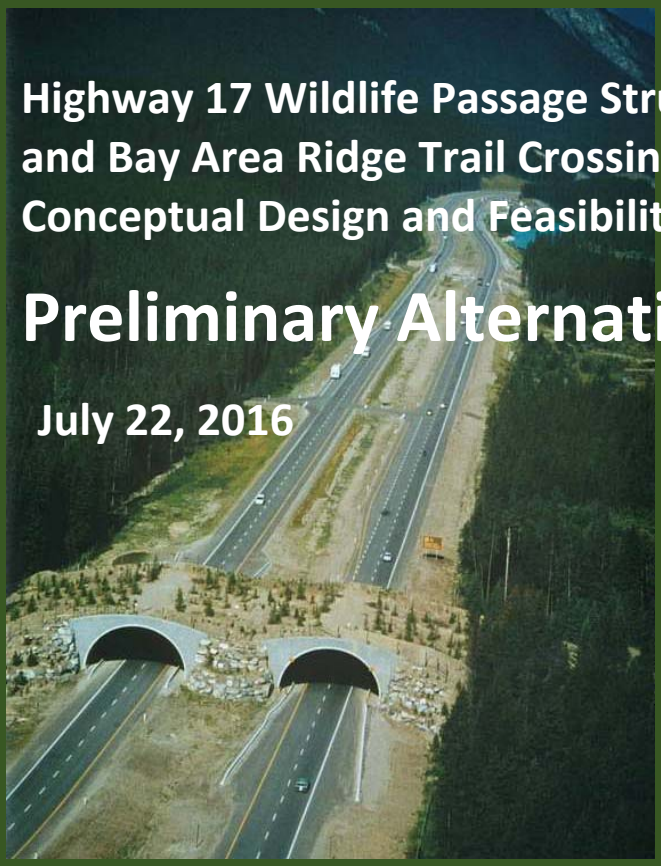
Highway 17 Wildlife Passage Structures and Bay Area Ridge Trail Crossing: Conceptual Design and Feasibility Study

Preliminary Alternatives Report

July 22, 2016



Prepared for:

Midpeninsula Regional Open Space District

Prepared by:

With:

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July 22, 2016

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Contents

List of Figures

List of Tables

List of Acronyms and Abbreviations

Agencies and Organizations

- ADA – Americans with Disabilities Act
- AASHTO – American Association of State Highway Transportation Officials
- Caltrans – California Department of Transportation
- CLN – Conservation Lands Network
- Midpen – Midpeninsula Regional Open Space District
- LTSCC – Land Trust of Santa Cruz County
- PfW – Pathways for Wildlife (consulting firm)
- SCVWD – Santa Clara Valley Water District
- SJWC – San Jose Water Company
- VTA – Santa Clara Valley Transportation Authority
- Terms and References
- OSP – Open Space Preserve
- HDM – Highway Design Manual (Caltrans)

Measurement Terms

- CY – Cubic Yards
- Ft – Foot/feet
- Km – Kilometer
- LF – Lineal Feet
- M – Meter
- Mi – Mile(s)
- Msl – (elevation above) Mean Sea Level
- SF – Square Feet

Caltrans/Highway Design Terms

- PM – Post Mile (Caltrans reference points)
- PID – Project Initiation Document
- PA/ED or PA-ED – Project Approval – Environmental Document
- PS&E – Plans, Specifications and Estimate (also Construction Documents)
- PSR-PDS – Project Study Report-Project Development Support
- ROW – Right-of-Way (public road or access)

1. Executive Summary

This study (the study) is intended to help identify options and facilitate decisions on either combined or separate crossing structure(s) for both wildlife and regional trail connections across Highway 17 between the Town of Los Gatos and the Bear Creek Road overcrossing. This area is the location of several documented road fatalities of mountain lions, as well as many deer, and countless smaller animals. It is also a gap in designated regional and national trail systems and a focal point for recreational trail traffic – including hikers, mountain bicyclists, road bicyclists, dog walkers, and equestrians.

Linking prime wildlife habitat and closing a vital trail connectivity gap would be the capstones of decades of effort by the Midpeninsula Regional Open Space District (Midpen) and many partner agencies and organizations working to create a regional greenbelt on the San Francisco Peninsula. Midpen leading this local, regional and nationally important project will work with many partner agencies to see the project to completion. The potential crossing locations and future trail connections are located across multiple agencies and Midpen will work collaboratively with partners for access approvals, environmental review and clearance, construction permits, cost sharing, and ongoing operation and maintenance of the structures once built.

The target species for the wildlife crossing are mountain lions and deer, which require a crossing structure comparable in size to a vehicle crossing. Accommodating special status wildlife species and a broad range of other smaller wildlife are secondary objectives. A trail crossing that accommodates the maximum range of user types and modes also needs to be a significant structure. Designing and constructing such major structures to cross a busy, winding, and narrow state route such as Highway 17 has many engineering constraints and requirements. The study area is also highly constrained by steep topography and potentially unstable geology. The highway, local roads, Lexington Reservoir and associated dam, spillway and water treatment and delivery systems all compete for space in the Lexington Basin.

The Study was developed by a consultant team comprised of wildlife biologists specializing in highway crossings, engineers, environmental planners, and trail design specialists. The team collaborated closely with Midpen, stakeholder agencies, and partner organizations to define the objectives and performance criteria, opportunities and constraints, alternatives development and evaluation and then compiled all of this information into a single report.

This report is the first stage in selecting the preferred alternative(s) to provide for improved wildlife connectivity and recreational trails. Based on thorough review and input from the public, partner agencies, stakeholders, and a decision by the District Board, a Preferred Alternative Report will be prepared by the end of 2016 that confirms and further delineates future crossings.

Four alternative crossing locations and configurations were analyzed in the Study (see Figure 1):

1. An undercrossing near the existing Ravine Culvert
2. An undercrossing near the existing Trout Creek Culvert
3. An overcrossing near the existing San Jose Water Company tanks and treatment facilities

4. An undercrossing between Montevina Road and Alma Bridge Road

Crossing site selection and design criteria were developed by the consultant and Midpen staff team and reviewed by the agencies that are stakeholders to the project. The criteria are summarized in Table 1 and detailed in Chapter 6 of this study.

The Study details in Chapter 7 why these sites were selected, their respective characteristics, their pros and cons relative to the criteria, and their anticipated cost. Table 6 in Chapter 8 presents the summary of these findings and the preliminary recommendation as to the best alternatives.

Alternatives 1, the Ravine Undercrossing and 2, the Trout Creek Undercrossing, are generally tied, but Trout Creek rates better for constructability factors due to space limitations and geologic constraints at Ravine Creek. These crossing alternatives rate highly for wildlife functionality, and could potentially perform well for the Ridge Trail crossing if feasible connections could be developed, but that would interfere with performance as a wildlife crossing, and there is no potential at the first 3 alternative locations to provide a complete ADA and service road connection to a public road on the west side.

Conversely, Alternative 3, the Overcrossing, has low value as a wildlife crossing, and Alternative 4, the Montevina Road – Alma Bridge Road Undercrossing, is compromised for that purpose, but stands out as the most feasible trail crossing based on constructability and cost versus the overcrossing, and due to the fact that it would afford a direct ADA-compliant connection and access for service vehicles.

Completing a safe, enjoyable connection from these crossings to the existing eastern portion of the Ridge Trail at the Priest Rock Trail would require significant trail improvements along Alma Bridge Road, as discussed in Appendix A.

The table below compares the conceptual cost estimates for the alternatives. Detail of the cost estimates is provided in Chapter 7.

Conceptual Cost Estimate Summary: Crossing Alternatives

		Construction Cost (million $)	Total Project Cost (million $)
Alt. 1	Ravine Undercrossing	$5.0	$7.7
Alt. 2	Trout Creek Undercrossing	$4.6	$7.2
Alt. 3	Overcrossing	$9.9	$15.1
Alt. 4	Montevina Undercrossing	$4.2	$6.6

The costs associated with this project range from $13.8 million (for Trout Creek and Montevina undercrossings) to $22.8 million (for Ravine Undercrossing and the Overcrossing) to complete all of the components of the project through construction of both a dedicated wildlife crossing and a dedicated Ridge Trail crossing. The actual cost depends on the combination of alternatives selected, and on more precise estimates and actual costs experienced based on final designs and environmental, access and permitting requirements. These numbers will be further refined as Midpen continues to work with Caltrans to select a preferred alternative.

Table 1: Design and Selection Criteria Summary

DESIGN CRITERIA FOR WILDLIFE 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

Undercrossing Dimensions (in feet)

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

Overcrossing Dimensions

	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′

Other Considerations

1. **Habitat connectivity** – the most continuous habitat possible; balance of openness and vegetation
2. **Line of sight** – good through visibility when entering and exiting
3. **Less human exposure** – includes measures to deter unauthorized access
4. **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.

DESIGN CRITERIA FOR TRAIL CROSSINGS

1. **Proximity to Ridge Trail and other trail connections**
2. **Appropriate dimensions and design features** to accommodate broadest range of trail users, bicyclists and pedestrians

Undercrossing Dimensions (in feet)

	Length	Width	Height	Slope	Slope (approach ramps)	Skew
Minimum		16′	10′	Min		Min
Maximum					8.33:1	
Recommended	Min	>20′	12′	None	5%	None

Overcrossing Dimensions (preferred for light and space)

	Length	Width	Height	Slope	Slope (approach ramps)	Skew
Minimum	Min	10′	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

1. **Non-motorized recreation and transportation connections.** Proximity and connection to public roads
2. **Emergency and maintenance vehicle access.** Access for authorized vehicles – pickup size.
3. **Lighting for evening use (potentially solar)**

Shared Criteria

Constructability/Cost

1. **Location with fill or cut embankments preferable**
2. **Environmental impact** – avoid streams or removal of native trees and vegetation
3. **Soils and geology feasible for construction**
4. **Can be designed to meet Caltrans highway and structural design standards**
5. **Minimal impact on existing facilities and operations** – highway traffic, water and dam facilities
6. **Lower relative cost**

Implementation/Feasibility

1. **Project Readiness/Funding identified**
2. **Access Permission/Ownership/Right of Way**
3. **Maintenance and Operations Addressed**
4. **Public Support**

2. Introduction

2.1. Project Background and Objectives

The Midpeninsula Regional Open Space District (Midpen or the District) is an independent special district formed by the voters in 1972 in portions of San Mateo and Santa Clara Counties, allocating a small share of property taxes toward the formation of a regional greenbelt system on the San Francisco Peninsula. The system owned and managed by Midpen is currently comprised of over 60,000 acres of land in 26 open space preserves protected for stewardship and public enjoyment. The District's mission is: "To acquire and preserve a regional greenbelt of open space land in perpetuity; protect and restore the natural environment; and provide opportunities for ecologically sensitive public enjoyment and education."[1]

Thousands of acres of open space habitat have been permanently protected by Midpen and other agencies and organizations in the Santa Cruz Mountains on either side of Highway 17. These lands comprise a critical habitat corridor with expected long-term benefits for wildlife movement, climate change resiliency, and preservation of a healthy genetic structure for wildlife populations within the Santa Cruz Mountains. They also provide many miles of publicly-accessible recreational trails, including the regional Bay Area Ridge Trail and the national Juan Bautista de Anza Historic Trail. Highway 17 presents a significant barrier to both wildlife and trail connectivity that limits the function of this important wildlife corridor and access to and completion of regional trail systems.

Midpen began funding studies examining wildlife use in this area in 2008 based on the importance of this habitat corridor and the significant number of collisions between large wildlife and motor vehicles that occur on Highway 17 between the Town of Los Gatos and Lexington Reservoir. These studies have documented that nine mountain lions have been killed by vehicles on Highway 17 in Santa Clara County in the last nine years, of which five were killed in the current study area. During the same period there were four successful Highway 17 crossings by two collared mountain lions near Lexington dam, based on tracking by the UCSC Puma Project. Additionally, data collected between 2000 and 2016 indicated that there were a total of 82 other wildlife species killed by vehicle collisions in the study area, including many small to medium mammals, and an additional 51 deer, indicating that a significant motorist safety issue also exists in this section of Highway 17. [2] Further discussion of the studies supporting this project can be found in Chapters 2.4 and 6 of this report.

Midpen has also worked with local, regional and national trail groups and partnered with other agencies and organizations to implement trail connections in the Lexington area – particularly the Bay Area Ridge Trail. The Bay Area Ridge Trail Council (the Council) is a private non-profit organization founded in 1987 with a mission to create a continuous 550+-mile trail for hikers, mountain bicyclists, and equestrians along the ridgelines overlooking San Francisco Bay. The Council works in close partnership with agencies and local government, parks, land trusts, and other stakeholders and volunteers to plan, acquire, design, build, care for, and promote the Bay Area Ridge Trail. The gap in the Ridge Trail between Sanborn County Park to the west of Highway 17, and Sierra Azul Open Space Preserve to the east, is one of the most challenging and significant in the Bay Area. This route is also anticipated to be designated as part

[1] Basic Policy, Midpeninsula Regional Open Space District, adopted March 10, 1999.
[2] *Highway 17 Wildlife Connectivity Project: Lexington Study Area*, Pathways for Wildlife, February 2016.

of the Juan Bautista de Anza National Historic Trail, a National Parks-administered facility which will ultimately extend from Mexico to San Francisco on a route as close as possible to that taken by the Spanish explorer.

Highway 17 is also a barrier to other non-motorized recreation and transportation connections between areas of Lexington County Park and the popular Los Gatos Creek Trail on the east side of Highway 17 and other park and open space areas on the west side of Highway 17, including Bear Creek Redwoods and El Sereno Open Space Preserves, and roads and neighborhoods in the Lexington Basin and the Santa Cruz Mountains beyond.

Midpen is committed to developing a wildlife crossing and a separate or combined regional multi-use trail crossing of Highway 17 near Lexington Reservoir, as identified in its Open Space Vision Plan as one of the top 25 priorities. In 2014 voters approved a $300 million bond measure to fund land conservation, stewardship and public access projects, including these two high priorities. Midpen commissioned this Feasibility Study (the Study) to explore and evaluate crossing alternatives, determine compatibility of recreational and wildlife usage, identify the preferred crossing alternative(s) and clarify their features, implementation steps, schedule, conceptual design and costs. This includes an effective wildlife crossing and a separate or potentially combined crossing for trail users, including the Bay Area Ridge Trail (the Ridge Trail), the Juan Bautista de Anza National Historic Trail and local trail and non-motorized transportation connections.

The primary objective for the wildlife crossing is to address wildlife mortality from vehicle collisions for mountain lions and deer on Highway 17 between Los Gatos and Lexington Hills as well as to study and plan for possible use by special status species occurring within the area, and any other wildlife that might benefit from this crossing.

The primary objective of the trail crossing is to accommodate the full range of potential Ridge Trail users – hikers, mountain bikers, equestrians, and dog owners[3] on a safe and enjoyable route, with as direct a connection as possible to the Ridge Trail alignments connecting to open space and parklands on either side of Highway 17. The secondary objective is to accommodate the widest possible range of other non-motorized access, including road bicyclists, people using wheelchairs and other mobility devices, and others who would need or prefer a paved trail connection.

2.2. Overview of Preliminary Alternatives Report

The purpose of this report is to document the conditions, constraints, and opportunities for highway crossings; identify the options and assess their desirability and feasibility for wildlife and trail users.

The consultant team and Midpen staff collected and analyzed background information, and inventoried site conditions along Highway 17 in the study area. They coordinated with the key agency stakeholders, including Caltrans District 4, Santa Clara Valley Water District, Santa Clara County Parks, Santa Clara County Roads and Airports, San Jose Water Company, Bay Area Ridge Trail, National Park Service-Anza Trail, and agencies with law enforcement and resource protection responsibilities. They studied other

[3] 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.

wildlife crossing projects within the state having similar objectives, including the Laurel Curve Wildlife Crossing planned on Highway 17 in Santa Cruz County, and the Liberty Canyon Wildlife Crossing of Highway 101 planned in Los Angeles County.

