies to discuss the status of the project and review proposed east and west trail alignments over their property and potential easements. All parties stated that they do not use the Alternative 5 Service Road for vehicle access to Highway 17 and believe it is a “remnant” from previous highway configuration. Intricacies of the different trail potential east and west trail alignments were discussed.

Meeting with San Jose Water Company – April 18, 2017

A meeting was held with the Vice President of Operations, Manager of Water Treatment and Watershed Maintenance, Manager of Security, and Director of Water Quality and Environmental Services to further discuss the project. The team discussed concerns from SJW about recreational trail user proximity to potable water supply and mountain lion safety when working at facilities in proximity to proposed wildlife crossings. SJW questioned if locating a wildlife crossing in proximity to frequently used facilities was a good idea and stated that the project cannot have operational impacts to their facilities.

Telephone Meeting with California Department of Fish and Wildlife – October 31, 2017

Midpen talked with CDFW Landscape Conservation Planning Manager, a Senior Environmental Scientist, and regional wildlife biologists to further discuss the project and future partnering opportunities. CDFW reiterated that two separate crossings are needed and that is their top concern for the project.

Meeting with Peninsula Open Space Trust – November 6, 2017

Midpen met with the Wildlife Linkages Program Manager and Director of Lands program to discuss the project, future partnering and/or funding opportunities, and coordinated messaging of regional connectivity projects.

Meeting with Bay Area Ridge Trail – November 6, 2017

Midpen met with Ridge Trail staff to discuss the project, future trail connection opportunities, and partnering and/or funding opportunities.

Meeting with Santa Clara County Parks – November 29, 2017

Midpen met with Santa Clara County Parks' staff to discuss the project, future trail connection opportunities, partnering and/or funding opportunities, and other standalone trail projects needed within the Lexington Basin.

Meeting with Bay Area Ridge Trail, Santa Clara County Parks, and Peninsula Open Space Trust – February 22, 2018

Midpen, Ridge Trail, County Parks, and the Peninsula Open Space Trust (POST) met in the field to review and discuss opportunities and constraints for potential connecting trails. Stops included Ravine Creek and Trout Creek to discuss their infeasibility for trail use primarily due to topography as well potential east side trail connections.

Panel Discussion following *The Cat that Changed America* Screening – April 7, 2018

Midpen and POST co-hosted a screening of *The Cat that Changed America*, a movie about Mountain lion connectivity issues in southern California. The screening was followed by a panel discussion of wildlife connectivity projects in the local region including the Highway 17 Wildlife Passage and Regional Trail Crossings project. An estimated 350 persons were in attendance and were generally supportive and inquisitive of the project.

Midpen Planning and Natural Resources Committee Meeting – June 5, 2018

The eight recommended alternatives identified in this report were presented to the Committee for review. The Committee unanimously recommended all eight alternatives advance to the full Board of Directors for approval to begin the Caltrans PSR-PDS.

Midpen Board Meeting – June 27, 2018

Following the Planning and Natural Resources Committee Meeting, the Midpeninsula Regional Open Space District Board of Directors approved all eight alternatives identified in this report advance to the Caltrans PSR-PDS phase. The District's consultant team TrailPeople is undertaking this task.

Telephone Meeting with Caltrans – October 11, 2018

The consultant team held a conference call with the Caltrans District 4 team who are assigned to review the submittals for the wildlife and trail crossing structures during the formal Caltrans review process. The meeting served to acquaint the Caltrans staff with the overall project goals and set of alternatives and answer basic questions. The formal submittal for Caltrans approval with the required format and content is anticipated to be submitted in late 2018.

Meeting with Santa Clara County Parks, Santa Clara County Planning Department, Peninsula Open Space Trust, and Santa Clara Valley Water District –October 19, 2018

Midpen met with multiple stakeholder agencies to update them on project progress and to provide an overview of the Revised Alternatives Report. The agencies also discussed the separate connecting trail project and upcoming public meeting for the Highway 17 Wildlife and Regional Trail Crossings project.

Santa Clara County Roads and Airport Department provided comments after the meeting, and San Jose Water was invited to, but did not attend.

Public Meeting – November 7, 2018

As part of the Caltrans PSR-PDS process a second public meeting was conducted to review the eight Recommended Alternatives and to provide the public with ongoing feedback opportunities.

Appendix D - Wildlife Fencing Plan

Contents

Description of Wildlife Fencing Plan

This is a conceptual plan for fencing that is intended to provide a starting point for future detailed planning of fencing in conjunction with design of a new wildlife crossing of Highway 17. The plan includes "minimum" fencing extents for each wildlife alternative (1, 2, 3, 4, and 5), and a much longer "ideal" extent throughout the study corridor from the edges of downtown Los Gatos to south of the Alma Helitack Station. The plan responds to the wildlife roadkill data for the study area and the connecting roads and trails. It was developed with input from Wildlife Biologist Dr. Tony Clevenger, Pathways for Wildlife Biologist Tanya Diamond and Wildlife Researcher Ahiga Snyder, and Midpen Natural Resources Specialist III Julie Andersen.[1] The concepts reflect consideration of the guidelines for fencing design summarized in a survey of techniques used by wildlife managers. [2]

The "minimum" fencing associated with the selected highway crossings is conceptually Phase 1 in an overall program of fencing the corridor. Later phases would extend the fencing if wildlife vehicle collisions continue to occur beyond the minimum extent. Later phases would be based on wildlife monitoring and adaptive management.

Exclusion fencing for deer and mountain lions is typically 8-10 foot-high chain link fencing, versus the standard 6-foot highway fencing that exists in some parts of the study area. Photographs of existing wildlife fencing can be found in Photos 1-3 in the main body of this report. Fencing for smaller species, such as the semi-aquatic special status species that are expected to occur in the vicinity of the project consist of tighter mesh panels approximately 36 inches high that can be attached to the 8 foot fence or as a separate fence where appropriate. These panels are often referred to as "herp" fencing after herpetology: a branch of zoology dealing with reptiles and amphibians.

Escape or jump out ramps are designed to let larger animals escape from the highway should they get past the fencing. These are typically located near the ends of any fencing segment and at regular intervals (i.e. 500 feet as shown in the concept plans) in between.

To deter animals from entering the highway at connecting roadways, electrically-charged mats ("electro mats") can be placed in the roadway pavement between segments of fencing. Newer technology allows the electric conductors to be an integral part of the pavement rather than embedded in the pavement. These mats give a mild shock to any animals that attempt to cross. Pedestrian wearing shoes and cyclists won't be shocked when they cross the mat. However, dogs, horses and people without shoes will be exposed to an electric shock, but this could be avoided by a separate gate or if an "off" button on a timer are installed at the site. Signage warning people of the presence of the mats will be important so they know not to walk on them or let their pets stray onto them (keeping stray domesticated animals off the highway would be a side benefit of the fencing and mats). Electro mat technology is continuously evolving and as this project develops, newer designs that meet the needs of the project should be considered for implementation. For example in some areas, electro mats will need to be designed to prevent reptiles and amphibians from getting onto the mats. Design manufacturers are aware that there is a need for this product, but there is no design yet. As an example, the technology installed in 2012 in Photo 1 was later retrofitted to provide a wider mat to prevent larger animals from jumping over the mat.

[1] Based on a field trip October 31, 2016

[2] *Construction Guidelines for Wildlife Fencing and Associated Escape and lateral Access Control Measures*. Kociolek, Allen, McGowen; Western Transportation Institute – Montana State University; Cramer and Venner, April 2015

Photo 1: Example of "Electric Wildlife Mat", human access gate, directional fencing, and "jump out" feature
Photo credit: 2012, Caltrans District 5, Nancy Siepel and Morgan Robertson

Gates in the fencing allow access for people where trails connect along or across the highway. These should be designed to be self-closing.

The envisioned 8-foot fencing can be visually obtrusive, especially in a scenic area like the Lexington Basin. Where the land slopes down steeply from the highway the fencing can be located down the slope to reduce or eliminate its visibility. Where the fencing will be on flat ground or a slope above the highway it can be made less visible by using vinyl-coated fencing with a black or dark green color. Use of wood posts might also help to make the fence blend into the setting more.

The fencing plan takes advantage of an almost 1000-foot section of Highway 17 that is built on a sidehill viaduct, with the east side of the highway elevated well above ground level and eliminating the need for wildlife fencing on that side. To the north of this segment through downtown Los Gatos the east side of the highway has a 32-inch-high concrete crash barrier topped by a 4-foot-high chain link fence. This chain link fencing would need to be increased in height to provide better exclusion in what the data shows is a roadkill hot spot.

Encouraging wildlife to use the new highway crossings will also involve removing barriers that may deter wildlife from entering them. The proposed Trout Creek undercrossing is located near the dam spillway where there are fences to deter people from accidentally or deliberately entering operational or hazardous areas, including the entrances to the existing Trout Creek culverts. Figure 4 of 8 shows some

proposed modification/relocation of these fences to maintain the safety barriers for humans while permitting unimpeded access for wildlife to the proposed undercrossing.

Crash barriers are anticipated to be required along the edge of the highway on either side of a new undercrossing to prevent vehicles from going off the approximately 15 to 20-foot drop-off that would be created. The barriers would extend some distance (i.e. 100 feet) on either side of the undercrossing. As an additional means of encouraging wildlife use of the crossing, sound walls are envisioned to be integrated with the crash barrier.

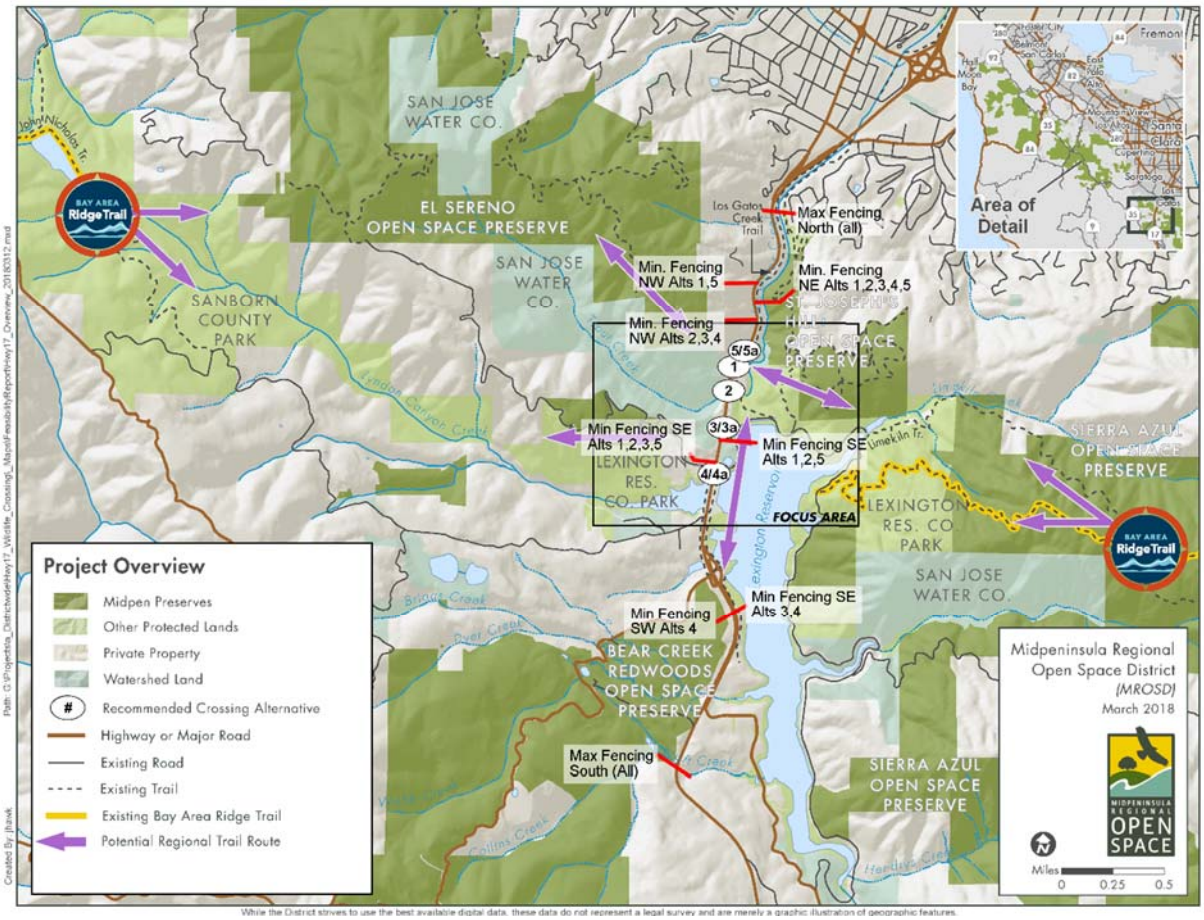


Figure 1: Fencing Extents Overview Map

Tables 1 through 6 show conceptual unit prices and cost estimates for the "minimum" fencing extent associated with each of the five alternative crossing locations, and the "maximum" or ideal fencing extent. The actual cost could vary depending on the extent of fence constructed at one time, installation specifications and economic conditions at the time of bidding and contracting.

Table 1: Trout Creek Crossing Minimum Fencing Plan Cost Estimate

Trout Creek Crossing Minimum Fencing Plan Cost Estimate						
Item	**Quantity**	**Unit**	**Cost per Unit**		**2018 Cost**	**2024 Estimate**
10' Fence	8,201	LF	$85	$	1,081,454.87	**$ 1,081,454.87**
Gates	7	EA	$2,500	$	25,855.47	**$ 25,855.47**
Jump Outs	23	EA	$8,000	$	285,444.39	**$ 285,444.39**
Herp Fence/Panel	1,444	LF	$15	$	32,001.68	**$ 32,001.68**
Electro Mat	40	LF	$1,500	$	93,079.69	**$ 93,079.69**
Fence Removal	917	LF	$50	$	67,741.33	**$ 67,741.33**
			Total		**$1,585,577.44**	

Table 2: Ravine Crossing Minimum Fencing Plan Cost Estimate

Ravine Crossing Minimum Fencing Plan Cost Estimate						
Item	**Quantity**	**Unit**	**Cost per Unit**		**2018 Cost**	**2024 Estimate**
10' Fence	9,132	LF	$85	$	1,204,171.99	**$ 1,204,171.99**
Gates	8	EA	$2,500	$	29,549.11	**$ 29,549.11**
Jump Outs	25	EA	$8,000	$	310,265.64	**$ 310,265.64**
Herp Fence/Panel	1,444	LF	$15	$	32,001.68	**$ 32,001.68**
Electro Mat	40	LF	$1,500	$	93,079.69	**$ 93,079.69**
Fence Removal	917	LF	$50	$	67,741.33	**$ 67,741.33**
			Total		**$1,736,809.45**	

Table 3: Southern Crossing Minimum Fencing Plan Cost Estimate

Southern Crossing Minimum Fencing Plan Cost Estimate						
Item	**Quantity**	**Unit**	**Cost per Unit**		**2018 Cost**	**2024 Estimate**
10' Fence	10,614	LF	$85	$	1,399,592.80	**$ 1,399,592.80**
Gates	8	EA	$2,500	$	29,549.11	**$ 29,549.11**
Jump Outs	30	EA	$8,000	$	372,318.77	**$ 372,318.77**
Herp Fence/Panel	3,857	LF	$15	$	85,478.18	**$ 85,478.18**
Electro Mat	40	LF	$1,500	$	93,079.69	**$ 93,079.69**
Fence Removal	917	LF	$50	$	67,741.33	**$ 67,741.33**
			Total		**$2,047,759.89**	

Table 4: Montevina Crossing Minimum Fencing Plan Cost Estimate

Montevina Crossing Minimum Fencing Plan Cost Estimate					
Item	**Quantity**	**Unit**	**Cost per Unit**	**2018 Cost**	**2024 Estimate**
10' Fence	14,368	LF	$85	$ 1,894,606.12	**$ 1,894,606.12**
Gates	12	EA	$2,500	$ 44,323.66	**$ 44,323.66**
Jump Outs	38	EA	$8,000	$ 471,603.78	**$ 471,603.78**
Herp Fence/Panel	6,301	LF	$15	$ 139,641.70	**$ 139,641.70**
Electro Mat	160	LF	$1,500	$ 372,318.77	**$ 372,318.77**
Fence Removal	917	LF	$50	$ 67,741.33	**$ 67,741.33**
			Total	**$2,990,235.37**	

Table 5: Northern Crossing Minimum Fencing Plan Cost Estimate

Northern Crossing Minimum Fencing Plan Cost Estimate					
Item	**Quantity**	**Unit**	**Cost per Unit**	**2018 Cost**	**2024 Estimate**
10' Fence	9,132	LF	$85	$ 1,204,171.99	**$ 1,204,171.99**
Gates	8	EA	$2,500	$ 29,549.11	**$ 29,549.11**
Jump Outs	25	EA	$8,000	$ 310,265.64	**$ 310,265.64**
Herp Fence/Panel	1,444	LF	$15	$ 32,001.68	**$ 32,001.68**
Electro Mat	40	LF	$1,500	$ 93,079.69	**$ 93,079.69**
Fence Removal	917	LF	$50	$ 67,741.33	**$ 67,741.33**
			Total	**$1,736,809.45**	