The Study examined the potential to modify the six existing culverts that cross under the highway in the Study Area, and the single existing overcrossing structure (Bear Creek Road) to meet the study objectives. It was generally found to be infeasible to modify the existing structures to meet the primary objectives, so the study focuses on potential new crossing structure alternatives, some of which are adjacent to existing culverts. Alternative designs were developed at a conceptual level and evaluated to identify the most feasible alternatives and eliminate those that have "fatal flaws" early in the process. Criteria were defined for crossing location and design (See Chapters 6.2), and the alternatives were evaluated against these criteria and compared (Chapter 7)

Following stakeholder, public, and agency review and comment, the Feasibility Study will proceed to a "Preferred Alternatives" phase, in which the conceptual design of up to two new crossing alternatives (at least one for wildlife and one for recreational trail users) will be developed in more detail, including more detailed cost estimates, schedules and steps for implementation, and technical information to initiate the formal environmental review and Caltrans approval process.

2.3.Study Area Overview

The study area for this 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 (SJWC) – see Figure 1.

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 master reservoir agreement with SCVWD that is amended every five years. 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), within which SCVWD and SJWC have rights to locate and 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, SJWC 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.

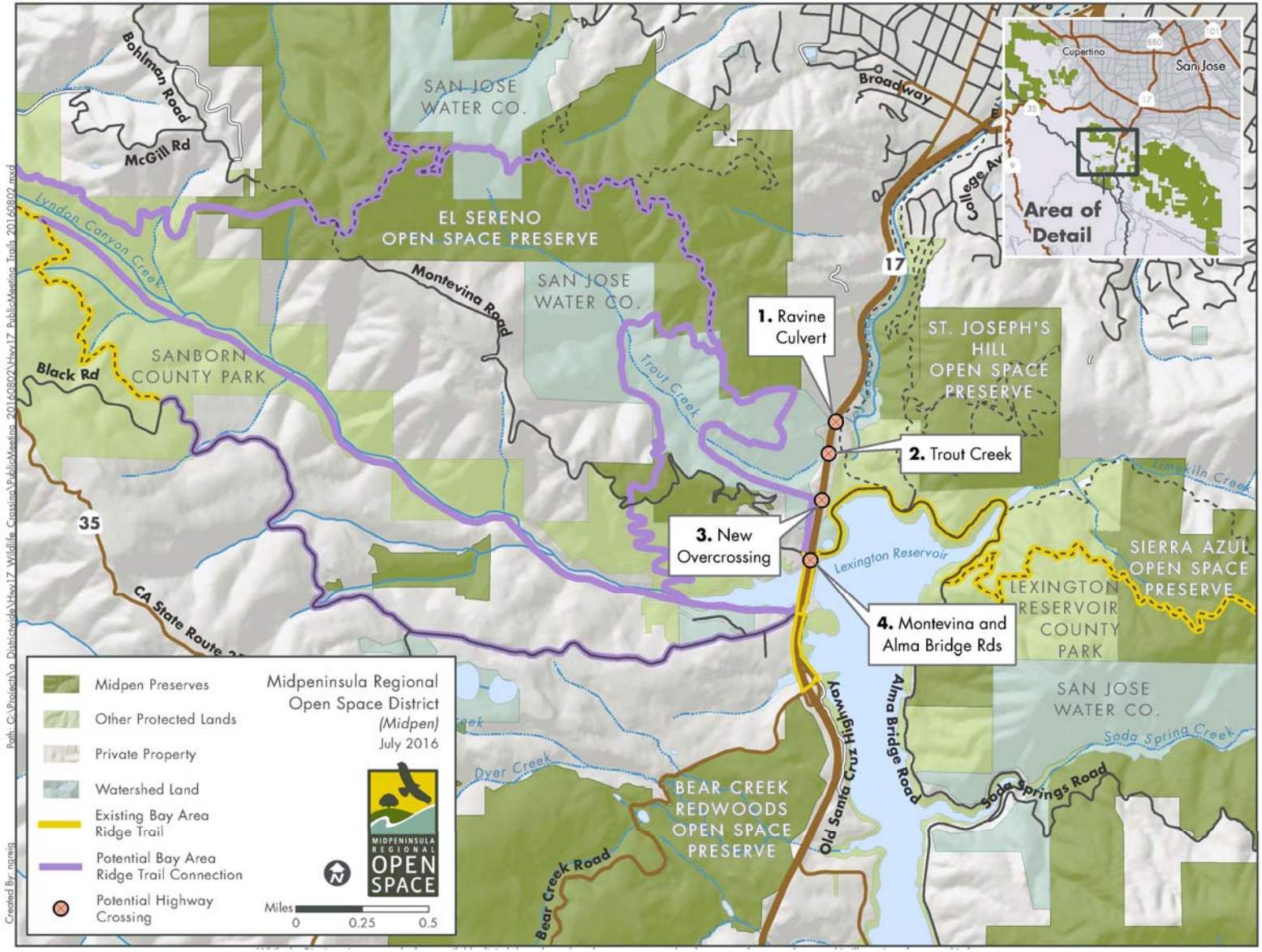
Alma Bridge Road east of the on and off ramp portions paralleling Highway 17, which are in Caltrans ROW, is owned and operated by Santa Clara County through its Roads and Airports Department. The portion of Montevina Road that parallels Highway 17 on the west north of Black Road is also in Caltrans ROW, 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 concentrate 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 (SJWC) 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. From that point south to about 1000’ north of the toe of the dam it is located on land owned by SJWC in an easement granted by SJWC.

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 SJWC, which treats and stores the water at facilities at the northwest end of the Reservoir, and across Highway 17 to the west. There is a 10” intake pipeline located in Trout Creek to the west of Highway 17 which leads under Highway 17 to the treatment plant. Settlement and clarifier ponds are located on the west side of Highway 17 with pipeline connections under the highway to the plant. The treatment plant and pipelines are located in the Caltrans ROW or on SCVWD in easements granted to SJWC.

Figure 1: Study Area Map



2.4. Background

Related Plans, Studies and Projects – Wildlife Crossing

Caltrans 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.

Critical Linkages: Bay Area & Beyond Report

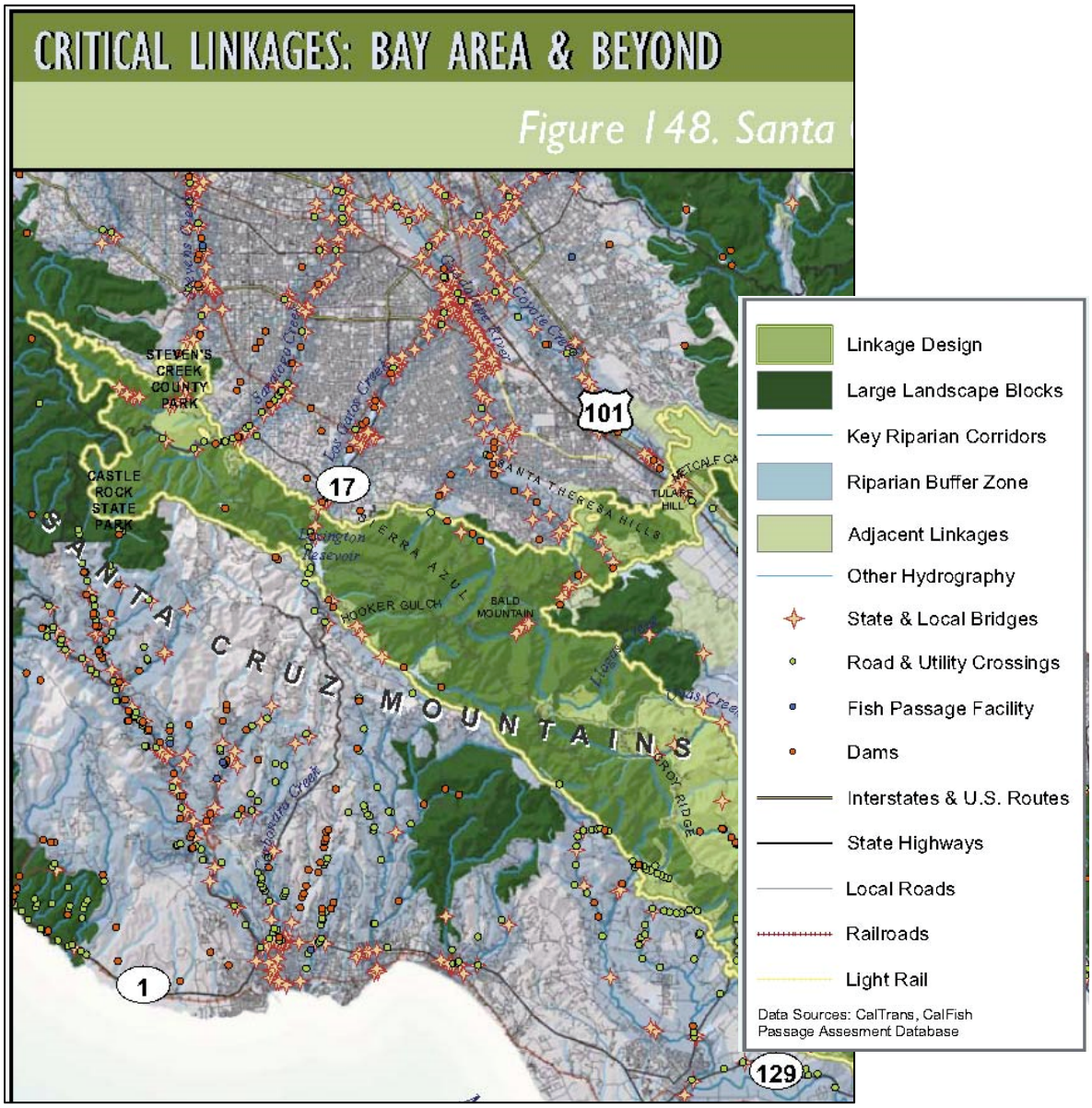
The Bay Area Open Space Council is a unique non-profit organization that is a network of 65 nonprofits and public agencies (including Midpen) in the San Francisco Bay Area. Collectively these partners maintain thousands of miles of trails, steward over 1 million acres of publicly accessible parks and 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* [4] is the result of the CLN's efforts developing linkage designs for several priority landscape linkages whose protection is crucial to maintaining ecological and 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

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

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.

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



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 and 2015 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.

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.

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.

Related Plans, Studies and Projects – Trail Crossing

Town of Los Gatos Bicycle and Pedestrian Master Plan

The Town of Los Gatos recently initiated its first Bicycle and Pedestrian Master Plan (Master Plan), which is scheduled to be prepared between May and December, 2016; generally in parallel with the Crossing Study. The Master Plan will address 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. This is discussed in detail in Appendix A of the current study.

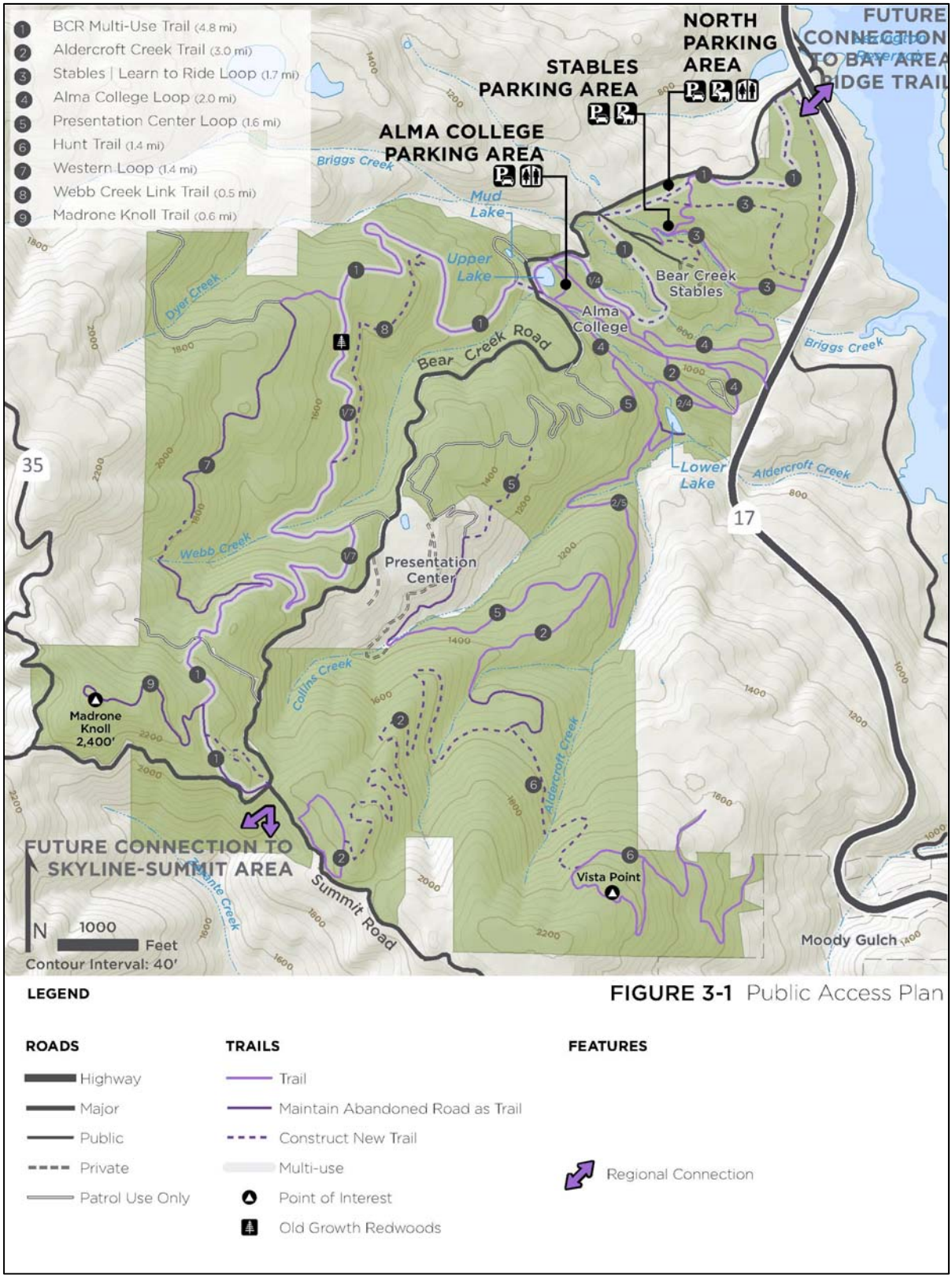
Juan Bautista de Anza National Historic Trail

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.

Figure 3: Bear Creek Redwoods OSP Preliminary Public Access Plan



SJWC Treatment Plant Improvement Project

Currently SJWC is involved in a project to improve the water treatment plant at Lexington Reservoir, converting to a reverse osmosis treatment system, and improving vehicle access to and from the plant by increasing the shoulder space along Alma Bridge Road, widening the driveway and the on-ramp onto Highway 17. The improvements to Alma Bridge Road are pertinent for access to the prospective trail crossing, as the road is currently winding, narrow, and has heavy truck traffic. The more significant improvements to Alma Bridge Road that would be needed to fully accommodate trail access to a Highway 17 crossing are discussed in Appendix A of this Study.

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 dangerous 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. Purpose and Need

Purpose

The purpose is threefold: 1) improve wildlife passage, 2) improve regional trail connections, and 3) reduce motor vehicle collisions by constructing designated wildlife and recreational trail crossings (either separately or in tandem) physically separated from motor vehicle travel lanes on Highway 17 within the study area.

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. Many millions of dollars of public funding has been invested in this area to protect thousands of acres of open space habitat, including funding specifically focused on mountain lion habitat. Providing the envisioned wildlife corridor crossing dramatically enhances the value of these protected lands representing public investment and public resources.

Highway 17 presents a barrier for the Bay Area Ridge Trail, Anza Trail and other regional multi-use trail connections to planned 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 bicycle/pedestrian/equestrian crossing would significantly improve recreation and transportation access, and improve safety.

4. Deficiencies

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).

4.1. 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.

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 9 years, nine mountains lions have been hit by vehicles in Santa Clara County, 5 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 Caltrans over the period from 2007 through 2016. On average there has been at least one mountain lion killed per year on Highway 17 in the Lexington Reservoir area.

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 [5] 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.

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.

[5] 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

Figure 4: Mountain Lion Crossings and Roadkill Data

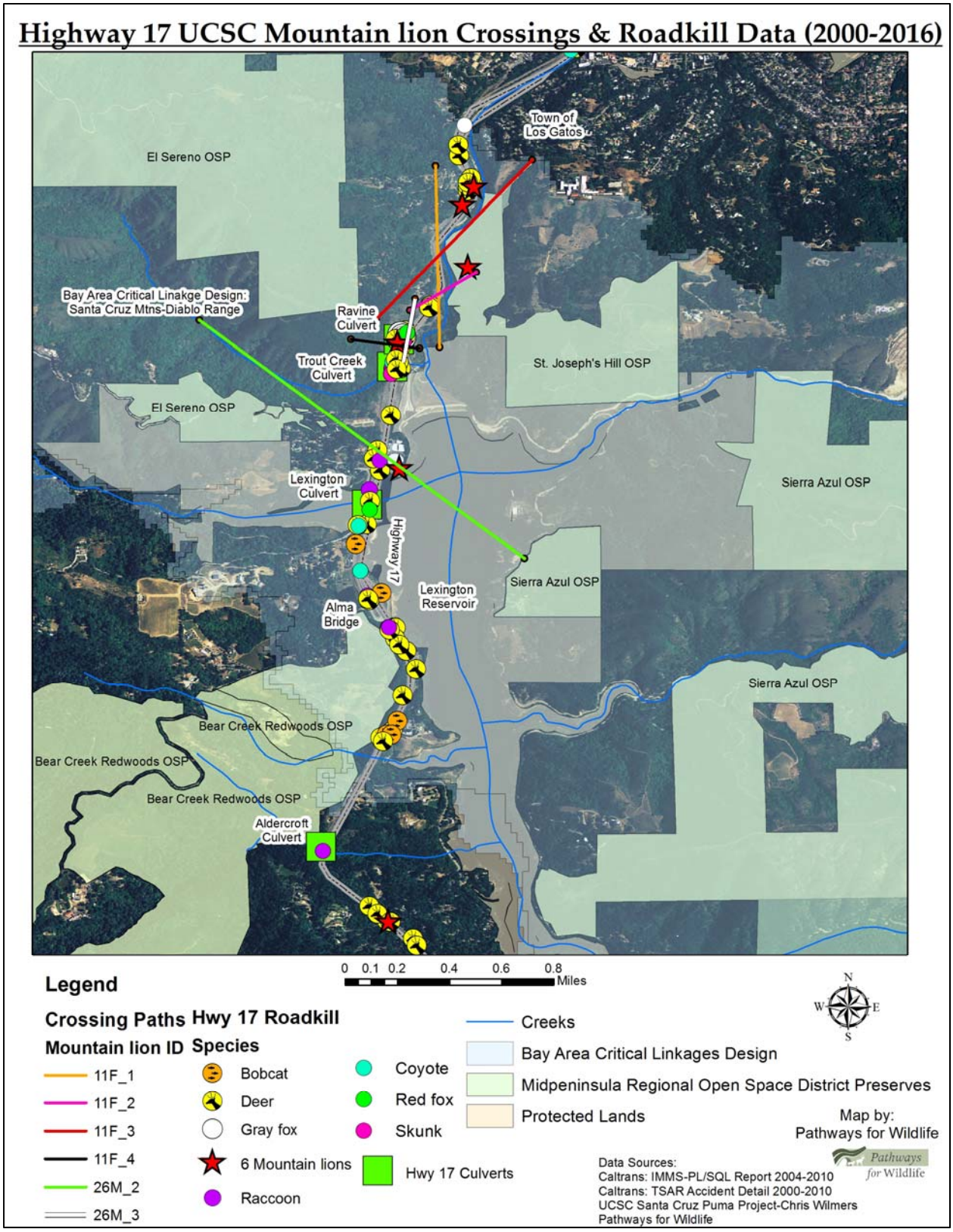
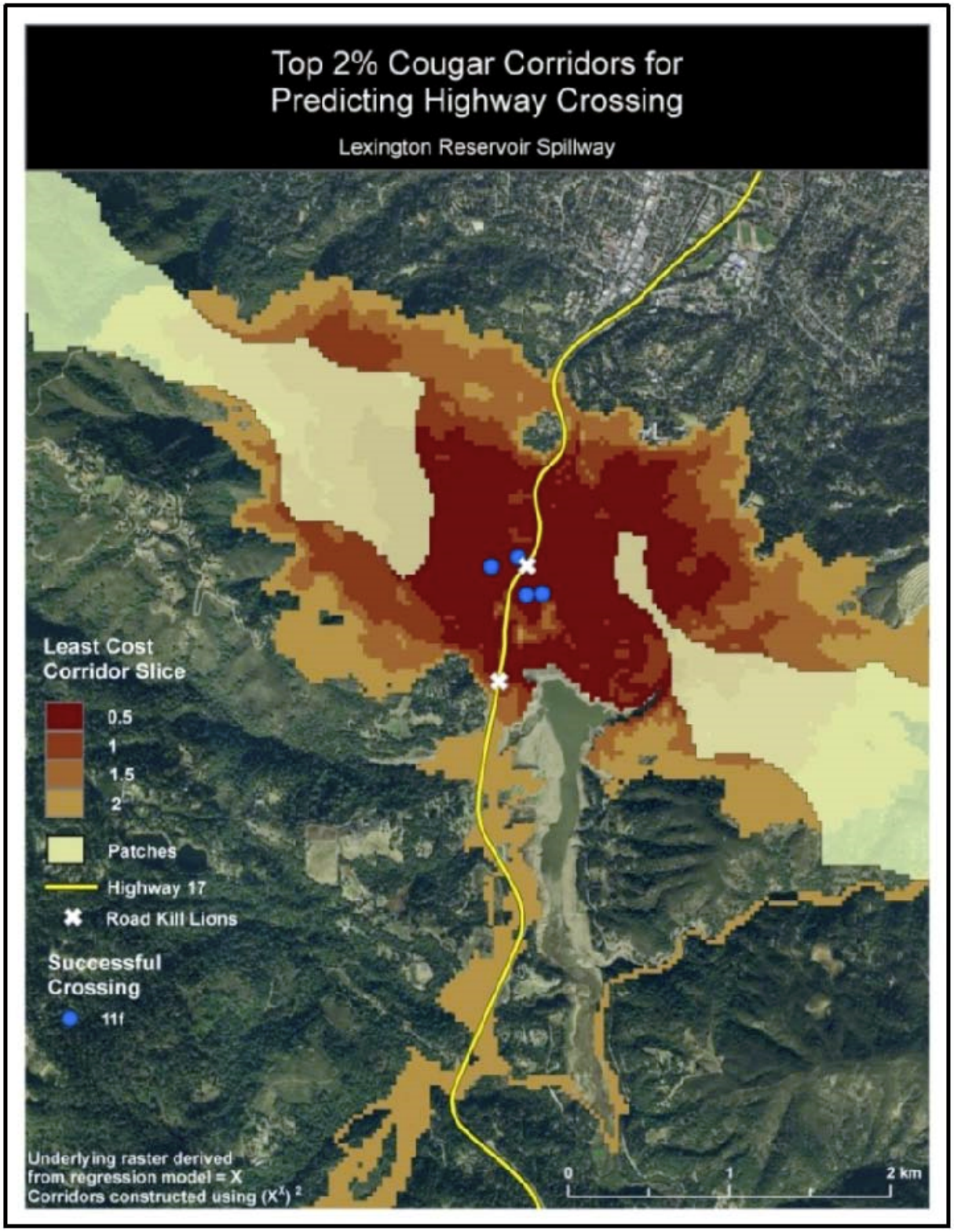


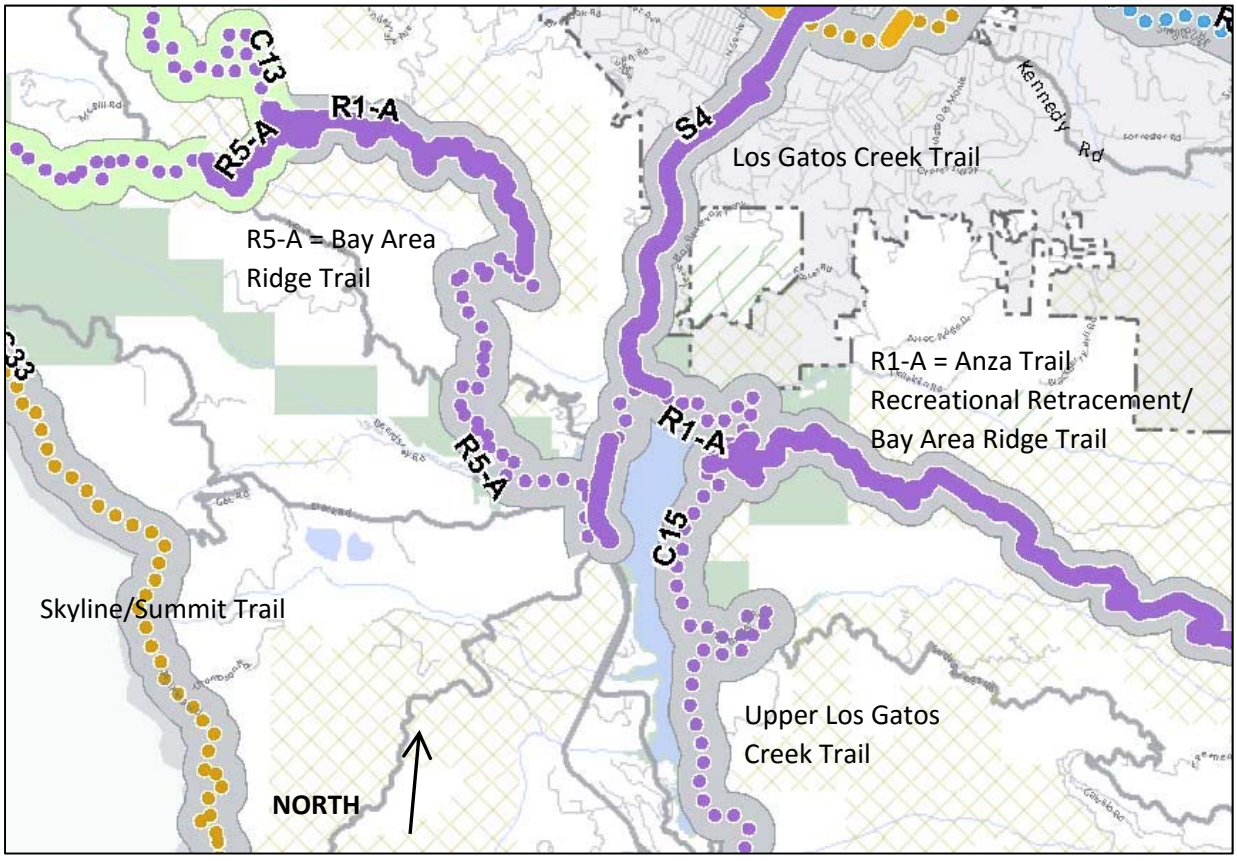
Figure 5: Top 2% Cougar Corridors for Predicting Highway Crossings (from UCSC Puma Project Report)



4.2. Regional Multi-Use Trail Connection Gap

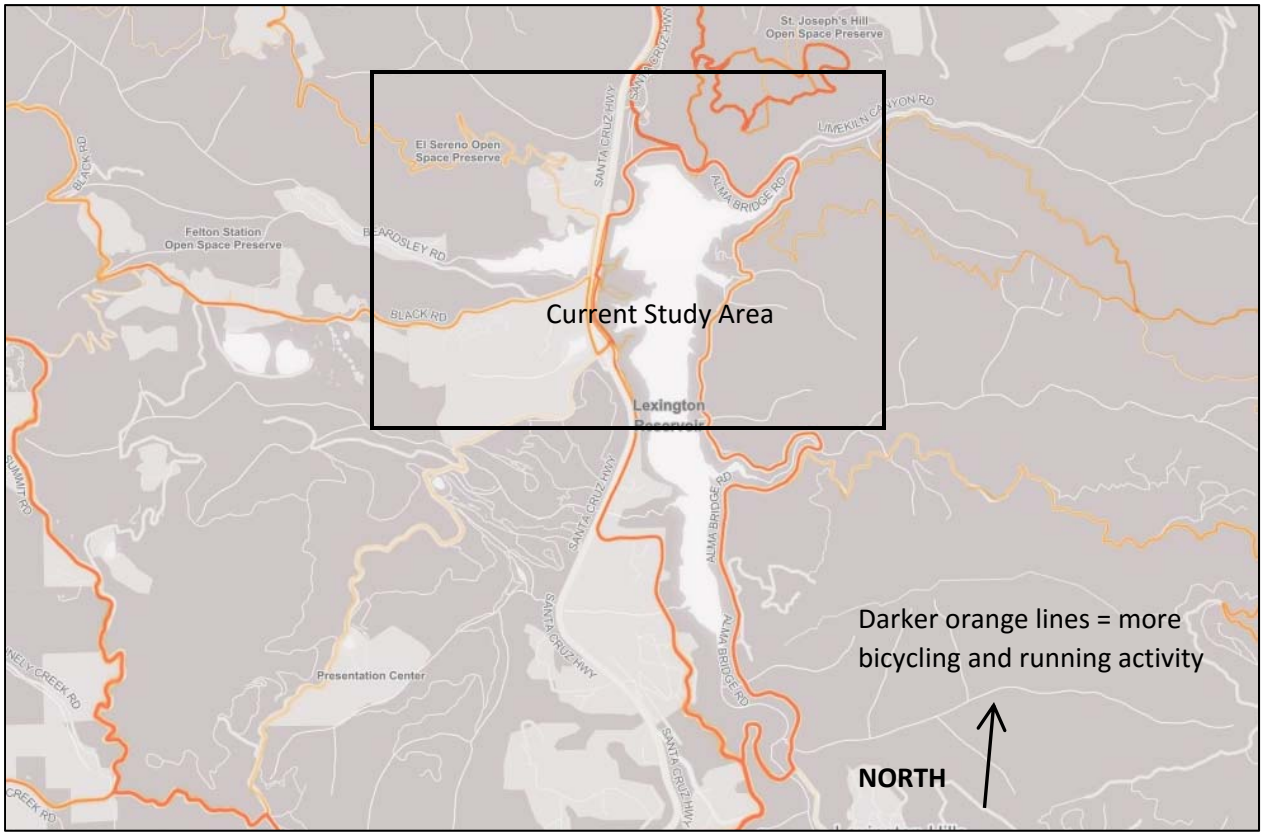
Lexington County Park is a major crossroads for regional trails – as the current terminus of the Los Gatos Creek Trail, the Bay Area Ridge Trail, the Juan Bautista de Anza National Historic Trail, and other popular trails in St. Josephs Hill and Sierra Azul Open Space Preserves (see Figure 6 – an excerpt from an overall trail status map prepared by Santa Clara County Parks). Once the trail connection challenges and the highway crossing challenge are resolved, regional trail connections from the west from El Sereno Open Space Preserve, Sanborn County Park and Bear Creek Redwoods Open Space Preserve will complete a system that is likely to be highly popular, comprising a recreational trail resource in close proximity to two million people in Santa Clara County, and connecting to trails in Santa Cruz County. The highway crossing will also help address a gap in the bicycle transportation system to allow local residents in the Lexington basin and Santa Cruz Mountains to be able to bypass congested Highway 17 by bike. This connection would be enhanced further by the paving of the Los Gatos Creek Trail into the Town of Los Gatos – a concept under study in the Town's Bicycle and Pedestrian Master Plan.

Figure 6: Portion of Santa Clara County Trail Alignments Status Map, August 2015



Because it is a gap, it is difficult to measure the potential use of an improved multi-use trail crossing of Highway 17. It will only be fully functional once the trail connections on either side are improved. But the regional "heat maps" of actual bicycling and running compiled by Strava Labs (affiliated with a web application that aggregates all the data) show that in spite of constraints, people are currently finding a way to make these regional connections (see Figure 7), indicating a need to formalize and improve this connection. The number of users on a route is represented by the range from a light orange line to a heavy orange line (Strava does not make the actual numbers available).

Figure 7 : "Heat Map" of Study Area Bicycling and Running Activity



Midpen has conducted counts of trail users, rotating though a selection of the preserves each year, using a set of automatic infrared counters. The most recent local counts are for the St. Josephs Hill Open Space Preserve just northwest of Lexington Reservoir, for spring 2008, which estimated an average of 336 users per day or 122,640 annually. Conversely, the El Sereno Preserve on the west side of Highway 17, which has no direct trail connection or trail staging area, had only 10 users per day or 3700 annually based on winter 2010 counts. The disparity between the east side users and the west side users reflects the demand for a crossing that would allow equal access to preserves and parks on both sides of the highway. The opening of Bear Creek Redwoods Open Space Preserve, planned for 2018, and the opening of other public park and open space lands on the west side of Highway 17 will further increase the demand for trail access, and increase Lexington Reservoir County Park's role as a regional hub for recreation. The trail crossing of Highway 17 is a critical component of this future system.