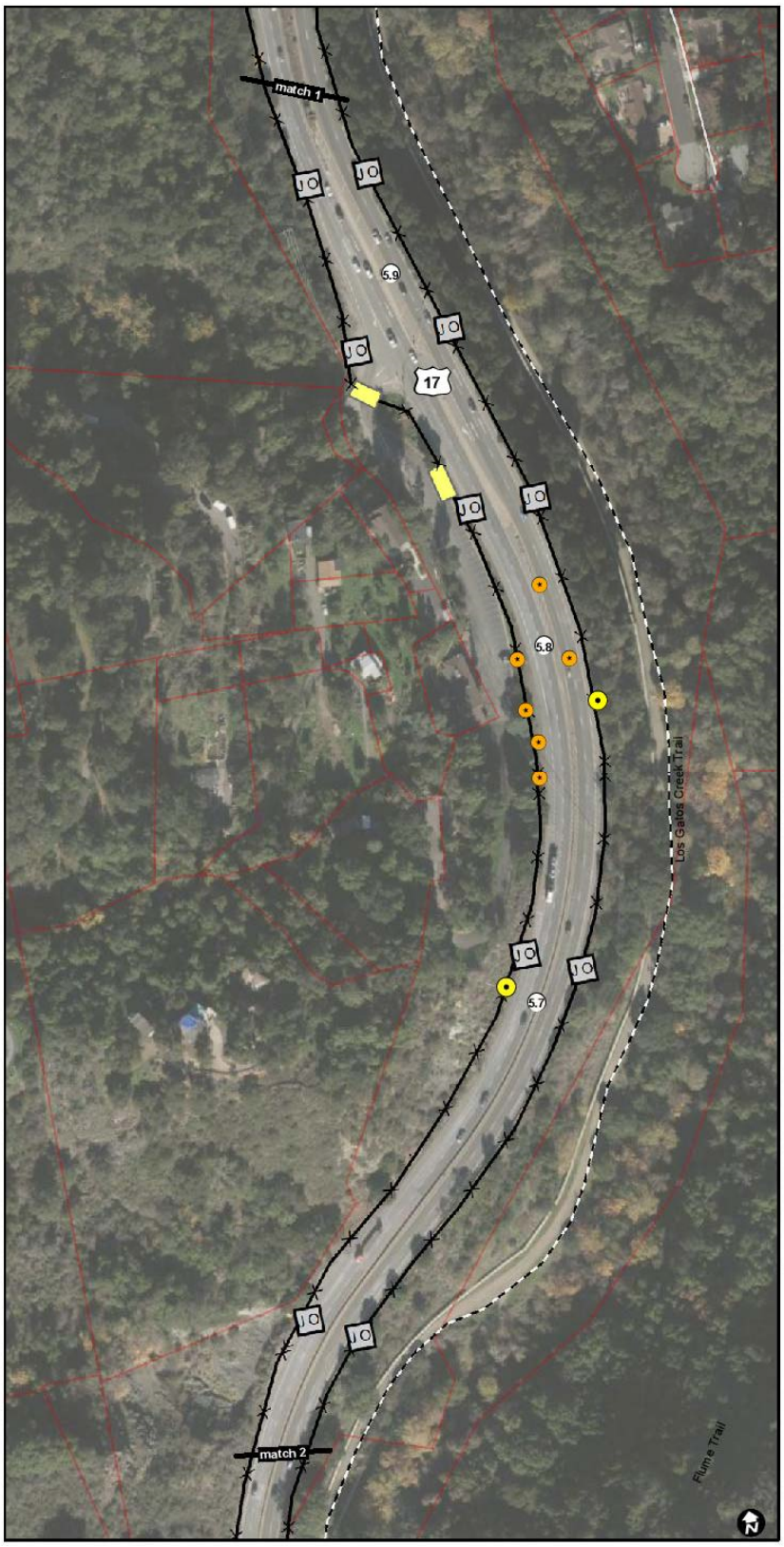
Table 6: Ideal Extent Fencing Plan Cost Estimate

Ideal Extent Fencing Plan Cost Estimate					
Item	**Quantity**	**Unit**	**Cost per Unit**	**2018 Cost**	**2024 Estimate**
10' Fence	28,589	LF	$85	$ 3,769,894.25	**$ 3,769,894.25**
Gates	17	EA	$2,500	$ 62,791.86	**$ 62,791.86**
Jump Outs	67	EA	$8,000	$ 831,511.92	**$ 831,511.92**
Herp Fence/Panel	7,531	LF	$15	$ 166,900.75	**$ 166,900.75**
Electro Mat	320	LF	$1,500	$ 744,637.54	**$ 744,637.54**
Fence Removal	917	LF	$50	$ 67,741.33	**$ 67,741.33**
			Total	**$5,643,477.66**	

JO Jump out
New 8' fence maximum extent
Existing trail
Parcel boundary
Road kill
Other

0 80 160 320
Feet

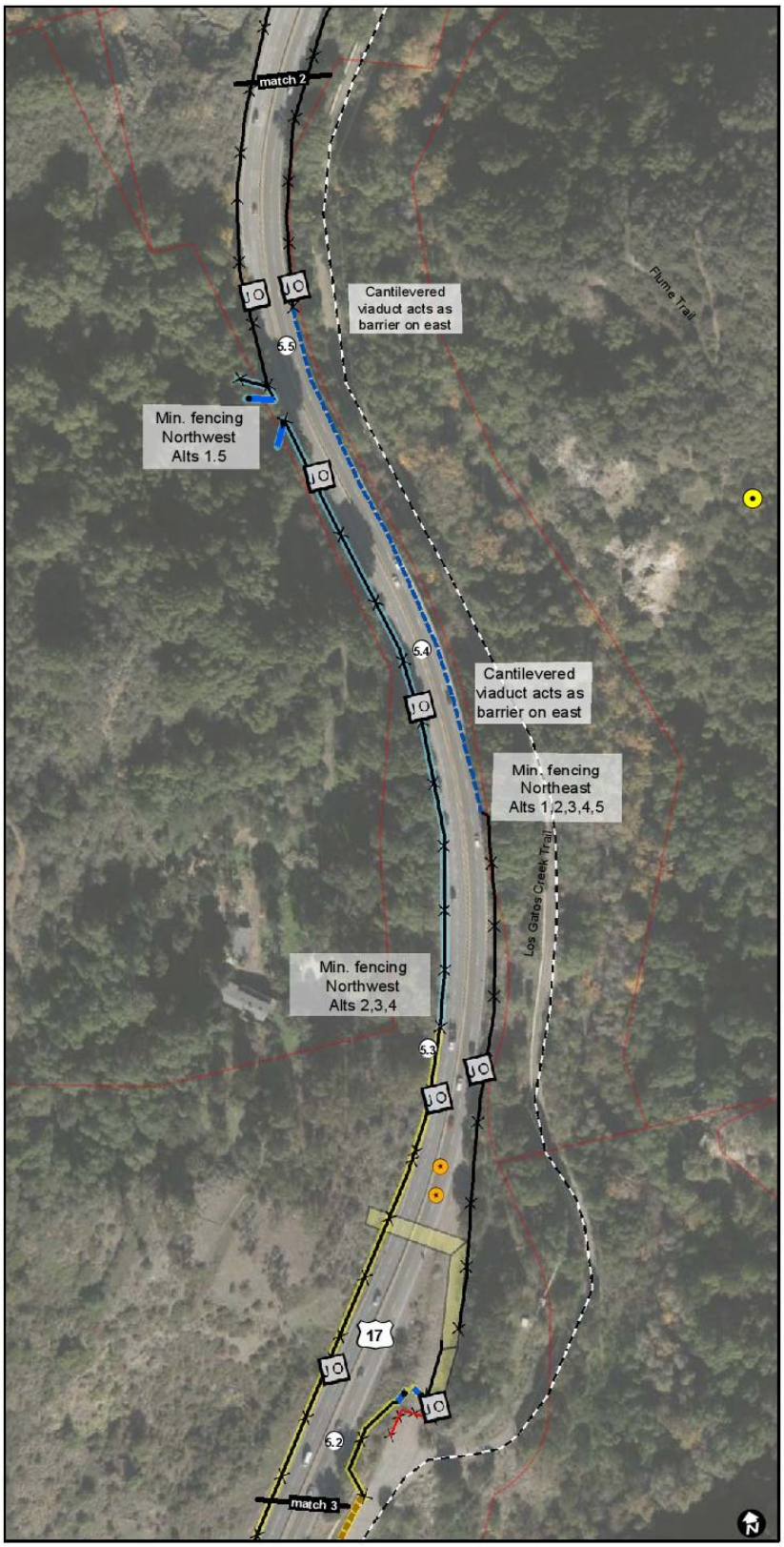
1 inch = 217 feet



JO Jump out
Electromat barrier
New 8' fence maximum extent
Existing trail
Parcel boundary
Road kill
Mountain Lion
Deer