5. Stakeholder Coordination

Since before the inception of the Study Midpen has coordinated with Caltrans District 4; with District 5 through the Laurel Curve Wildlife Crossing Project, with the Valley Transportation Authority (VTA – the overall Transportation Management Agency in Santa Clara County) and with adjacent land and facility owners and operators who may be affected by or involved in the potential crossings, including Santa Clara County Parks, Santa Clara County Roads, SCVWD, SJWC, and the Town of Los Gatos.

- A field meeting with Caltrans District 4 staff May 7, 2015
- Meeting at District 4 offices in Oakland March 16, 2016 to review the scope, objectives, and early information from the Crossing Study, and to discuss issues, requirements and process to obtain approval and potentially funding.
- Meeting with Santa Clara County Parks, the Town of Los Gatos and the Bay Area Ridge Trail Council on April 19, 2016 to review the scope, objectives, and early information from the Crossing Study, and to discuss issues and interests of those agencies.
- Meeting with SCVWD and Santa Clara County Roads and Airports Department on May 2, 2016;
- Meeting with Santa Clara Valley Transportation Authority (VTA) and Caltrans District 4 staff on May 3, 2016;
- Meeting with SJWC on May 6, 2016;
- Meeting on July 14, 2016 with local law enforcement and environmental protection agencies, including California Highway Patrol, Santa Clara County Sheriff, Monte Sereno/Los Gatos Police Department, SJWC, and California Department of Fish and Wildlife.

The Feasibility Study was conducted to thoroughly respond to the input from these meetings in the identification and analysis of alternatives, with the goal that conceptual crossing designs will be fully coordinated with the transportation systems; water storage, treatment and delivery systems; and the related habitat protection and recreation lands and efforts.

The notes from these meetings are contained in Appendix C.

6. 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.

6.1. 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.

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 are summarized below.

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 [6] 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.

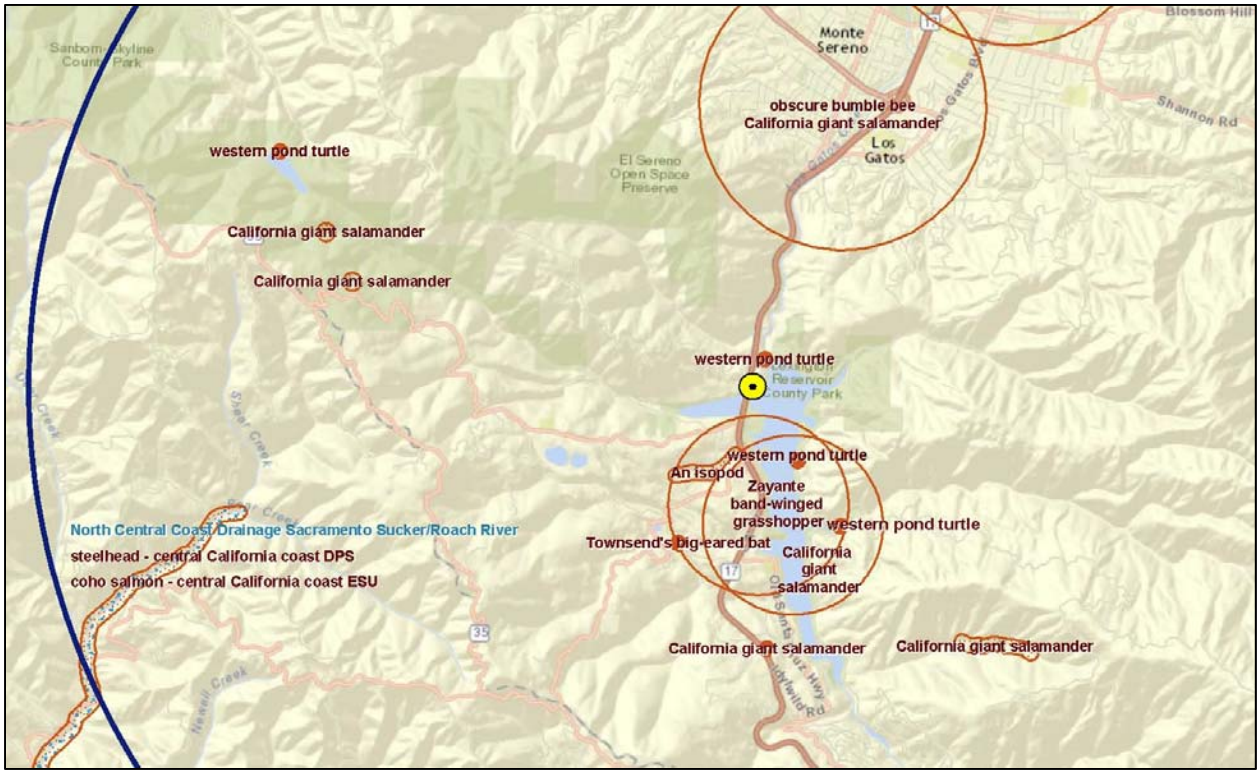
[6] Clevenger, A.P., M. Barrueto. 2014. Trans-Canada Highway Wildlife and Monitoring Research, Final Report. Part B: Research. Report to Parks Canada Agency, Radium Hot Springs, British Columbia, Canada.

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 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. Generally none of the locations under study offer this continuity on both sides, as there are intervening roads, trails and other facilities on at least one side, and significant graded embankments. However Lexington Culvert offers good potential to accommodate both 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 8 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 (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.
- *Trail creation*: Can be used to lead animals to 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 a table 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 (= 4 m high x 7 m wide; see "Design" above).
- 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).

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.

Project Review and Approval Process

The Caltrans *Project Development Procedure Manual* provides the framework of policies and procedures for developing and approving all projects that are located on the State highway system. This includes actual highway improvements (e.g., additional lanes, new bridges, interchanges, etc.) as well as non-highway improvements that occur within the Caltrans right-of-way (ROW). The latter category includes, but is not limited to, local road crossings, pedestrian crossings, trail crossings, and utility crossings.
There are two basic paths for Caltrans review and approval of the crossing project(s), depending on whether the project involves more or less than $3 million in construction in the Caltrans ROW, the

complexity of the project relative to the Caltrans ROW and facility, and whether there is state or federal transportation funding involved in the project.

Due to the anticipated cost of the project, the standard multi-phase Caltrans review and approval process would apply. The first phase is completion of a Project Initiation Document (PID), for this local assistance project also known as a Project Study Report-Project Development Support (PSR-PDS) document. The PSR-PDS is used to program the improvement and it generally describes the project's purpose and need, alternatives, costs, and environmental issues from a "big picture" perspective. Following approval of the PSR-PDS, the project enters the Project Approval-Environmental Document (PA-ED) phase during which a Project Report (PR) is prepared and the CEQA/NEPA process is formally undertaken. At the conclusion of the PA-ED phase, the project is approved and the project is allowed to move forward into the ROW and Plans, Specifications, and Estimate (PS&E) phase. All of these phases, and their corresponding documents, require that a definitive and highly-structured process be followed, including specified formats and templates for all reports and plans.

When compared to the PEER process, the standard Caltrans project development and approval process that entails both the PSR-PDS and PA-ED phases takes significantly longer and costs are significantly higher.

Further, the PSR-PDS and PA-ED route would require compensating Caltrans for their role in documenting and processing the project (tentatively estimated at $100,000 by Caltrans District 4).

The above costs and timeframes are very conceptual – the actual costs and schedule will depend on specific features of the project which are yet to be determined.

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 AASHTO 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 9 shows night-time construction using the process described above.

Figure 9: Pile Supported Precast Slab Bridge Construction

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

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 10.

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.

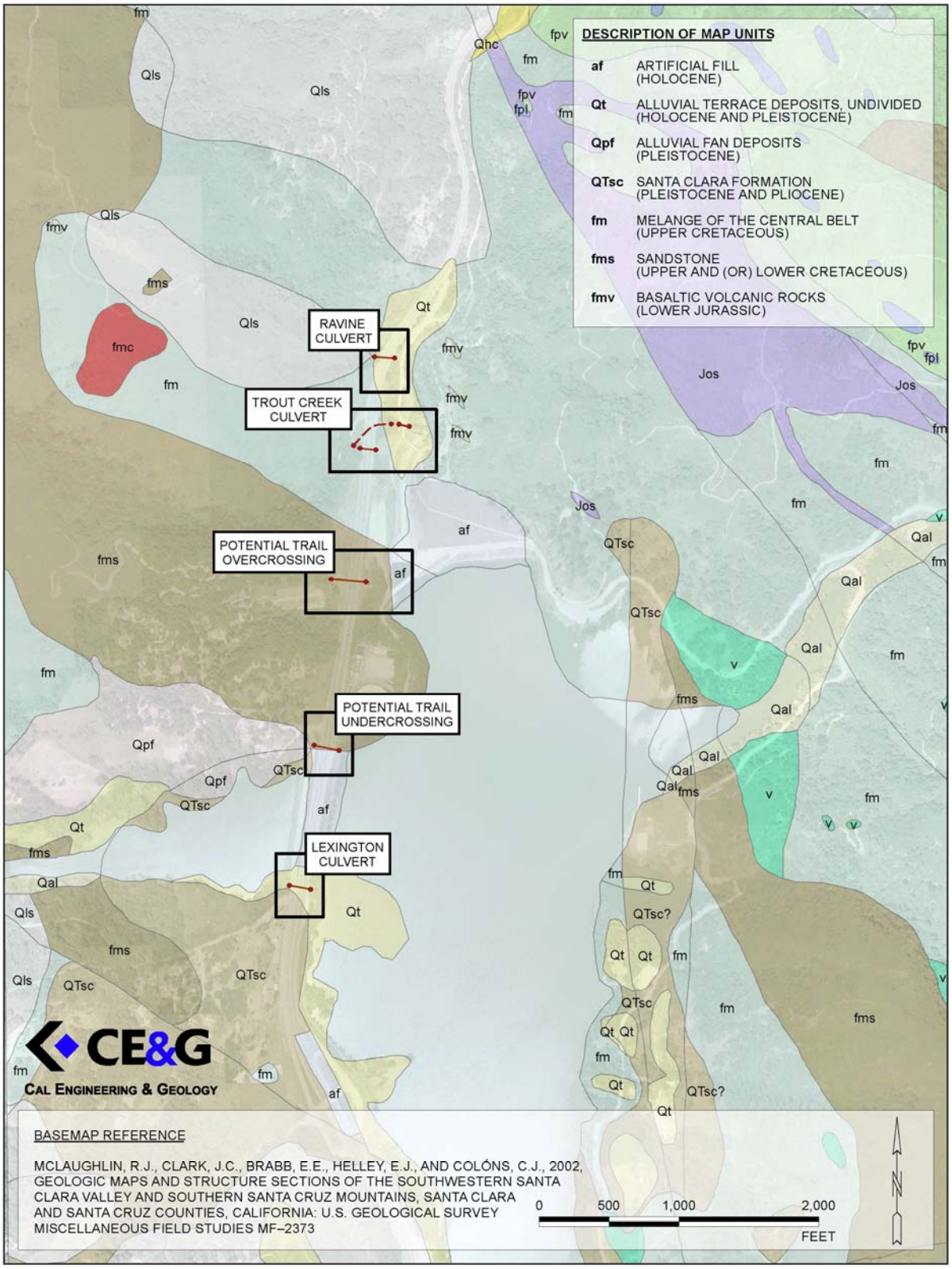
Many of the rocks in the site vicinity are at least locally weakened by faulting and folding, with the result that they are susceptible to landsliding and erosion. Large areas of landslide deposits (map unit Qls) are mapped on slopes in the project vicinity, notably near the Bear Creek Road exit from 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 10: Study Area Geologic Map



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.

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.[7]

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 ample width– ideally on the order of 18 – 20' wide, although a space half that wide could be made to work if necessary. The crossing should meet minimum vertical clearance recommendations - 10 feet minimum per the above guide.

Although accommodating the Ridge Trail and Anza Trail 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

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

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. Appendix A contains further detail on the design standards for a non-motorized transportation connection through the trail crossing.

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. Appendix A contains a review of the potential routes the Ridge Trail and Anza Trail might take on the western side of Highway 17 from where they currently terminate in Sanborn County Park, and where and how they might connect to the crossing alternatives and an assessment of the challenges, opportunities and costs of constructing an improved trail connection from Highway 17 east along Alma Bridge Road to the existing Ridge Trail/Anza Trail route on Priest Rock Trail.

6.2. Crossing Alternatives Evaluation Criteria

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

Functionality for Wildlife

1. **Proximity to 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. **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 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.

Functionality for People

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

1. **Proximity to Ridge Trail connections.** The crossing would ideally be as close to the Lexington Dam as possible, as this is the alignment of the existing and proposed Ridge Trail connections as well as the terminus of the Los Gatos Creek Trail.

2. **Appropriate dimensions.** The crossing should ideally be at least 20 feet wide, although a space as narrow as 10 feet could be made to function as a trail. If the crossing is an undercrossing, it should be at least 10 and ideally 12 feet high. An overcrossing is preferred because it provides more light and sense of space and better user experience. Access to and within the crossing should meet ADA standards of maximum 5% slope. Dimensions should be functional for maximum diversity of trail users (hikers, bicyclists, equestrians).

3. **Non-motorized recreation and transportation connections.** Proximity and connection to current/future recreational resources and non-motorized transportation routes to accommodate the maximum number and range of users (gap closure); ideally providing an ADA-compliant access route including a paved trail for access to/from public roads.

4. **Emergency and maintenance vehicle access.** Authorized vehicular access through the crossing is desirable both for support of the trail use and for other emergency and maintenance operations, including the operations of the reservoir and water treatment facilities.

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

2. **Environmental impact - 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.

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).

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 Support.** The public and their representatives support the preferred alternative.

6.3. Evaluation Methodology

Each alternative was evaluated against each criterion identified in Chapter 6.2 above by the respective consultant team expert(s) in that category. The basis for the judgment of relative performance between the four alternatives was summarized in a table (Table 5)

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, with the intention that this will be thoroughly reviewed by Midpen staff, partner or advisory agencies, the public, stakeholders, and decision-makers before a final ranking and selection is made.

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

7. Alternatives Analysis

7.1. Existing Crossing Facilities

The most obvious opportunities for crossing Highway 17 are the existing culverts under the Highway and the sole bridge that crosses over the highway in the Study Area (See Figure 1).

Existing Culverts

There are a total of six significant Caltrans-owned drainage culverts that pass under the highway in the Study Area, plus one low-elevation cross-connection culvert between the main body of Lexington Reservoir and the arm of the reservoir to the west of the highway that is part of the reservoir facilities rather than the highway. These are shown on Figure 13 and on the circa 1950 "as-built" plans from the original construction of the highway contained in Appendix B. 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:

1. At an unnamed drainage, Station 188+82 – a 30" diameter by 252' Reinforced Concrete Pipe (RCP).
2. At Black Creek, Station 203+48 – a 48" diameter x 464' RCP.
3. 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.
4. A very long low-elevation reservoir cross-connection that is normally below the water line of Lexington Reservoir even when the level is low.
5. At Montevina and Alma Bridge Roads, Station 235+37.5 – a 30" diameter x 136' RCP.
6. The "Trout Creek Culvert", Station 250+25 – a 4' x 4' x approximately 333' Concrete Box Culvert.
7. The "Ravine Culvert", Station 255+33 - a 4' x 4' x approximately 372' Concrete Box Culvert

In addition, there is another Highway 17 culvert crossing to the south of the Study Area in the Bear Creek Redwoods Open Space Preserve at Briggs Creek. This could only be visited by staff from the Preserve side. There is a trash rack at the inlet that appears to deter access by wildlife. The outlet isn't accessible because it is off a private road, but based on Google imagery it appears to terminate in a concrete-lined retention pond.

As-built plans and site photos of the existing culverts are contained in Appendix B.

<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, and in the case of the Lexington Culvert to better accommodate humans as an alternative hiking-only crossing.

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 a 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.

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 11) 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.