0 80 160 320
Feet

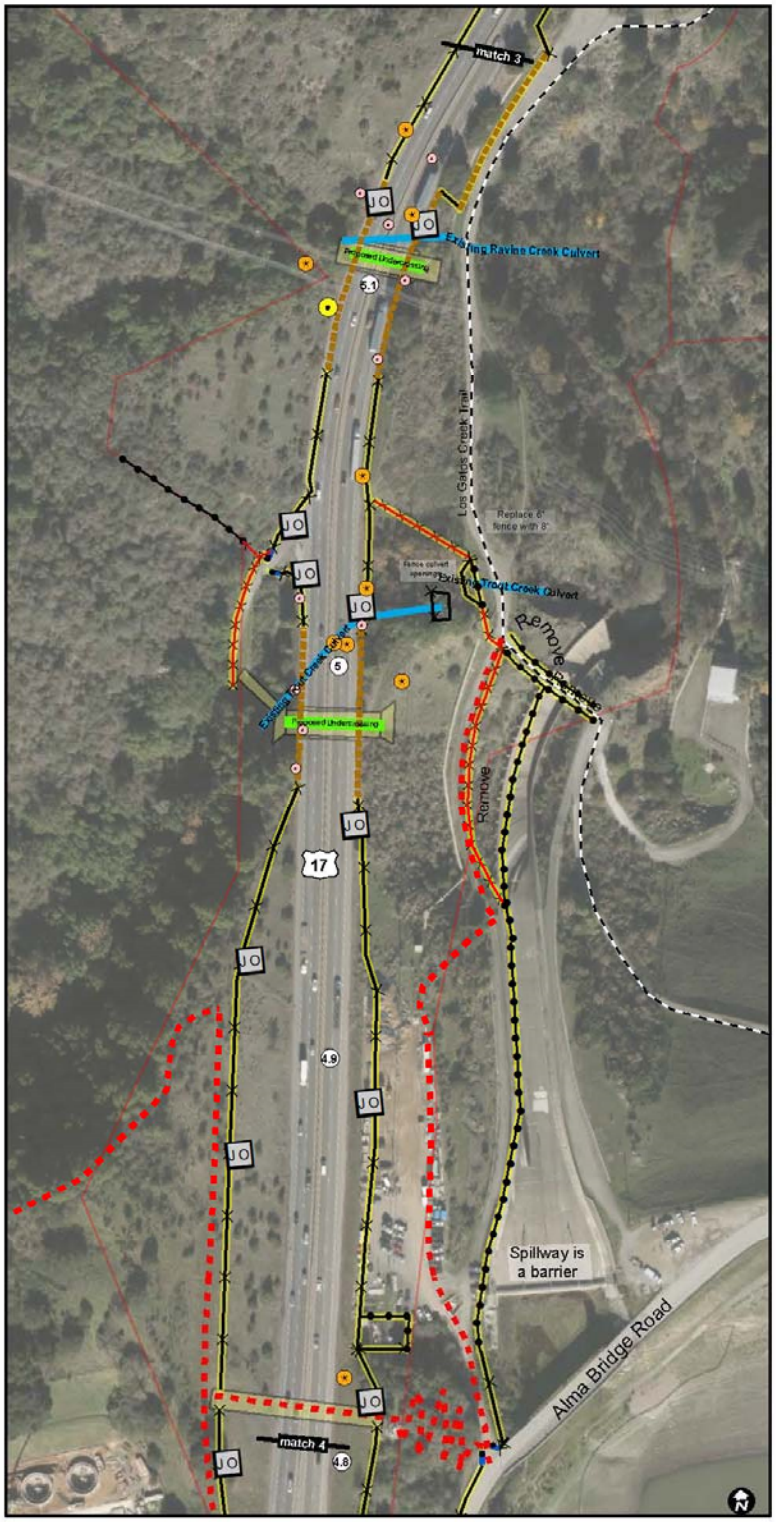
1 inch = 217 feet



JO Jump out
<all other values>
New 8' fence maximum extent
Existing 6' fence to be removed
New gate
New or existing wall
Existing trail
Viaduct
Min fencing, Trout Creek Undercrossing
Min fencing, Ravine Undercrossing
Parcel boundary
Road kill
Mountain Lion
Deer

0 80 160 320
Feet

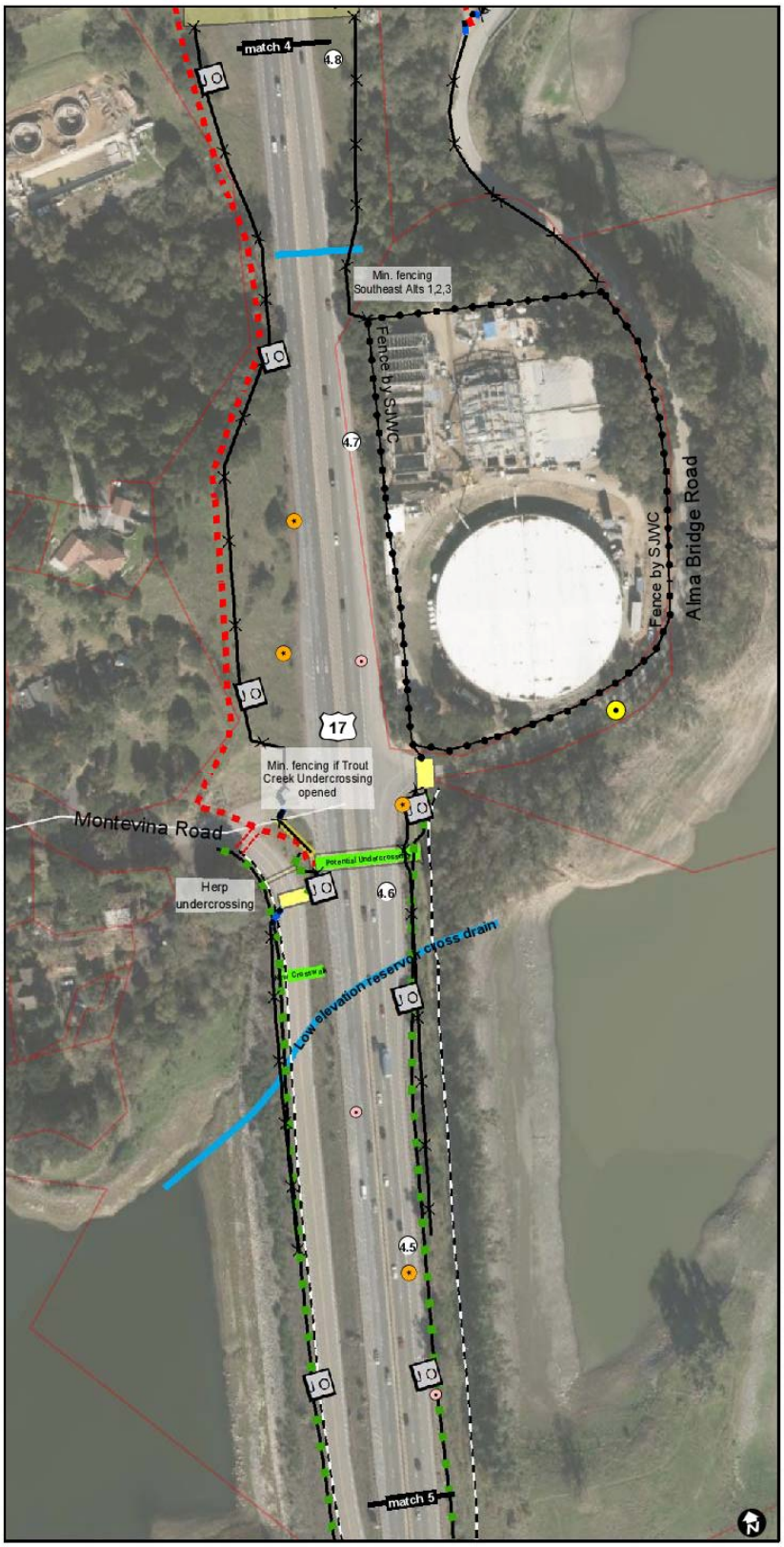
1 inch = 217 feet



Jump out
<all other values>
New 8' fence maximum extent
Existing 6' fence to remain
Existing 6' fence to be removed
New gate
New or existing wall
Existing trail
Proposed / potential trail
Min fencing, Trout Creek Undercrossing
Existing culvert
Proposed crossing
Parcel boundary
Road kill
Mountain Lion
Deer
Other

0 80 160 320
Feet

1 inch = 217 feet



JO Jump out
Electromat barrier
<all other values>
New 8' fence maximum extent
New 8' fence w herp panel
Existing 6' fence to remain
New gate
Proposed crosswalk
Existing trail
Proposed / potential trail
Min fencing, Trout Creek Undercrossing
Existing culvert
Proposed crossing
Parcel boundary
Road kill
Mountain Lion
Deer
Other

0 80 160 320
Feet

1 inch = 217 feet

JO Jump out
Electromat barrier
New 8' fence maximum extent
New 8' fence w herp panel
New gate
New or existing wall
Existing crosswalk
Proposed crosswalk
Existing trail
Proposed / potential trail
Min fencing, Trout Creek Undercrossing
Existing culvert
Proposed crossing
Parcel boundary

Road kill
Deer
Other

0 80 160 320
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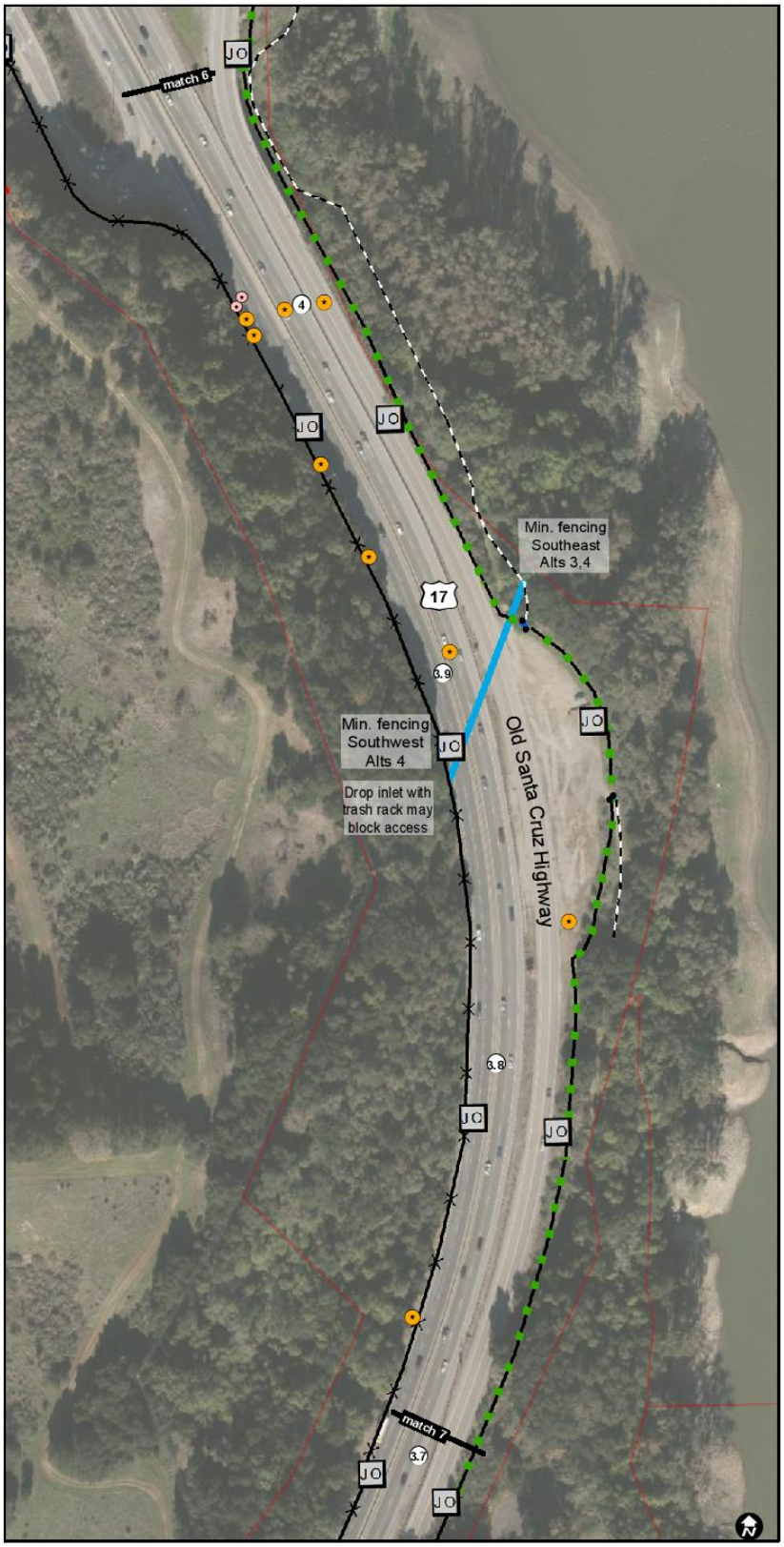
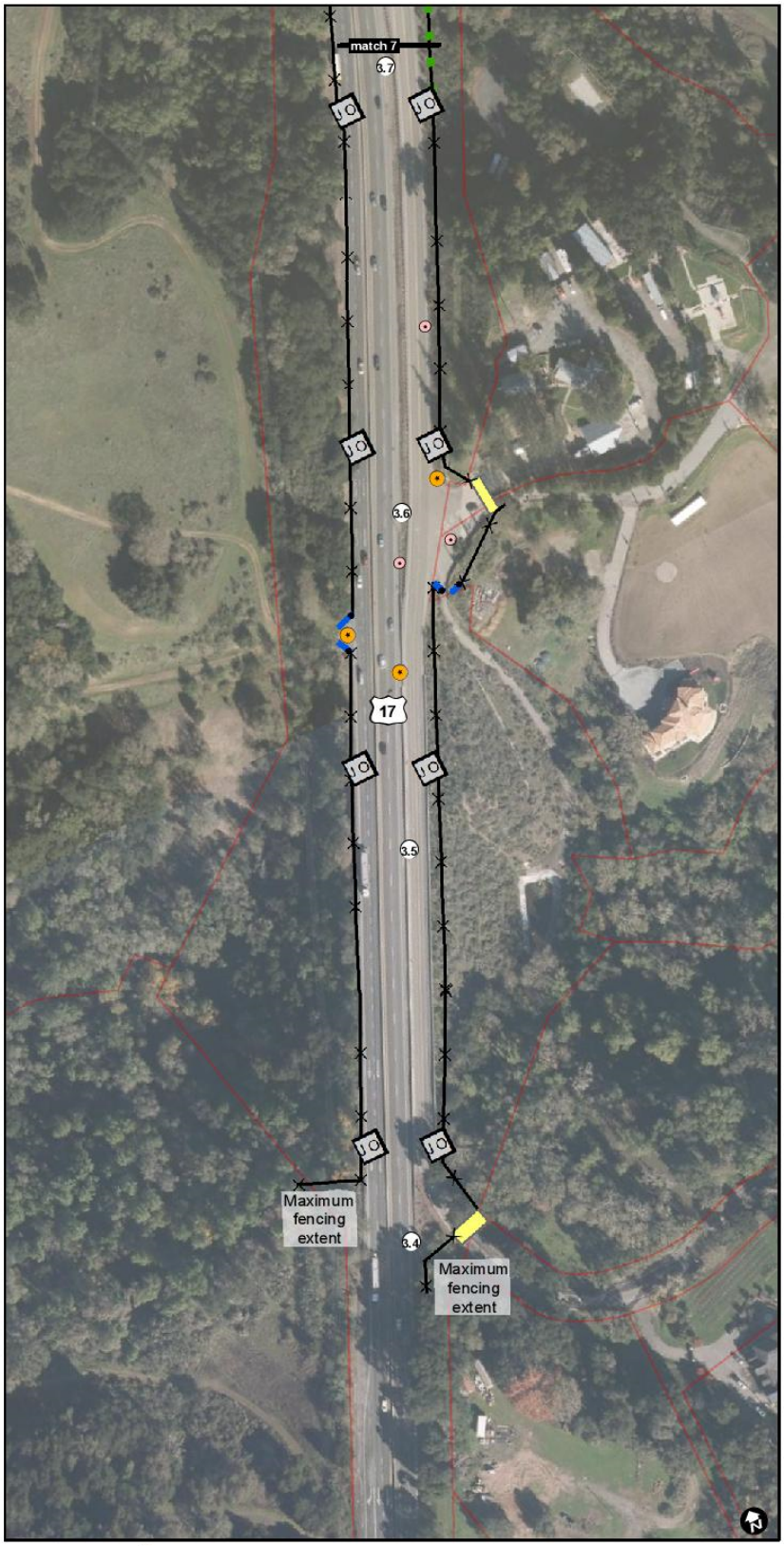
1 inch = 217 feet



JO Jump out
New 8' fence maximum extent
New 8' fence w herp panel
New gate
Existing trail
Proposed / potential trail
Existing culvert
Parcel boundary
Road kill
Deer
Other

0 80 160 320
Feet

1 inch = 217 feet



Jump out
Electromat barrier
New 8' fence maximum extent
New 8' fence w herp panel
New gate
Parcel boundary
Road kill
Deer
Other

0 80 160 320
Feet

1 inch = 217 feet

Appendix E – Funding Opportunities

Contents

Funding Opportunities

The funding opportunities described below outline various sources of funding available to plan and construct bicycle and pedestrian facilities, develop and improve wildlife corridors, enhance traffic safety, reduce pollution, protect wildlife, prioritize smart growth, increase recreational access, and improve community health and well-being. The following sections cover federal, state, regional, and local sources of funding, including potential sources of community-based and private funding. This Appendix will be maintained as a living document and additional funding sources will be added as they are encountered throughout the project. Because no one source of funding will be sufficient to cover the project in its entirety any combination of funds from these funding sources along with direct funding from partner agencies will be considered.

Federal Sources

In California, federal transportation monies are administered through the California Department of Transportation (Caltrans) and Metropolitan Planning Organizations. Federal funding is intended for capital improvements and safety and education programs, and projects must relate to the surface transportation system. In the Bay Area, the Metropolitan Transportation Commission administers federal money via the competitive One Bay Area Grant Program (One Bay Area Grant Program under *State Sources*). In turn, wildlife and environmental funds are dispersed through a variety of state agencies, as described below.

Fixing America's Surface Transportation Act (FAST)

Fixing America's Surface Transportation (FAST) authorizes $305 billion from 2016-2020 for highway, highway and motor vehicle safety. A portion of these funds is available through the programs described below.

More info: **http://www.fhwa.dot.gov/legsregs/directives/notices/n4510805/n4510805_t2.cfm; https://www.transportation.gov/fastact**

Surface Transportation Block Grant Program (STBG)

Fifty-one percent of each state's STBG funds are sub-allocated geographically by population.[1] A wide variety of bicycle and pedestrian improvements are eligible. The remaining monies may be spent in any area of the state. Two relevant areas of funding under the under this grant program are the Transportation Alternatives Set-Aside and the Recreational Trails Program, which are outlined below. In addition, in the San Francisco Bay Area the Surface Transportation Block Grant program is rolled into One Bay Area Grant program grants. A wide variety of bicycle and pedestrian improvements are eligible. This program is described under *State Sources*.

[1] Per the FAST Act, this percentage will increase by one percentage point each year up to 55%

Transportation Alternatives Set-Aside includes the construction, planning, and design of a range of bicycle and pedestrian infrastructure including on–road and off–road trail facilities for pedestrians, bicyclists, and other active forms of transportation. The FAST Act will set aside $835 million annually for TA for FY 2016 and 2017, and $850 million annually for FYs 2018-2020.

More info: **http://www.fhwa.dot.gov/environment/transportation_alternatives/**

Recreational Trails. This program funds development and maintenance of recreational trails and trail-related facilities for a variety of pedestrian, bicycle, and streetscape projects including sidewalks, bikeways, multi-use paths, and rail-trails. Approximately $82 million is available nationally for the Recreational Trails Program, with California receiving $5,698,627 per year through FY 2020. In California the Recreational Trails Program is administered by the California Department of parks and Recreation, with federal funding available through the Federal Highway Administration. Recreational Trail funding is also available as an eligible category through the Active Transportation Program, which is described under *State Sources*.

More info: **http://www.fhwa.dot.gov/environment/recreational_trails/**

Highway Safety Improvement Program (HSIP)

HSIP provides roughly $2.2 billion nationally for projects and programs that help communities achieve significant reductions in traffic fatalities and serious injuries on all public roads, bikeways, and walkways. Infrastructure and non-infrastructure projects are eligible for HSIP funds. All HSIP projects must be consistent with the state's Strategic Highway Safety Plan. Grant size ranges from $100,000 to $10 million. In California this program is administered by Caltrans – see *State Sources* for more information.

More info: **http://dot.ca.gov/hq/LocalPrograms/hsip.html**

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

CMAQ funds projects and programs that support transportation projects and other related efforts that contribute to air quality improvements and provide congestion relief. These federal dollars can be used to build bicycle and pedestrian facilities that reduce travel by automobile. The FAST Act provides between $2.3 - $2.5 billion in CMAQ funding each year.

CMAQ funding in the San Francisco Bay Area is included in the One Bay Area Grant Program which projects that encourage bicycle and pedestrian transportation options are eligible (see *State Sources)*.