Lexington Culvert Improvement Options

- Clear out most of the silt that presently covers the bottom of the culvert
- Grade a drainage ditch from the eastern outlet of the culvert to towards the main body of the reservoir so that the culvert drains after storms rather than retaining standing water (an energetic non permitted volunteer has dug a ditch through the culvert and a pit at the east end to try to accomplish this, but it still holds water).
- Build a catwalk – a platform on the side of the culvert approximately 3 feet wide that can be used by animals and humans even if there is a minor amount of water flowing through the culvert. The area that drains into the culvert during storms, as opposed to the flooding that occurs when the reservoir reaches maximum capacity, is very small: approximately 1.2 acres, so the flow through the culvert would normally be minimal.
- Clear some of the vegetation from the entrances of the culvert. When Pathways for Wildlife cleared vegetation from the entrances to make them more visible to their wildlife cameras, they found that wildlife use increased. However some brush cover should be retained to encourage use by more wildlife– the specific balance to be determined at the design stage. Having more visibility may also deter the apparent use of the culvert as a hangout or a homeless encampment.
- Install directional fencing at the culvert, including provisions for small animals including herpetofauna, and install exclusion fencing along the frontage roads and the highway.

Figure 11: Lexington Culvert Site and Geology

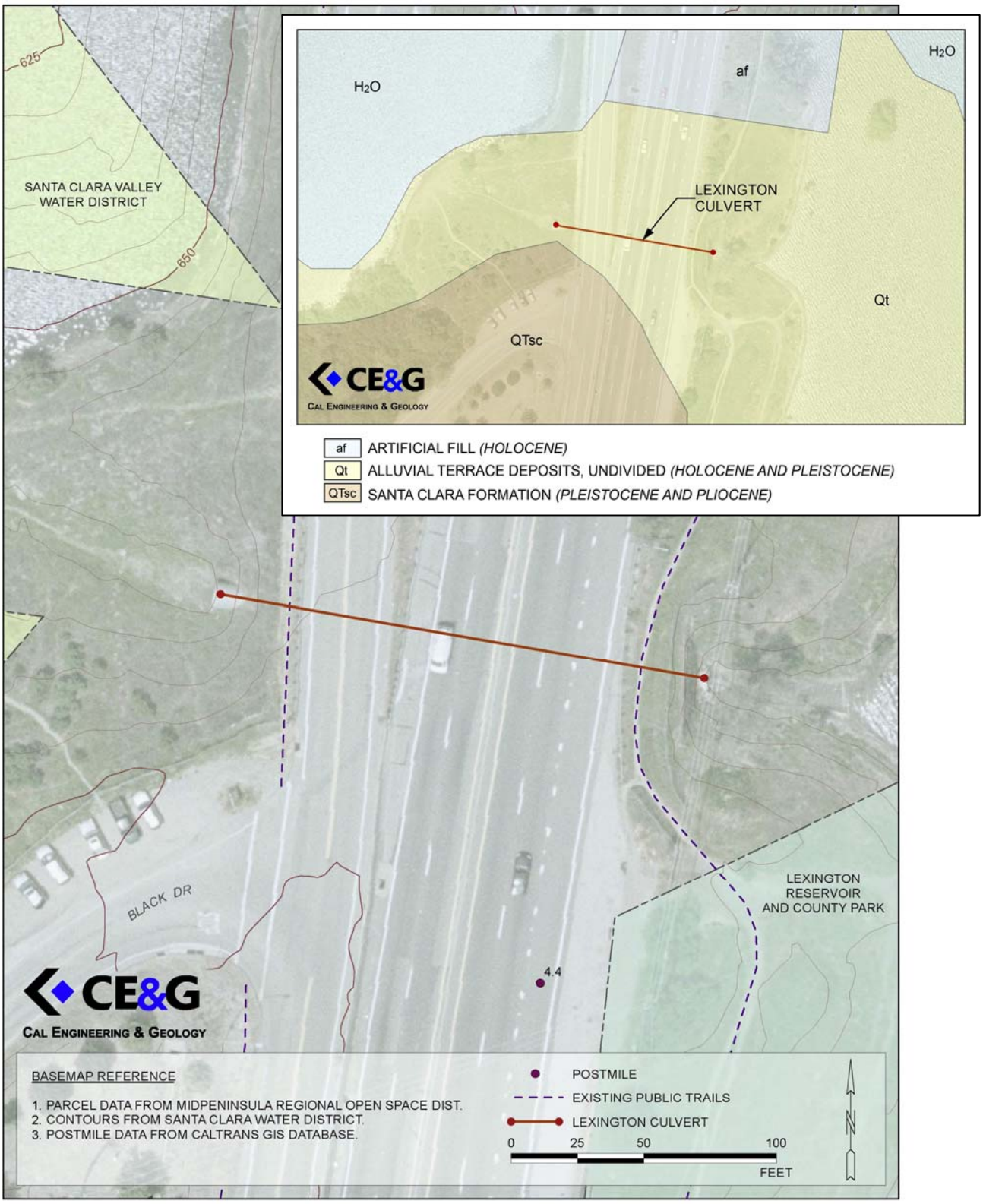
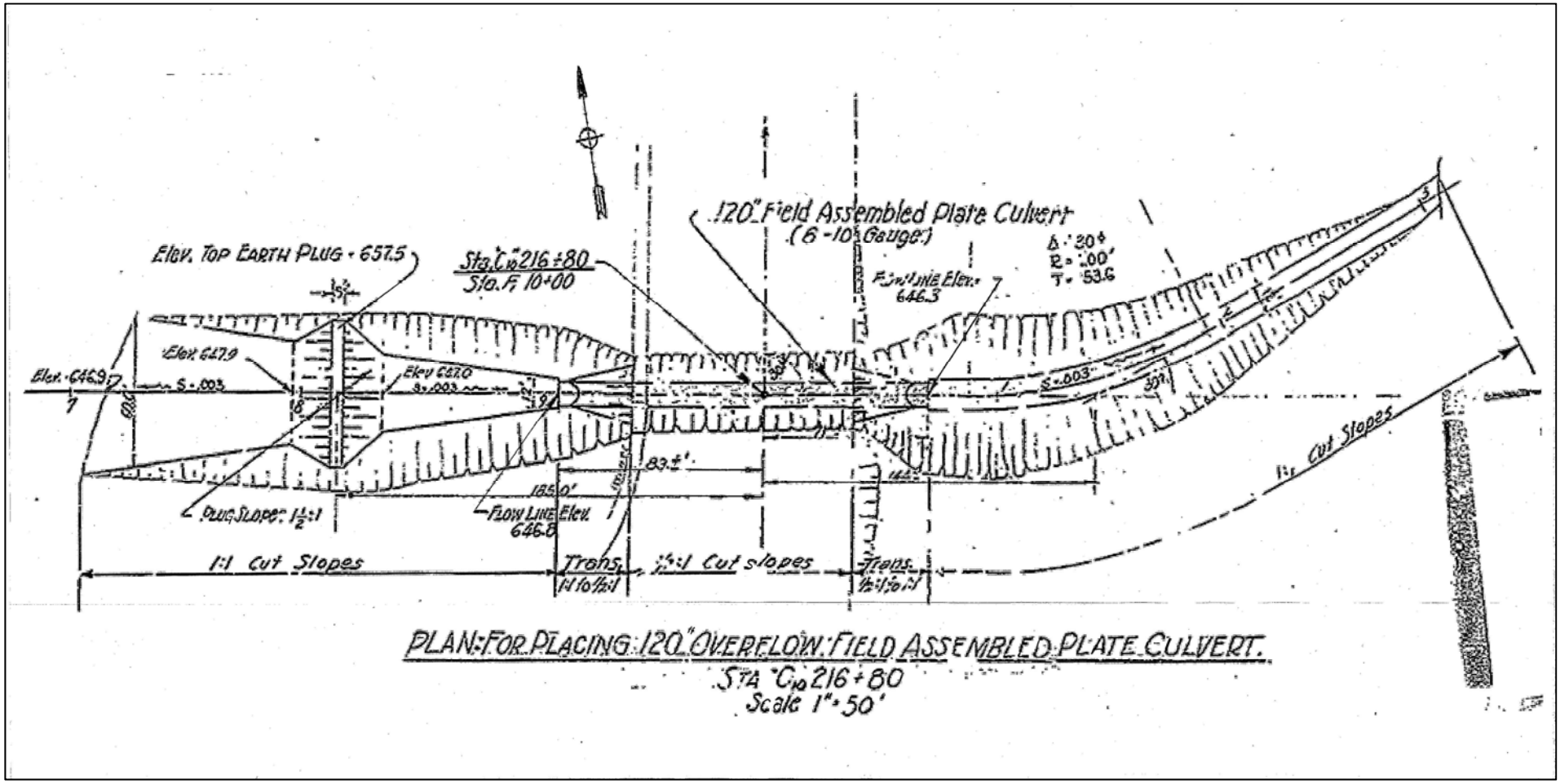


Figure 12: Lexington Culvert As-Built Plan



Lexington Culvert East End

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.

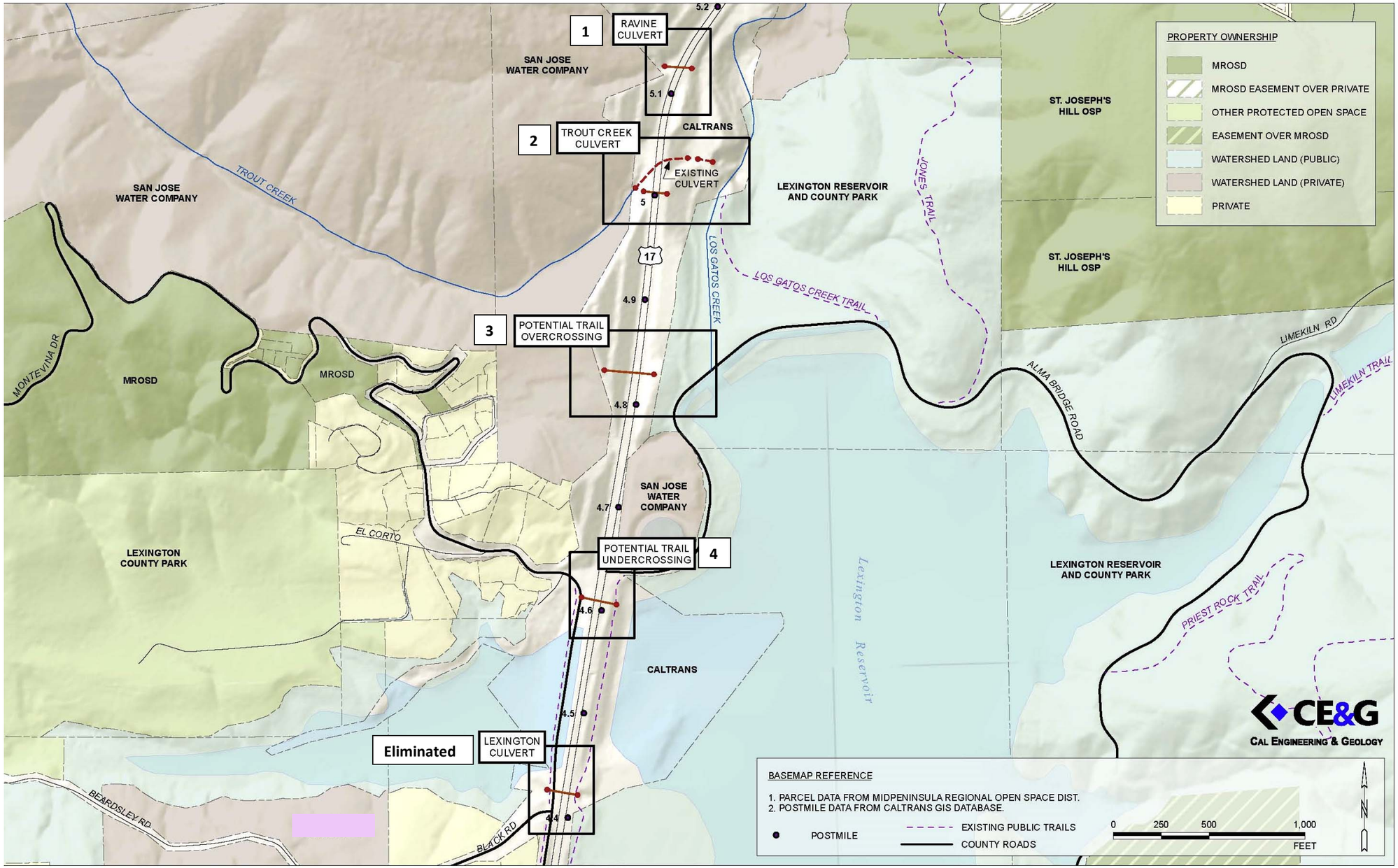
Bear Creek Road/Alma Bridge Road Overcrossing

7.2. New Crossing Alternatives

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.

The consultant team evaluated a total of five alternative locations and configurations of wildlife/trail crossings, as illustrated in Figure 13. The Lexington Culvert alternative was eliminated early in the process as detailed below. The consultant team developed siting and design concepts and evaluated the other alternatives based on field reconnaissance, engineering and environmental analysis, and input from stakeholder agencies and organizations.

Figure 13: Alternative Crossing Locations



Alternative 1 – New Undercrossing at Ravine Culvert

Site Conditions

Ravine culvert is located approximately at post mile 5.1 (Figure 13), 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 14).

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.

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.

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.

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, California giant salamander, and California red legged frog would be challenged.

Functionality for People

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. The route would also entail a significant descent and climb that would not be necessary for crossing alternatives farther to the south. The Ravine Culvert crossing location is not considered feasible for a trail crossing location because these conditions would make an unpaved trail connection very challenging to construct, and the desired ADA-compliant paved connection to a public road virtually impossible.

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.

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.

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.

Maintenance and Management Considerations

The close proximity to frequent public use on the Los Gatos Creek Trail may be a deterrent to homeless use or other unauthorized use. There would be easy access for maintenance and inspection. The structure itself should be very low maintenance.

Cost Considerations

The Ravine Crossing Alternative is estimated to cost $7.7 million, as detailed in the table below. 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 2: Conceptual Cost Estimate, Alternative 1 – Ravine Undercrossing

Prepared 5-27-16

ROADWAY & STRUCTURE ITEMS	QUANTITY	UNIT	UNIT COST	TOTAL
Clearing and Grubbing	1	LS	$50,000	$50,000
Grading and Drainage	1	LS	$100,000	$100,000
Temporary Construction Access/Staging Area*	1	LS	$50,000	$50,000
Undercrossing Structure (90'x42.5'x12')	1	LS	$2,300,000	$2,300,000
Wildlife Fencing and Features	1	LF	$100,000	$100,000
Habitat Site Preparation	1	LF	$100,000	$100,000
Traffic Control Systems	1	LS	$150,000	$150,000
Traffic Management Plan	1	LS	$50,000	$50,000
Water Pollution Control and Treatment BMPs	1	LS	$50,000	$50,000
Environmental Mitigation	1	LS	$100,000	$100,000
Misc. Minor Items (20%)	1	LS	$700,000	$700,000
Mobilization (10%)	1	LS	$400,000	$400,000
Contingency (25%)	1	LS	$770,000	$770,000
			TOTAL CONSTRUCTION	**$5,000,000**
RIGHT OF WAY:	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Misc. Utilities	1	LS	50,000	**50,000**
Caltrans PID Cost	1	LS	100,000	**100,000**
Other Permits and Fees	1	LS	100,000	**100,000**
			RIGHT OF WAY SUBTOTAL	**250,000**
ENGINEERING SUPPORT				
Engineering Studies (6%)				**$300,000**
Environmental Studies (3%)				**$150,000**
Design Engineering (15%)				**$750,000**
Construction Staking (2%)				**$100,000**
Construction Support (3%)				**$150,000**
Construction Management (20%)**				$1,000,000
			ESTIMATED PROJECT COSTS	**$7,700,000**