More info: **https://www.fhwa.dot.gov/fastact/factsheets/cmaqfs.cfm**

Partnership for Sustainable Communities

The Partnership for Sustainable Communities is a joint project of the Environmental Protection Agency, the U.S. Department of Housing and Urban Development, and the U.S. Department of Transportation. The partnership aims to "improve access to affordable housing, more transportation options, and lower transportation costs while protecting the environment in communities nationwide." The Partnership is based on five Livability Principles, one of which explicitly addresses the need for bicycle and pedestrian infrastructure. The Partnership is not a formal agency with a regular annual grant program: rather, each participating agency separately offers funding opportunities. Therefore, it is not a funding program in itself but an overarching partnership that links to other specific funding programs.

More info: **https://www.epa.gov/smartgrowth/partnership-sustainable-communities-supporting-environmental-justice-and-equitable**

Better Utilizing Investments to Leverage Development (BUILD) Transportation Discretionary Grants Program

The U.S. Department of Transportation's Build Discretionary Grant program replaces the pre-existing Transportation Investment Generating Economic Recovery (TIGER) grant program. FY 2018 BUILD Transportation grants are for investments in surface transportation infrastructure, with funding to support roads, bridges, transit, rail, ports, or intermodal transportation. In 2018 $1.5 billion was appropriated through 2020.

More info: **https://www.transportation.gov/BUILDgrants**

State Grant Sources

The recent passage of Prop 68, and SB 1 has opened up funding opportunities that have not been more recently available due to lack of funding. Below outlines these and other state-appropriated funds expected to be available over the next several years.

State Cap and Trade Program

Per AB 32, California must reduce greenhouse gas emissions to 1990 levels by 2020. A key component of this goal is the creation of a carbon cap and trade program, which places a cap on carbon emissions and enables companies to buy and/or trade emissions allowances through a state-run marketplace. Auction revenue is deposited into the California Climate Investments, which includes permanent annual appropriations to support low carbon transportation. The remaining revenue is subject to annual appropriations, some of which may benefit active transportation programs. Key programs from both the continuous appropriation and the current state budget are outlined below.

More info: **https://www.arb.ca.gov/cc/capandtrade/auctionproceeds/ggrfprogrampage.htm**

Low Carbon Transit Operations Program (LCTOP)

The LCTOP is one of several programs that are part of the Transit, Affordable Housing, and Sustainable Communities program established by the California Legislature in 2014. The LCTOP was created to provide operating and capital assistance for transit agencies to reduce greenhouse gas emission and improve mobility, with a focus on disadvantaged communities. It is administered by Caltrans in coordination with Air Resources Board and the State Controller's Office. Funds are allocated formulaically to transportation agencies but the District may be eligible through a contributing sponsor.

More info: **http://www.dot.ca.gov/drmt/splctop.html**

Affordable Housing and Sustainable Communities

The Affordable Housing and Sustainable Communities program is administered by the Strategic Growth Council and implemented by the Department of Housing and Community Development. The fund receives a permanent annual appropriation equivalent to 30% of the Greenhouse Gas Reduction Fund. Although 50% of this money must go towards affordable housing, the remainder can support a range of projects including bicycle and pedestrian infrastructure projects.

More info: **http://www.hcd.ca.gov/grants-funding/active-funding/ahsc.shtml**

Climate Ready Grant Program - California State Coastal Conservancy

Climate Ready grants are intended to encourage local governments and non-governmental organizations to advance planning and implementation of on-the-ground actions that reduce greenhouse gas (GHG) emissions and lessen the impacts of climate change on California's coastal communities. The grant program makes eligible "development of multi-use trails with clearly identified GHG reduction goals; (and) protecting and managing open space lands with clearly identified GHG reduction goals."

More info: **http://scc.ca.gov/climate-change/climate-ready-program/**

Urban Greening Grant Program

Through the Urban Greening Grant Program, $24.7 million was available in FY 2018-2019 for projects that GHG emissions and transform the built environment into places that are more sustainable, enjoyable, and effective in creating healthy and vibrant communities by enhancing parks and open space. Successful projects focus on conversion of paved areas to green space, natural stormwater management, and generally green infrastructure projects that reduce GHG emissions. Projects must have one other co-benefit as well, such as reducing vehicle miles traveled through the construction of pedestrian and bicycle facilities that provide safe routes

between residences, commercial centers, workplaces, and schools. Future funding for this program will continue to be available through Prop 68.

***More info*: https://www.sacog.org/urban-greening-grant**

Wildlife Conservation Board (WCB)

WCB is a State of California Board that authorizes and allocates funds for acquisition and preservation, protection, and restoration of wildlife habitat, with a typical maximum of $250,000 per grant. Several WCB grant programs exist that could benefit the creation of public access trails or the construction of wildlife corridors:

Habitat Enhancement and Restoration – includes native habitat restoration projects, with funding from the Habitat Conservation Fund and various bond measures.

Public Access Development Program – programs to improve public access to wildlife-oriented recreation throughout California.

***More info:* https://www.wcb.ca.gov/Programs**

In addition, through Prop 68 a total of $275 million will be available for a variety of programmatic activities, including Wildlife and Fish Passage Grants.

California Natural Resources Agency

California Trails and Greenways

Through Prop 68, $30 million will be available for non-motorized infrastructure development and access improvements, likely beginning in 2019.

Environmental Enhancement and Mitigation (EEM) Grant Program

The EEM Program offers $7 million each fiscal year for grants to state, local, federal and nonprofit organizations for projects directly or indirectly related to the environmental impact of transportation facility modifications or construction of new transportation facilities. The EEM Program encourages projects that produce multiple benefits, such as reducing greenhouse gas emissions, increasing water use efficiency, reducing risks from climate change impacts, and demonstrating collaboration with local, state and community entities. Applicable funding categories include assessing environmental impact for proposed transportation improvements and acquisition, restoration, or enhancement of resource lands to mitigate for loss or detriment to such lands near right of way for transportation improvements.

***More info:* http://resources.ca.gov/grants/environmental-enhancement-and-mitigation-eem/**

California State Coastal Conservancy

Through Prop 68 the Coastal Conservancy will have a climate-related competitive grant round beginning in 2019. Details are not yet available, but funding may include support for planning or adaptation efforts related to wildlife movement.

Department of Fish and Wildlife

The State Wildlife Grant Program through the Department of Fish and Wildlife funds the development and implementation of programs that benefit wildlife and their habitat. In California, these funds are used to develop and implement the State Wildlife Action Plan, which aims to maintain and increase ecosystem and native species, ecological conditions, and ecosystem functions. For fiscal year 2017, $1.2M was available for sub-granting through this program.

***More info*: https://www.wildlife.ca.gov/Grants/State-Wildlife-Grants**

Caltrans

Various funding opportunities for improved transit and greenhouse gas emission reduction are available through SB 1, which was passed by voters in April 2017. This legislative package invests $54 billion over the next decade to fix roads, freeways, and bridges in communities across California. However, the fate of this bill is uncertain because a repeal measure is on the ballot for November 2018. If the repeal passes, some of this funding will no longer be available.

Active Transportation Program (ATP)

The purpose of the ATP is to encourage the increased use of active modes of transportation to reduce greenhouse gas emissions and enhance public health. For example, funding could enable activities that increase the proportion of trips that use biking and walking or increase safety and mobility for non-motorized users, including infrastructure projects such as recreational trails and walkways. In the May 2018 cycle 4, $440 million was available through Caltrans, which was funded from federal sources, SB 1, and the State Highway Account.

***More info:* http://www.dot.ca.gov/hq/LocalPrograms/atp/;**
http://www.dot.ca.gov/hq/LocalPrograms/atp/cycle-4.html

Sustainable Transportation and Adaptation Planning Grant

In 2018-2019 $7 million is available for projects that advance climate adaptation planning on California's transportation infrastructure, including roads, railways, bikeways, trails, bridges, ports, and airports.

Sustainable Transportation Planning Grant

In 2018-2019 $24.5 million will be available to support planning projects with a transportation nexus Of this, $17 million will be distributed through a competitive program, with Special Districts eligible as a sub-applicant.

Regional & Local Sources

Santa Clara Valley Transportation Authority Measure B

In 2016 Santa Clara County voters approved Measure B, a 30-year, half-cent countywide sales tax to enhance transit, highways, expressways and active transportation (bicycles, pedestrians and complete streets). Anticipated to generate $6 billion in 2017 and $6.5 billion in 2018, $250 million will support bicycle and pedestrian safety and improvements, including funds for capital and planning projects. In addition to direct local distribution, Measure B funds will also include discretionary bicycle and pedestrian funding and a competitive grant program.

More info: **http://www.vta.org/measure-b-2016**

One Bay Area Grant (OBAG) 3 Program[2]

In its third funding round the OBAG Program, which is divided into a regional program managed by Metropolitan Transportation Commission and a county program managed by Bay Area Congestion Management Agencies, will invest over $916 million from FY 2017/18 – FY 2021/22. In the previous funding round, OBAG 2 focused on integrating the region's federal transportation program with California's climate law and the Sustainable Communities Strategy. The county program ($386 million over five years) includes support for bicycle and pedestrian improvements, and Priority Conservation Areas, including $8.2 million for the Peninsula, Southern, and East Bay Counties. Currently, the program is on hold as the Metropolitan Transportation Commission revises the funding priorities and guidelines.

More info: **mtc.ca.gov/our-work/fund-invest/federal-funding/obag-2**

Transportation Fund for Clean Air

The Bay Area Air Quality Management District administers the Bay Area Regional Transportation Fund for Clean Air program, which is funded by a surcharge on Bay Area vehicles, generating approximately $22 million per year. Sixty percent of this revenue is dispersed through a Regional Fund, which distributes a portion of the funds towards bicycle infrastructure and facilities as a means to reduce pollutant emissions.

More info: **http://www.baaqmd.gov/grant-funding/public-agencies/regional-fund**

[2] The source of OBAG funding technically is federal funds that pass through state entities. However, for the purposes of this report OBAG is referred to as regional funds since they are administered by MTC and CMAs

Mitgation Credit Agreements with California Department of Fish and Wildlife

In 2017 Assembly Bill 2087 went into effect, which created the California Department of Fish and Wildlife's (CDFW) Regional Conservation Investment Strategy (RCIS) pilot program. This program encourages a voluntary, non-regulatory regional planning process intended to result in higher-quality conservation outcomes and includes an advance mitigation tool. Regional Conservation Investment Strategies developed under this program are conservation assessments that help support the long-term conservation priorities.

Under an approved RCIS, projects are eligible for Mitigation Credit Agreements (MCA). The MCA is developed in collaboration with CDFW to create mitigation credits by implementing the conservation or habitat enhancement identified in an RCIS. MCAs can create credits that may be used as compensatory mitigation for select projects within a region. Although no credits are currently necessary for transportation projects in the vicinity of the project area, this may change over time and if so, and MCA may create a funding opportunity to offset impacts for a project elsewhere.

Private Sources

Private funding sources can be acquired by applying through advocacy groups, foundations, or corporate donations, although funding can tap into federal and state sources as well. Below are several examples of private funding opportunities available.

Foundations

Foundation funding sources are typically private or community-based, and can be in the form of gifts, grants, or loans. Private foundations are generally comprised of a small core set of donors that can include an individual, a family, or a corporation, which dictate its funding interests. In turn, community foundations grants are generally donor-driven and focused on the local geographic area in which it is located. In either case, funding opportunities are available either through open Request for Proposals or can be relationship-driven. A wide range of funding interests exist through foundations, including community health and wellness, traffic and pedestrian safety, environmental conservation, and investments in smart growth.

Corporate Donations

Corporate donations are often received in the form of liquid investments (i.e., cash, stock, bonds) and in the form of land. Employers recognize that creating places to bike and walk is one way to build community and attract a quality workforce. Bicycling and outdoor recreation businesses often support local projects and programs. Municipalities typically create funds to facilitate and simplify a transaction from a corporation's donation to the given municipality. Donations are mainly received when a widely-supported capital improvement program is implemented. Such donations can improve capital budgets and/or projects.

People for Bikes Community Grants

People for Bikes community grants are supported by partners in the bicycle industry and go towards important and/or influential projects that will leverage federal funding and "build momentum for bicycling in communities across the U.S." The program funds corridor improvements, mountain bike trails, BMX parks, trails, and park access. Grants range from $1,000-$10,000.

More info: **http://www.peopleforbikes.org/pages/community-grants**

Appendix F – Midpen Cooperative Agreement with Caltrans

DEPARTMENT OF TRANSPORTATION
111 GRAND AVENUE
P. O. BOX 23660
OAKLAND, CA 94623-0660
PHONE (510) 286-7236
FAX (510)
TTY 711
www.dot.ca.gov

Serious drought.
Help save water!

December 29, 2016

Ms. Julie Andersen, Resource Specialist III
Midpeninsula Regional Open Space District
330 Distel Circle
Los Altos, CA 94022-1404

04-SCL-17-4.1/5.8
Wildlife Crossing
EA: 2K580
District Agreement No. 4-2630

Dear Ms. Andersen,

Enclosed for your file is the fully executed copy of Cooperative Agreement, No. 4-2630, between the State and Midpeninsula Regional Open Space District (MROSD). This Agreement is for constructing one wildlife crossing and one recreational trail crossing of Highway 17.

This Agreement was executed on December 28, 2016.

Sincerely,

DINA EL-TAWANSY
Regional Project Manager
Division of Project Management - South

Enclosures

COOPERATIVE AGREEMENT

Project Study Report – Project Development Support (PSR-PDS)

This Agreement, effective on December 28, 2016, is between the State of California, acting through its Department of Transportation, referred to as CALTRANS, and:

Midpeninsula Regional Open Space District, a public corporation/entity, referred to hereinafter as MROSD.

RECITALS

1. PARTNERS are authorized to enter into a cooperative agreement for improvements to the state highway system (SHS) per Government Code 65086.5.

2. MROSD desires that a project initiation document (PID) be developed for *constructing one wildlife crossing and one recreational trail crossing of Highway 17* within the State Highway System (SHS), referred to herein as PROJECT.

3. PARTNERS acknowledge that this Agreement is to complete a Project Study Report-Project Development Support (PSR-PDS) PID.

4. California Government Code section 65086.5 mandates that CALTRANS review and approve all PIDs developed by entities other than CALTRANS.

5. MROSD is willing to develop the PID and is willing to fund one hundred percent (100%) of the PID's costs and fees, including costs to reimburse CALTRANS. If, in the future, CALTRANS is allocated state funds and Personnel Years (PYs) for PID review of this PROJECT, CALTRANS will agree to amend this Agreement to change the reimbursement arrangement for PID review.

6. CALTRANS will review and approve the PID prepared by MROSD; will provide relevant proprietary information in the form of existing data dumps, spreadsheets, and maps, will actively participate in the project delivery team (PDT) meetings, and will complete any work elements identified in the SCOPE SUMMARY of this Agreement. All CALTRANS' activities will be done as reimbursed work PARTNERS hereby set forth the terms, covenants, and conditions of this Agreement, under which they will complete the PID.

ROLES AND RESPONSIBILITIES

7. MROSD will prepare a PID for PROJECT at its sole cost and expense and at no cost to CALTRANS. The PID shall be signed on behalf of MROSD by a Civil Engineer registered in the State of California.

8. CALTRANS will complete the work elements that are assigned to it on the SCOPE SUMMARY which is attached to and made a part of this Agreement. MROSD will complete the work elements assigned to it on the SCOPE SUMMARY. Work elements marked with "N/A" on the SCOPE SUMMARY are not included within this Agreement. Work elements are outlined in the *Workplan Standards Guide for the Delivery of Capital Projects* available at www.dot.ca.gov/hq/projmgmt/guidance.htm.

9. The PID shall be prepared in accordance with all State and Federal laws, regulations, policies, procedures, and standards that CALTRANS would normally follow if CALTRANS was to prepare the PID.

10. CALTRANS will complete a review of the draft PID and provide its comments to MROSD within sixty (60) calendar days from the date CALTRANS receives the draft PID from MROSD. MROSD will address the comments provided by CALTRANS. If any interim reviews are requested of CALTRANS by MROSD, CALTRANS will complete those reviews within thirty (30) calendar days from the date CALTRANS received the draft PID from MROSD.

11. After MROSD revises the PID to address all of CALTRANS' comments and submits a revised draft PID and all related attachments and appendices, CALTRANS will complete its review and final determination of the revised draft PID within thirty (30) calendar days from the date CALTRANS receives the revised draft PID from MROSD. Should CALTRANS require supporting data necessary to defend facts or claims cited in the revised draft PID, MROSD will provide all available supporting data in a reasonable time so that CALTRANS may conclude its review. The thirty (30) day CALTRANS review period will be stalled during that time and will continue to run after MROSD provides the required data.

12. CALTRANS will perform its review and approval in accordance with the provisions of the current Project Development Procedures Manual. CALTRANS' review and approval will consist of performing independent quality assurance (IQA) to verify that quality control/quality assurance (QC/QA) meets department standards and determination that the work is acceptable for the next project component. However, CALTRANS' review and approval does not involve any work necessary to actually develop or complete the PID. No liability will be assignable to CALTRANS, its officers and employees by MROSD under the terms of this Agreement or by third parties by reason of CALTRANS' review and approval of the PID.

13. PID preparation, except as set forth in this Agreement, is to be performed by MROSD. Should MROSD request CALTRANS to perform any portion of PID preparation work except as otherwise set forth in this Agreement, MROSD shall first agree to reimburse CALTRANS for such work and PARTNERS will amend this Agreement.

INVOICE AND PAYMENT

14. MROSD agrees to pay CALTRANS, an amount not to exceed $165,000.

15. CALTRANS will draw from state and federal funds that are provided by MROSD without invoicing MROSD when CALTRANS administers those funds and CALTRANS has been allocated those funds by the CTC and whenever else possible.

16. The cost of any engineering support performed by CALTRANS, when allowed, will be charged according to current law.

17. CALTRANS will invoice MROSD for a $30,000 initial deposit after execution of this Agreement and thirty (30) working days prior to the commencement of PROJECT expenditures.

18. Thereafter, CALTRANS will submit to MROSD monthly invoices for estimated monthly costs based on the prior month's expenditures.

19. After PARTNERS agree that all work is complete for the PROJECT, CALTRANS will submit a final accounting for all costs. Based on the final accounting, CALTRANS will refund or invoice as necessary in order to satisfy the financial commitments of this Agreement.

20. If an executed Program Supplement Agreement (PSA) or STIP Planning, Programming, and Monitoring Program Fund Transfer Agreement (PPM) exists for this PROJECT then MROSD will abide by the billing and payment conditions detailed for the fund types identified in the PSA or PPM.

21. If MROSD has received Electronic Funds Transfer (EFT) certification from CALTRANS then MROSD will use the EFT mechanism and follow all EFT procedures to pay all invoices issued from CALTRANS.

22. If CALTRANS reimburses MROSD for any costs later determined to be unallowable, MROSD will reimburse those funds.

23. Except as otherwise provided in this Agreement, PARTNERS will pay invoices within thirty (30) calendar days of receipt of invoice.