* Includes permanent maintenance access/trail access

** Assume Caltrans AAA Construction Contract

Note: Cost does not include maintenance costs

SAY **$7,700,000**

Figure 14:Ravine Culvert Site and Geology

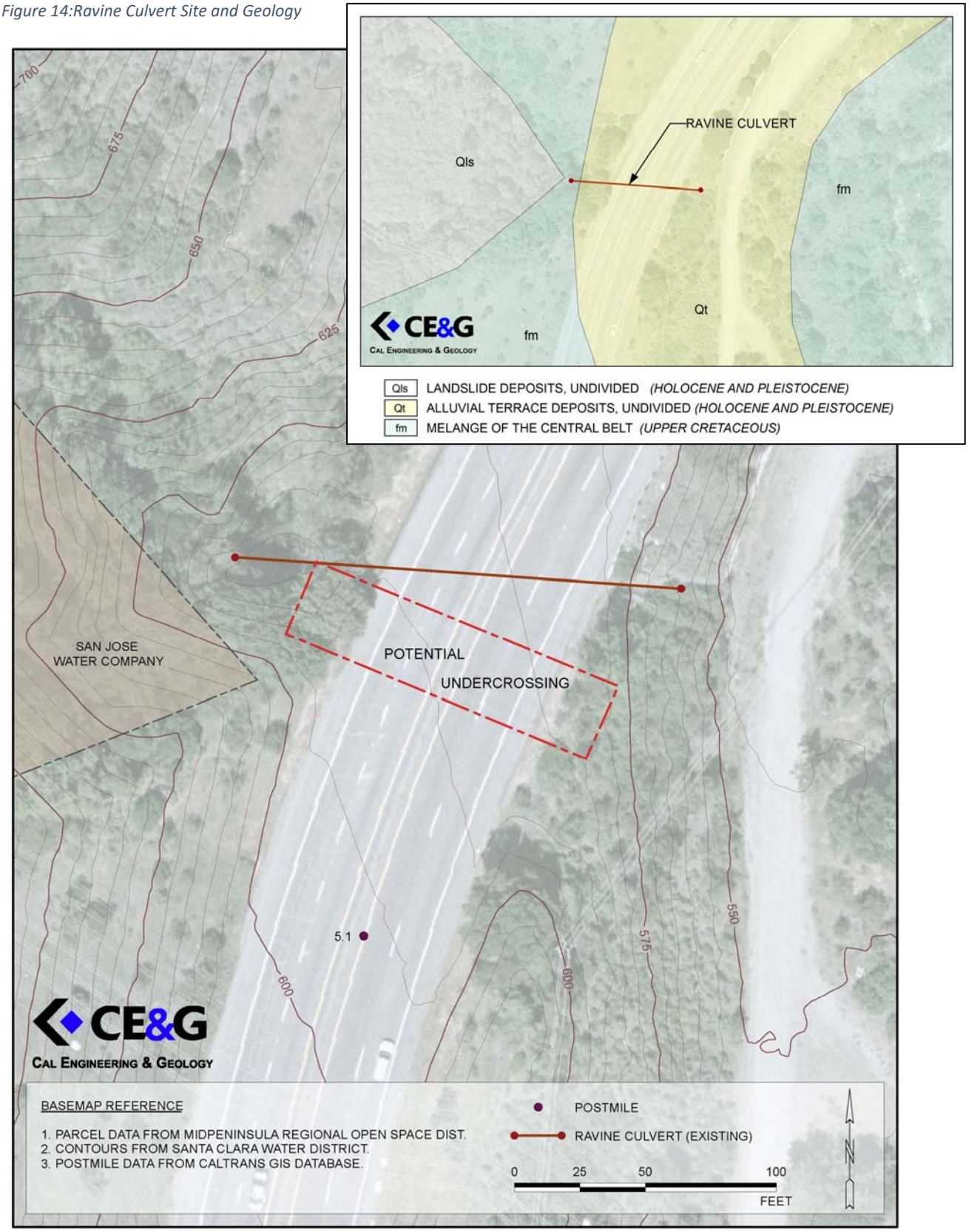
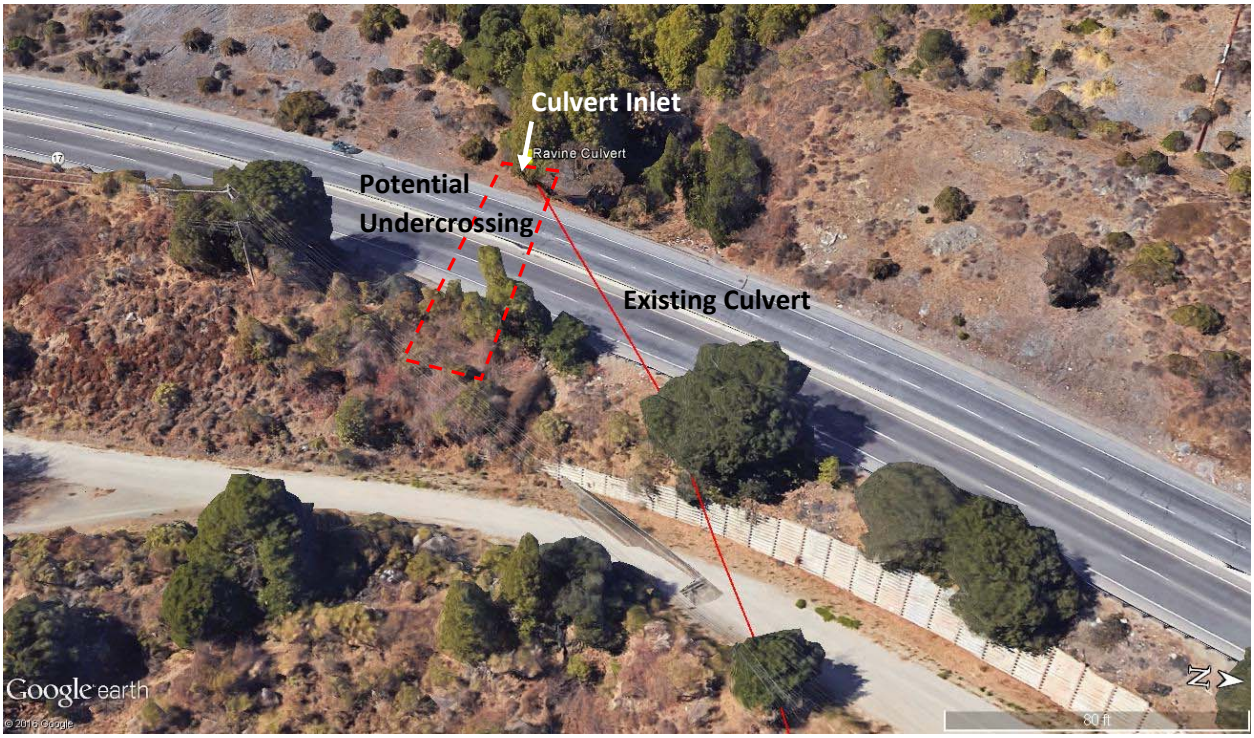
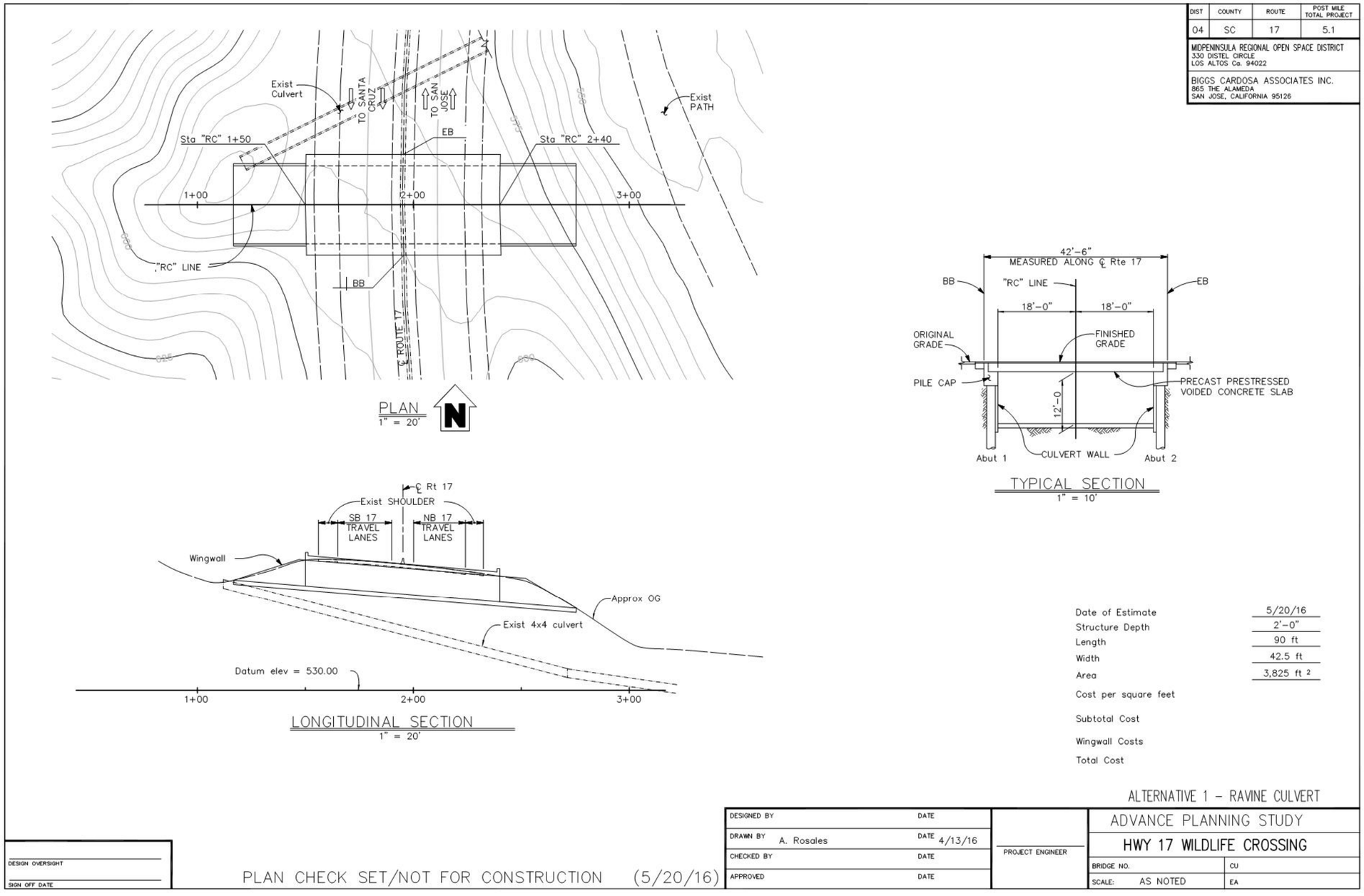


Figure 15: Ravine Culvert Site Photos



Ravine Culvert Inlet

Figure 16: Ravine Culvert Conceptual Plan



Evaluation: Alternative 1 – New 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.

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 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 does not offer many opportunities to accommodate use by species of special status.	**Low**	○

Functionality for People

1. Proximity to Ridge Trail connections. Close to the envisioned route in El Sereno OSP, though steep topography would make trail connection very challenging. [8]	**Medium**	◐
2. Appropriate dimensions. The undercrossing would provide ample space for a trail.	**High**	●
3. Non-motorized recreation and transportation connections. No feasible way to create a connection to a public road or an ADA compliant path of travel on the west side.	**No Score**	

[8] The proposed route in El Sereno OSP will require acquisition of access rights and a public process including stakeholder engagement and support. "Medium" score is due to the uncertain regional trail route and the steep topo constraints for the regional trail connection.

4. Emergency and maintenance vehicle access. No feasible way to create access for emergency or maintenance vehicles to the west side of the highway.	**No Score**	

Constructability/Cost

1. Location with fill or cut embankments: There are embankments on both sides into which the undercrossing could be constructed, but there is no level space south of the inlet on the west side and the depth of the inlet relative to the highway surface is minimal for constructing an undercrossing.	**Medium**	
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 and bed of a minor tributary drainage to Los Gatos Creek.	**Medium**	
3. 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**	
4. Can be designed to meet standards. Only apparent challenge is proximity to existing culvert on the west.	**High**	
5. 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**	
6. Minimal impact on existing facilities and operations. Ongoing operation would require little or no change to existing facilities or impact on them.	**High**	
7. 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 Support.		

Alternative 2 – New Undercrossing at Trout Creek

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 along it 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 17). 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. SJWC has a 10" water intake pipe in the bed of the creek upstream from the culvert. This line extends under the highway to connect to the treatment plant on the east side. 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 SJWC water line located along the edge of the roads below the prospective opening. This water line would need to be bridged for construction access and for ongoing service access to the undercrossing structure. A ramp and unpaved road into the undercrossing would also improve access for small animals, and would be necessary for any trail/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 lands and facilities of SJWC and SCVWD and approvals or agreements with them.

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.

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.

Construction Staging and Traffic Control

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

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.

Functionality for People

The conceptual route for the Ridge Trail passes through Trout Creek Canyon, which would depend on securing access rights from SJWC. There are significant topographic challenges to building a trail through the canyon, but trails have been constructed in many such challenging settings. Using this location for a Ridge Trail crossing would require significantly more access improvements along or above the creek bank on the west side at the opening to the crossing.

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 access would have on the functionality for wildlife, this crossing location is considered a wildlife crossing alternative only.

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. Improvement of the crossing to accommodate the Ridge Trail, let alone a paved non-motorized connection, would have significantly more impacts, and is part of the reason this alternative is not considered viable for that purpose.

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 over the existing water line. 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

Maintenance and Management Considerations

There would be easy access for maintenance and inspection. The structure itself should be very low maintenance.

Cost Considerations

The Trout Creek Crossing Alternative is estimated to cost $7.2 million, as detailed in the table below. 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 3: Conceptual Cost Estimate, Alternative 2 – Trout Creek Undercrossing

Prepared 5-27-16

ROADWAY & STRUCTURE ITEMS	QUANTITY	UNIT	UNIT COST	TOTAL
Clearing and Grubbing	1	LS	$50,000	$50,000
Grading and Drainage	1	LS	$50,000	$50,000
Temporary Construction Access/Staging Area*	1	LS	$100,000	$100,000
Undercrossing Structure (90'x42.5'x12')	1	LS	$2,300,000	$2,300,000
Wildlife Fencing and Features	1	LF	$100,000	$100,000
Habitat Site Preparation	1	LF	$50,000	$50,000
Traffic Control Systems	1	LS	$150,000	$150,000
Traffic Management Plan	1	LS	$50,000	$50,000
Water Pollution Control and Treatment BMPs	1	LS	$50,000	$50,000
Environmental Mitigation	1	LS	$50,000	$50,000
Misc. Minor Items (20%)	1	LS	$600,000	$600,000
Mobilization (10%)	1	LS	$300,000	$300,000
Contingency (25%)	1	LS	$740,000	$740,000
			TOTAL CONSTRUCTION	**$4,600,000**
RIGHT OF WAY:	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Misc. Utilities	1	LS	50,000	**50,000**
Caltrans PID Cost	1	LS	100,000	**100,000**
Other Permits and Fees	1	LS	100,000	**100,000**
			RIGHT OF WAY SUBTOTAL	**250,000**
ENGINEERING SUPPORT				
Engineering Studies (6%)				**$280,000**
Environmental Studies (3%)				**$140,000**
Design Engineering (15%)				**$690,000**
Construction Staking (2%)				**$100,000**
Construction Support (3%)				**$140,000**
Construction Management (20%)**				**$920,000**
			ESTIMATED PROJECT COSTS	**$7,120,000**

* Includes permanent maintenance access/trail access

** Assume Caltrans AAA Construction Contract

Note: Cost does not include maintenance costs

SAY **$7,200,000**

Figure 17: Trout Creek Crossing Site and Geology

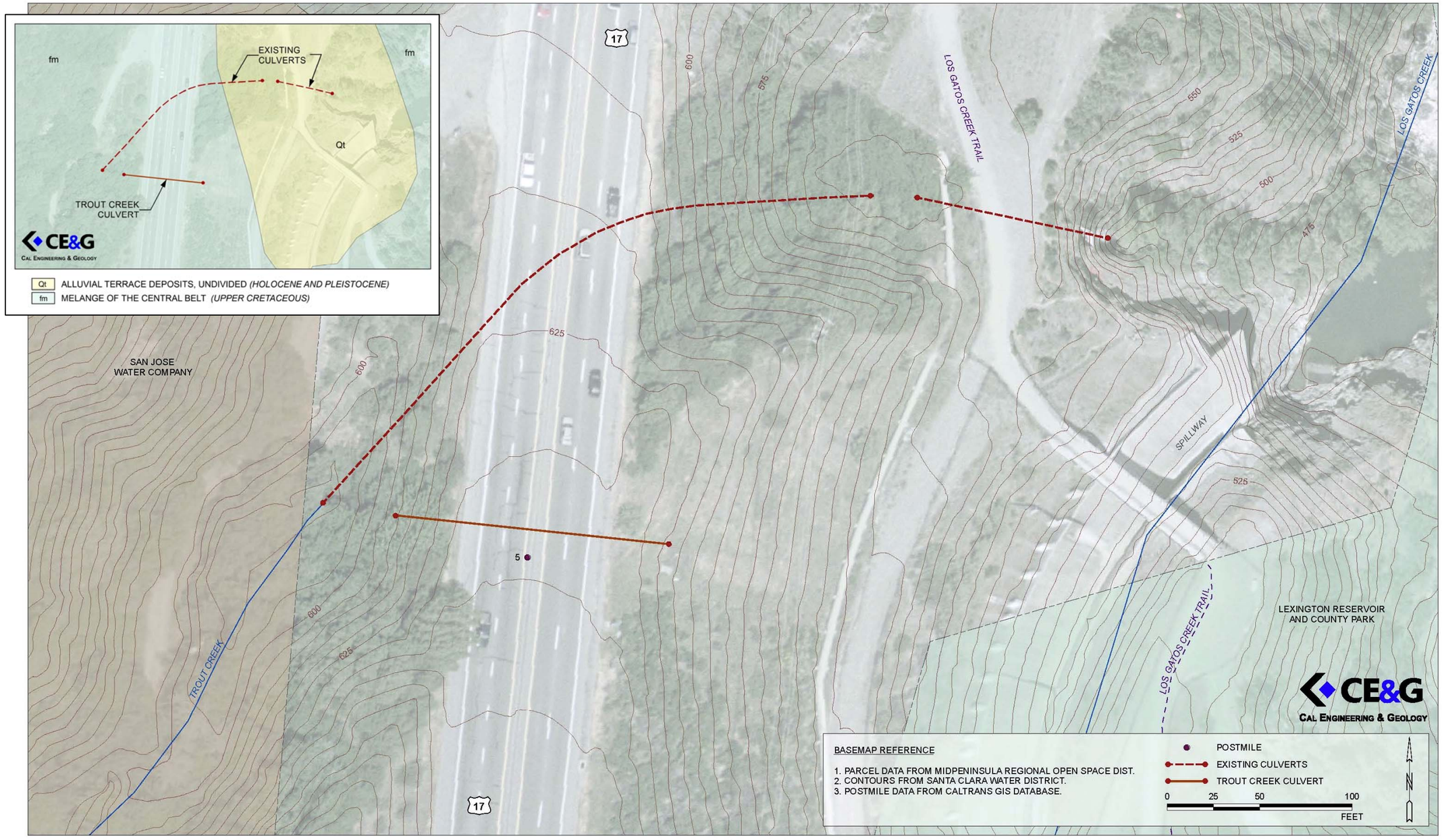
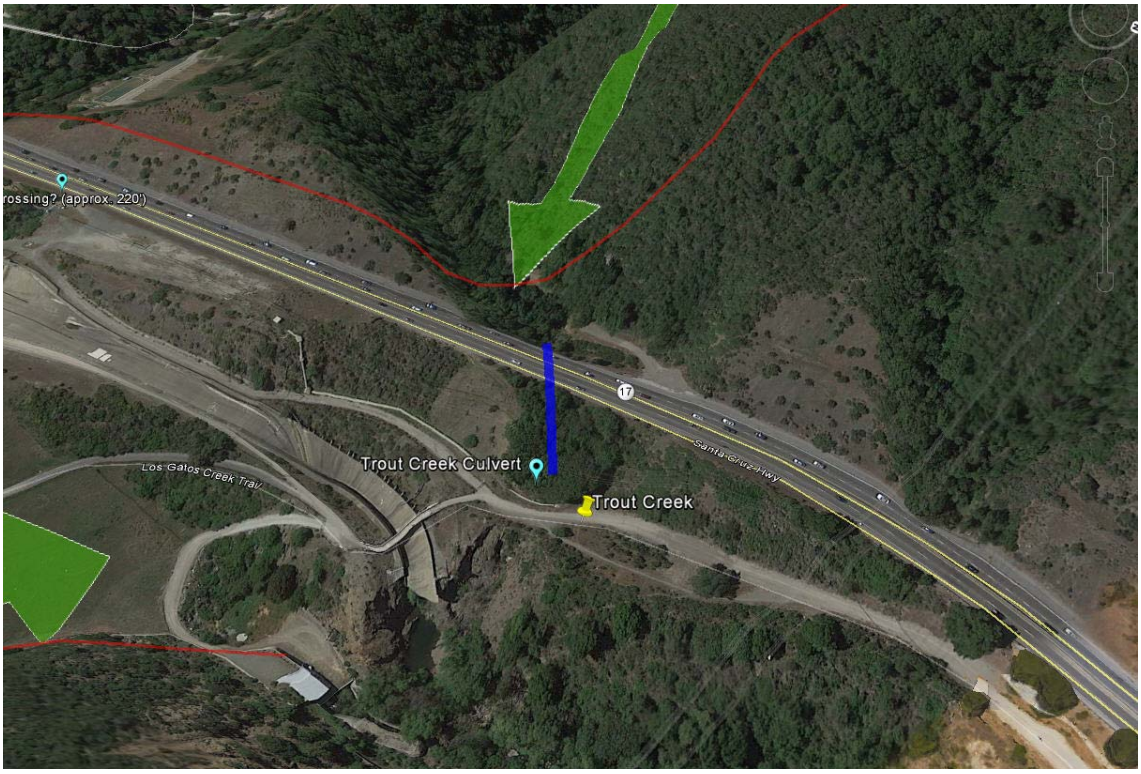


Figure 18: Trout Creek Site Photos

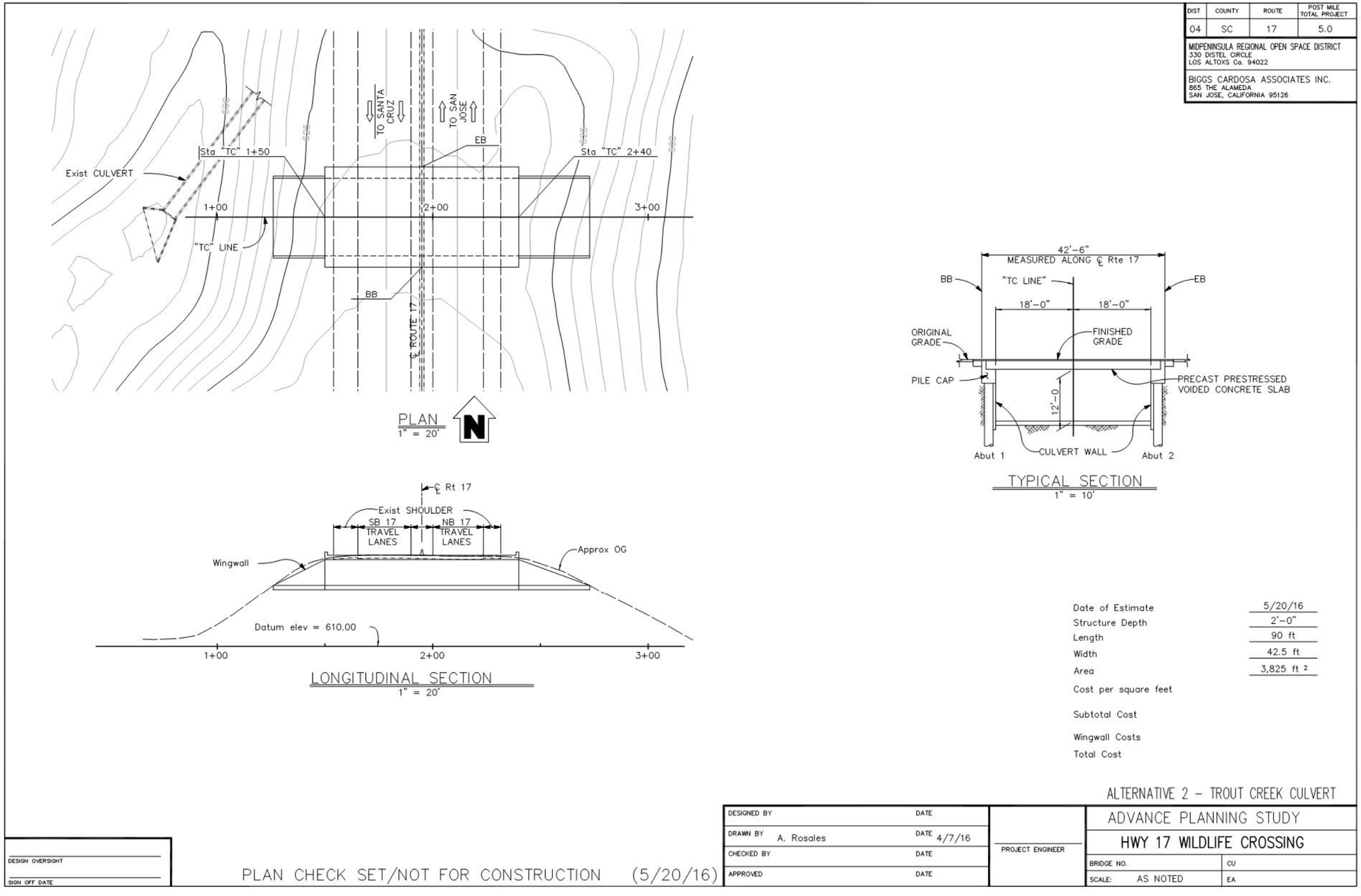
Approximate conceptual opening (near top of photo) location on east side

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 19: Trout Creek Crossing Conceptual Plan



Evaluation: Alternative 2 – New 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.

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**.**	**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 – it is within a fenced off area and is not immediately visible from the trail.	**Medium**	◐
6. **Species of special status:** The location does not offer many opportunities to accommodate use by species of special status, though directional fencing tied into the Trout Creek drainage would provide some potential.	**Low**	○

Functionality for People

1. Proximity to Ridge Trail connections. Close to the envisioned route in El Sereno OSP, though steep topography would make trail connection very challenging. [9]	**Medium**	◐
2. Appropriate dimensions. The undercrossing would provide ample space for a trail.	**High**	●

[9] The proposed route in El Sereno OSP will require acquisition of access rights and a public process including stakeholder engagement and support. "Medium" score is due to the uncertain regional trail route and the steep topo constraints for the regional trail connection.

3. Non-motorized recreation and transportation connections. No feasible way to create a connection to a public road or an ADA compliant path of travel on the west side.	**No Score**	
4. Emergency and maintenance vehicle access. No feasible way to create access for emergency or maintenance vehicles to the west side of the highway.	**No Score**	

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.	**High**	
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; the potential impact on the existing water intake line from the creek needs to be determined	**Medium**	
7. 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. Still relatively low cost = high score.	**Medium**	

Future Decision Factors

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

Alternative 3 – New Overcrossing

Site Conditions

The team considered a new wildlife overcrossing at a location approximately 500 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 20). The terrain immediately to the east 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 west side of Highway 17 there is a smaller hill with a wider landing area, however it is approximately 25 feet lower than the east landing elevation. The entire footprint area for the overcrossing is in Caltrans ROW, although connection to it for construction and ongoing access would involve lands and facilities of 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 is currently being used for construction staging for the water treatment plant improvement project, and which 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.

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.

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. 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.

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 also exceeds the goal of a 5% gradient for non-motorized access and a relatively level approach for a wildlife crossing.

The overcrossing would be designed to accommodate maintenance and emergency vehicles, the "live load" of potentially heavy trail traffic, including horses, and to also function as a wildlife crossing, the weight of soil to be placed on the structure to allow growth of continuous habitat.

Functionality for Wildlife

The overcrossing location is well 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.

Functionality for People

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. It would reduce some of the descending and climbing that would be necessary if a crossing was located farther to the north. 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 paved trail connection to Montevina Road, as discussed in Appendix A.

Environmental Resources and Potential Impacts

There are no 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 west side that might be impacted.

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 currently 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.

Relationship to Adjacent Facilities

This alternative would require construction in close proximity to the existing overhead utility lines, which may be a significant constraint. It would occupy the staging area that is used for SJWC and SCVWD projects, and would permanently occupy part of that area and introduce a use that would 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.

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.

Cost Considerations

The Overcrossing Alternative is estimated to cost $15.1 million, as detailed in the table below. This reflects the fact that an overcrossing will be a much longer and more substantial structure than an undercrossing, and reflects the costs of making the overcrossing sufficiently wide, with a planted sol 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 4: Conceptual Cost Estimate, Alternative 3 – Overcrossing

Prepared 5-27-16

ROADWAY & STRUCTURE ITEMS	QUANTITY	UNIT	UNIT COST	TOTAL
Clearing and Grubbing	1	LS	$50,000	$50,000
Grading and Drainage	1	LS	$100,000	$100,000
Temporary Construction Access/Staging Area*	1	LS	$100,000	$100,000
Bridge Overcrossing Structure (245'L x 32'W)	1	LS	$5,500,000	$5,500,000
Wildlife Fencing and Features	1	LF	$150,000	$150,000
Habitat Site Preparation	1	LF	$50,000	$50,000
Traffic Control Systems	1	LS	$150,000	$150,000
Traffic Management Plan	1	LS	$50,000	$50,000
Water Pollution Control and Treatment BMPs	1	LS	$50,000	$50,000
Environmental Mitigation	1	LS	$50,000	$50,000
Misc. Minor Items (20%)	1	LS	$1,300,000	$1,300,000
Mobilization (10%)	1	LS	$700,000	$700,000
Contingency (25%)	1	LS	$1,570,000	$1,570,000
			TOTAL CONSTRUCTION	$9,900,000
RIGHT OF WAY:	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Misc. Utilities	1	LS	100,000	**100,000**
Caltrans PID Cost	1	LS	100,000	**100,000**
Other Permits and Fees	1	LS	100,000	**100,000**
			RIGHT OF WAY SUBTOTAL	300,000
ENGINEERING SUPPORT				
Engineering Studies (6%)				$600,000
Environmental Studies (3%)				$300,000
Design Engineering (15%)				$1,490,000
Construction Staking (2%)				$200,000
Construction Support (3%)				$300,000
Construction Management (20%)**				$1,980,000
			ESTIMATED PROJECT COSTS	$15,070,000