GENERAL CONDITIONS

24. Per Chapter 603, amending item 2660-001-0042 of Section 2.00 of the State Budget Act of 2012, the cost of any engineering services performed by CALTRANS towards any local government agency-sponsored PID project will only include direct costs. Indirect or overhead costs will not be applied during the development of the PID document.

25. If any hazardous materials, pursuant to Health and Safety Code 25260(d), are found within PROJECT limits, PARTNER will notify CALTRANS within 24 hours of discovery.

26. PARTNERS agree to consider alternatives to PROJECT scope and/or alignment, to the extent practicable, in an effort to avoid any known hazardous materials within the proposed PROJECT limits.

27. If hazardous materials are discovered within PROJECT limits, but outside of SHS right of way, it is the responsibility of MROSD in concert with the local agency having land use jurisdiction over the property, and the property owner, to remedy before CALTRANS will acquire or accept title to such property.

28. CALTRANS' acquisition or acceptance of title to any property on which any hazardous materials are found will proceed in accordance with CALTRANS' policy.

29. CALTRANS' obligations under this Agreement are subject to the appropriations of resources by the Legislature, the State Budget Act authority, and the allocation of funds by the California Transportation Commission.

30. Neither MROSD nor any officer or employee thereof is responsible for any injury, damage or liability occurring by reason of anything done or omitted to be done by CALTRANS, its contractors, sub-contractors, and/or its agents under or in connection with any work, authority, or jurisdiction conferred upon CALTRANS under this Agreement. It is understood and agreed that CALTRANS, to the extent permitted by law, will defend, indemnify, and save harmless MROSD and all of its officers and employees from all claims, suits, or actions of every name, kind, and description brought forth under, but not limited to, tortious, contractual, inverse condemnation, or other theories and assertions of liability occurring by reason of anything done or omitted to be done by CALTRANS, its contractors, sub-contractors, and/or its agents under this Agreement.

31. Neither CALTRANS nor any officer or employee thereof is responsible for any injury, damage, or liability occurring by reason of anything done or omitted to be done by MROSD, its contractors, sub-contractors, and/or its agents under or in connection with any work, authority, or jurisdiction conferred upon MROSD under this Agreement. It is understood and agreed that MROSD, to the extent permitted by law, will defend, indemnify, and save harmless CALTRANS and all of its officers and employees from all claims, suits, or actions of every name, kind, and description brought forth under, but not limited to, tortious, contractual, inverse condemnation, or other theories and assertions of liability occurring by reason of anything done or omitted to be done by MROSD, its contractors, sub-contractors, and/or its agents under this Agreement.

32. If work is done under contract (not completed by MROSD's own employees) and is governed by the California Labor Code's definitions of a "public works" (section1720(a)), MROSD will conform to sections 1720-1815 of the California Labor Code and all applicable regulations and coverage determinations issued by the Director of Industrial Relations.

33. This Agreement is intended to be PARTNERS' final expression and supersedes all prior oral understanding pertaining to PROJECT.

34. This Agreement will terminate one hundred eighty (180) days after PID is signed by PARTNERS or as mutually agreed by PARTNERS in writing. However, all indemnification articles will remain in effect until terminated or modified in writing by mutual agreement.

DEFINITIONS

PARTNER – Any individual signatory party to this Agreement.

PARTNERS – The term that collectively references all of the signatory agencies to this Agreement. This term only describes the relationship between these agencies to work together to achieve a mutually beneficial goal. It is not used in the traditional legal sense in which one PARTNER's individual actions legally bind the other parties.

SCOPE SUMMARY – The attachment in which each PARTNER designates its responsibility for the completion of specific work elements as outlined by the *Guide to Capital Project Delivery Workplan Standards* (previously known as WBS Guide) available at http://www.dot.ca.gov/hq/projmgmt/guidance.htm.

CONTACT INFORMATION

The information provided below indicates the primary contact information for each PARTNER to this Agreement. PARTNERS will notify each other in writing of any personnel or location changes. Contact information changes do not require an amendment to this Agreement.

The primary Agreement contact person for CALTRANS is:
Dina El-Tawansy, Regional Project Manager
111 Grand Avenue
Oakland, CA 94612

Office Phone: (510) 286-7236
Email: dina.el-tawansy@dot.ca.gov

The primary Agreement contact person for MROSD is:
Julie Andersen, Resource specialist III
330 Distel Circle
Los Altos, CA 94022

Office Phone: (650) 691-1200
Email: jandersen@openspace.org

SIGNATURES

PARTNERS declare that:

1. Each PARTNER is an authorized legal entity under California state law.
2. Each PARTNER has the authority to enter into this Agreement.
3. The people signing this Agreement have the authority to do so on behalf of their public agencies.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

By: _____
Helena (Lenka) Culik-Caro
Deputy District Director, Design

Certified as to funds:

By: _____
for Jeffrey Armstrong
District Budget Manager

MIDPENINSULA REGIONAL OPEN SPACE DISTRICT

By: _____
Stephen E. Abbors
General Manager

Attest:

By: _____
Jennifer Woodworth
District Clerk

Approved as to form and procedure:

By: _____
Sheryl Schaffner
General Counsel

SCOPE SUMMARY

WORK ELEMENT	CALTRANS	MROSD	N/A
0.100.05.05.xx - Quality Management Plan		X	
0.100.05.05.xx - Risk Management Plan		X	
0.100.05.05.xx - Communication Plan		X	
0.100.05.10.xx - Cooperative Agreement for PA&ED Phase	X		
0.100.05.10.xx - Independent Quality Assurance (IQA)	X		
0.100.05.10.xx - Project Development Team Meetings	X	X	
1.150.05.05 - Review of Existing Reports Studies and Mapping		X	
1.150.05.05.xx - Provision of Existing Reports, Data, Studies, and Mapping	X		
1.150.05.10 - Geological Hazards Review		X	
1.150.05.10.xx - Provision of Existing Geological Information	X		
1.150.05.15 - Utility Search		X	
1.150.05.15.xx - Provision of Existing Utility Information	X		
1.150.05.20 - Environmental Constraints Identification		X	
1.150.05.20.xx - Provision of Environmental Constraints Information	X		
1.150.05.25 - Traffic Forecasts/Modeling		X	
1.150.05.25.xx - Provision of Existing Traffic Forecasts/Modeling Information	X		
1.150.05.30 - Surveys and Maps for PID		X	
1.150.05.30.xx - Provision of Existing Surveys and Mapping	X		
1.150.05.35 - Problem Definition		X	
1.150.05.45 - As-Built Centerline and Existing Right of Way	X		
1.150.05.xx - Provision of Existing District Geotechnical Information	X		
1.150.10.05 - Public/Local Agency Input		X	
1.150.15.05 - Right of Way Data Sheets		X	
1.150.15.10 - Utility Relocation Requirements Assessment		X	
1.150.15.15 - Railroad Involvement Determination		X	
1.150.15.25 - Preliminary Materials Report		X	
1.150.15.35 - Multimodal Review		X	

WORK ELEMENT	CALTRANS	MROSD	N/A
1.150.15.40 - Hydraulic Review		X	
1.150.15.50 - Traffic Studies		X	
1.150.15.55 - Construction Estimates		X	
1.150.20.05 - Initial Noise Study		X	
1.150.20.10 - Hazardous Waste Initial Site Assessment		X	
1.150.20.15 - Scenic Resource and Landscape Architecture Review		X	
1.150.20.30 - Initial Records and Literature Search for Cultural Resources		X	
1.150.20.50 - Initial Water Quality Studies		X	
1.150.20.60 - Preliminary Environmental Analysis Report Preparation		X	
1.150.20.65 - Initial Paleontology Study		X	
1.150.25.05 - Draft PID		X	
1.150.25.20 - PID Circulation, Review, and Approval	X		
1.150.25.25 - Storm Water Data Report		X	
1.150.35 - Required Permits During PID Development		X	
1.150.40 - Permit Identification During PID Development		X	
1.150.45 - Base Maps and Plan Sheets for PID		X	

RESOLUTION 16-58

RESOLUTION OF THE BOARD OF DIRECTORS OF THE MIDPENINSULA REGIONAL OPEN SPACE DISTRICT UTHORIZING ENTERING INTO A COOPERATIVE AGREEMENT WITH THE CALIFORNIA DEPARTMENT OF TRANSPORTATION FOR PREPARATION OF A PROJECT SCOPING REPORT FOR WILDLIFE AND RECREATIONAL TRAIL CROSSINGS ON HIGHWAY 17

BE IT RESOLVED that the Board of Directors of the Midpeninsula Regional Open Space District hereby;

1. ADOPTS the staff report and recommendations dated November 9, 2016.

2. AUTHORIZES entering into a Cooperative Agreement with the California Department of Transportation for preparation of a project scoping report for wildlife and recreational trail crossings on Highway 17.

3. AUTHORIZES the Executive Officer to do any and all acts necessary to carry out this resolution and any recommendations by the Board of Directors.

PASSED AND ADOPTED by the Board of Directors of the Midpeninsula Regional Open Space District on November 9, 2016, at a regular meeting thereof, by the following vote:

* *

AYES: **CYR, HANKO, HASSETT, KISHIMOTO, RIFFLE, SIEMENS**
NOES: **NONE**
ABSTAIN: **NONE**
ABSENT: **HARRIS**

ATTEST: **APPROVED:**

Secretary
Board of Directors

President
Board of Directors

APPROVED AS TO FORM:

Assistant General Counsel

General Counsel

I, the District Clerk of the Midpeninsula Regional Open Space District, hereby certify that the above is a true and correct copy of a resolution duly adopted by the Board of Directors

of the Midpeninsula Regional Open Space District by the above vote at a meeting thereof duly held and called on the above day.

District Clerk