* Includes permanent maintenance access/trail access

** Assume Caltrans AAA Construction Contract

Note: Cost does not include maintenance costs

SAY $15,100,000

Figure 20: Overcrossing Site and Geology

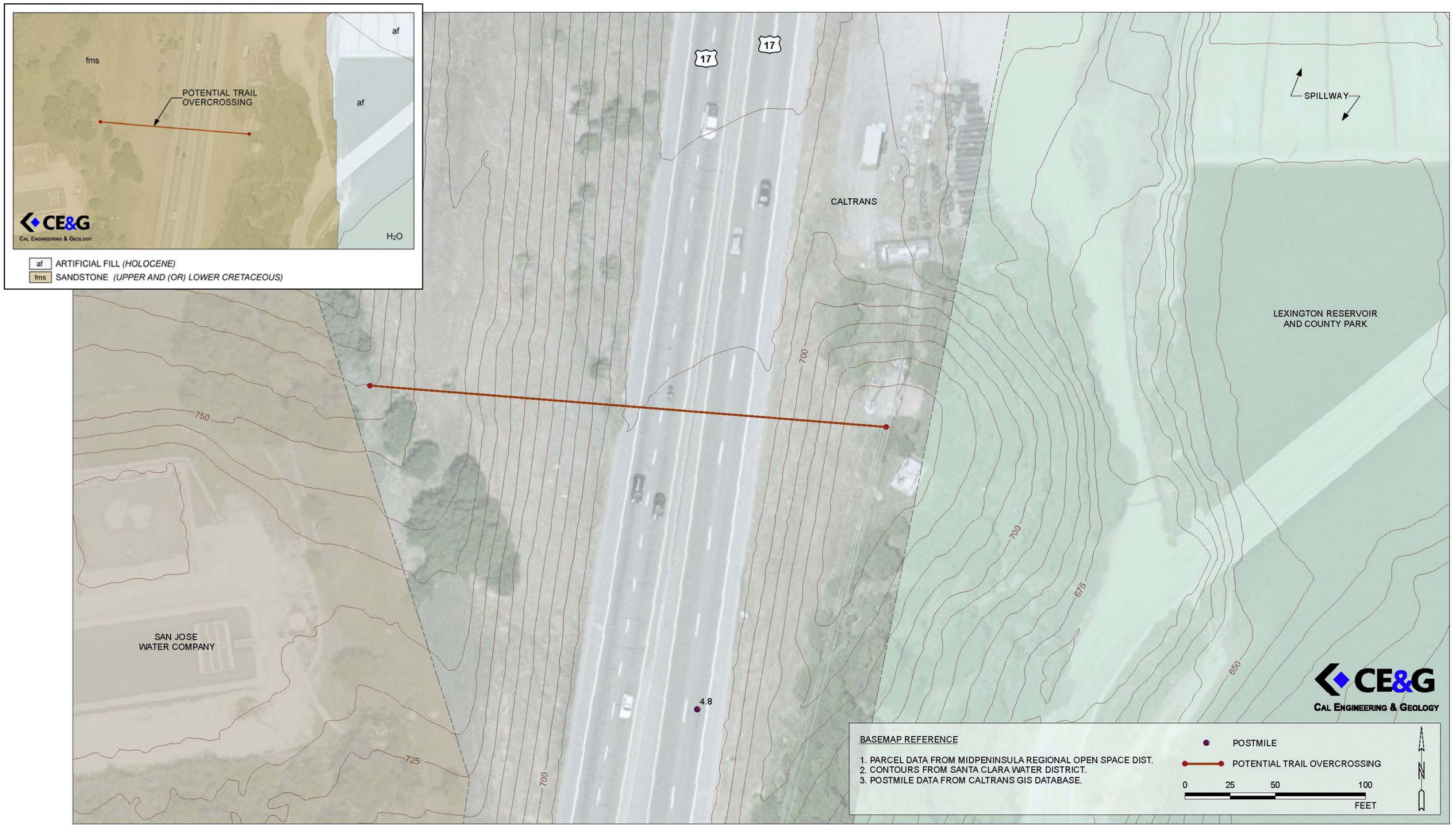
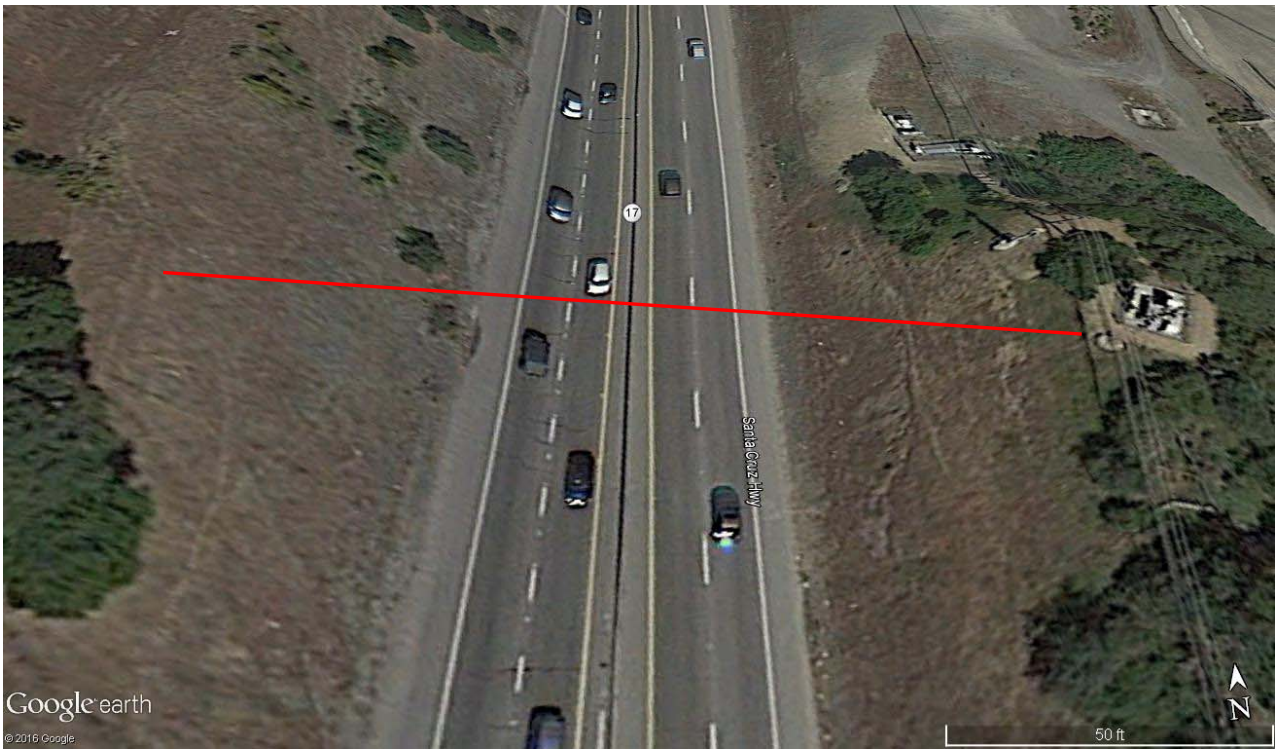


Figure 21: Overcrossing Site Photos

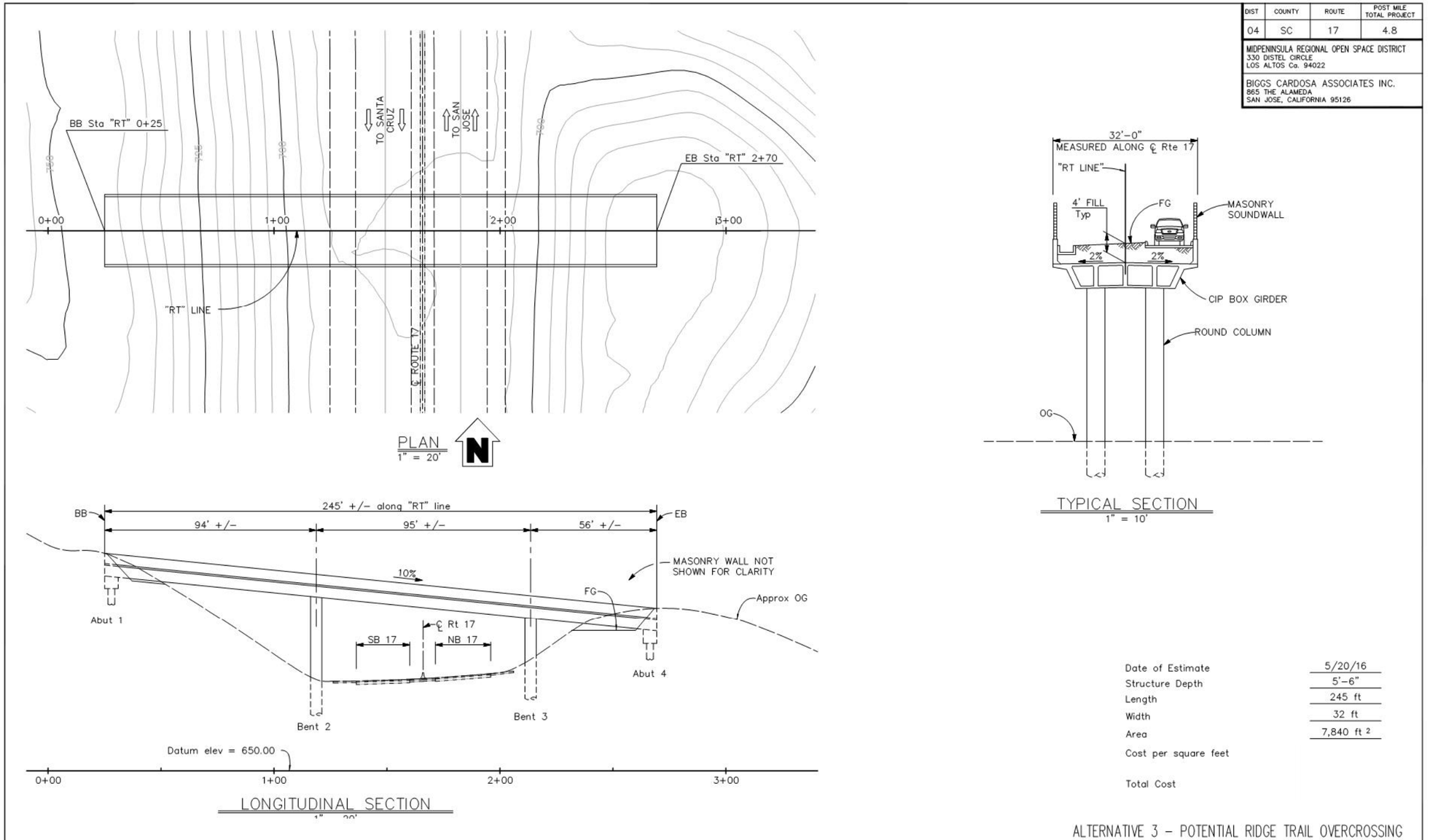


Above – potential overcrossing site looking north

Left - view of east landing area looking south west – note utilities and cell towers

Right - view from east side south toward potential landing area – note utilities and cell

Figure 22: Overcrossing Conceptual Plan



Evaluation: Alternative 3 – New 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.

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.	**Low**	○
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: Given the drop in elevation between east and west sides there will be poor line of sight.	**Low**	○
5. Less human exposure: The site would allow for a trail connection that bypasses Alma Bridge Road.	**Low**	○
6. Species of special status: The location does not offer any opportunities to accommodate use by special status species.	**Low**	○

Functionality for People

1. Proximity to Ridge Trail connections. Close to the envisioned route in El Sereno OSP, though steep topography would make trail connection very challenging. The connection to Alma Bridge Road could bypass the narrow curved portion near Highway 17. [10]	**Medium**	◐
2. Appropriate dimensions. The overcrossing would provide ample space for a trail and is preferred to an undercrossing.	**High**	●
3. Non-motorized recreation and transportation connections. No feasible way to create a connection to a public road or an ADA compliant path of travel on the west side.	**No Score**	

[10] The proposed route in El Sereno OSP will require acquisition of access rights and a public process including stakeholder engagement and support. "Medium" score is due to the uncertain regional trail route and the steep topo constraints for the regional trail connection.

4. Emergency and maintenance vehicle access. No feasible way to create access for emergency or maintenance vehicles to the west side of the highway	**No Score**	

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; only top of eastern knoll with a few native trees is undisturbed area.	**High**	
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.	**High**	
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.	**Medium**	
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 Support.		

Alternative 4 – New Undercrossing – Montevina Road to Alma Bridge Road

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 23). 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.

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.

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.

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. Although a trail undercrossing would only need to be a minimum of 20 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 26.5 feet has been assumed in the conceptual plan. 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.

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.

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. [11] 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).

Functionality for People

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. 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 – see Appendix A for further discussion.

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

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

areas. However, proximity to the reservoir may create potential for aquatic species to enter the construction area without exclusion measures in place.

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, as discussed below. 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.

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.

Cost Considerations

This undercrossing Alternative is estimated to cost $6.6 million, as detailed in the table below. The structure is similar to the other undercrossings; this relatively low cost reflects 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 5: Conceptual Cost Estimate, Alternative 4 – Montevina Undercrossing

Prepared 5-27-16

ROADWAY & STRUCTURE ITEMS	QUANTITY	UNIT	UNIT COST	TOTAL
Clearing and Grubbing	1	LS	$50,000	$50,000
Grading and Drainage	1	LS	$50,000	$50,000
Temporary Construction Access/Staging Area*	1	LS	$150,000	$150,000
Undercrossing Structure (104'x26.5'x12')	1	LS	$2,000,000	$2,000,000
Wildlife Fencing and Features	1	LF	$10,000	$10,000
Habitat Site Preparation	1	LF	$50,000	$50,000
Traffic Control Systems	1	LS	$150,000	$150,000
Traffic Management Plan	1	LS	$50,000	$50,000
Water Pollution Control and Treatment BMPs	1	LS	$50,000	$50,000
Environmental Mitigation	1	LS	$50,000	$50,000
Misc. Minor Items (20%)	1	LS	$600,000	$600,000
Mobilization (10%)	1	LS	$300,000	$300,000
Contingency (25%)	1	LS	$660,000	$660,000
			TOTAL CONSTRUCTION	$4,200,000
RIGHT OF WAY:	**QUANTITY**	**UNIT**	**UNIT COST**	**TOTAL**
Misc. Utilities	1	LS	50,000	50,000
Caltrans PID Cost	1	LS	100,000	100,000
Other Permits and Fees	1	LS	100,000	100,000
			RIGHT OF WAY SUBTOTAL	250,000
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	$6,530,000

* Includes permanent maintenance access/trail access

** Assume Caltrans AAA Construction Contract

Note: Cost does not include maintenance costs

SAY $6,600,000

Figure 23: Montevina Rd. - Alma Bridge Rd. Undercrossing Site and Geology

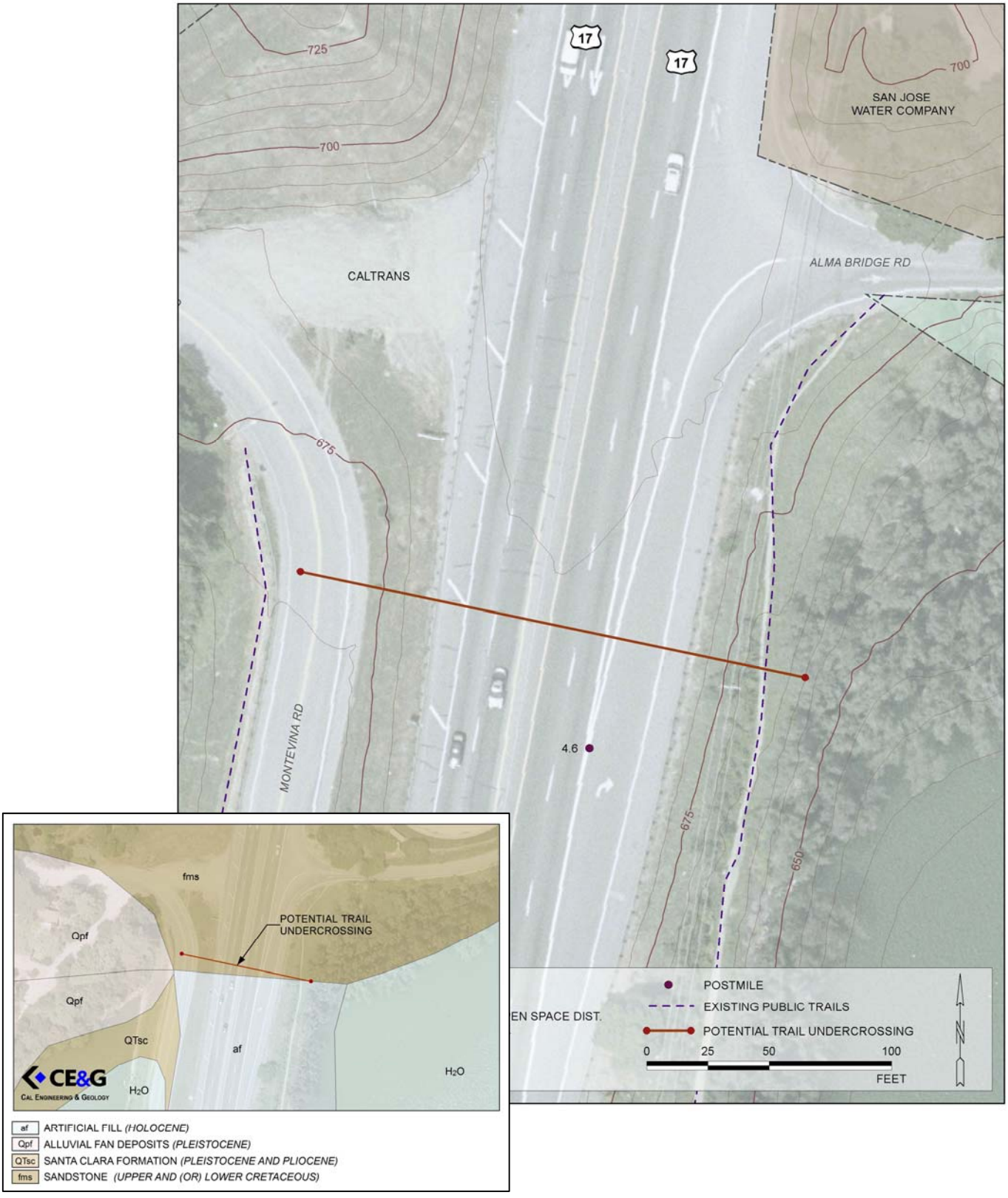
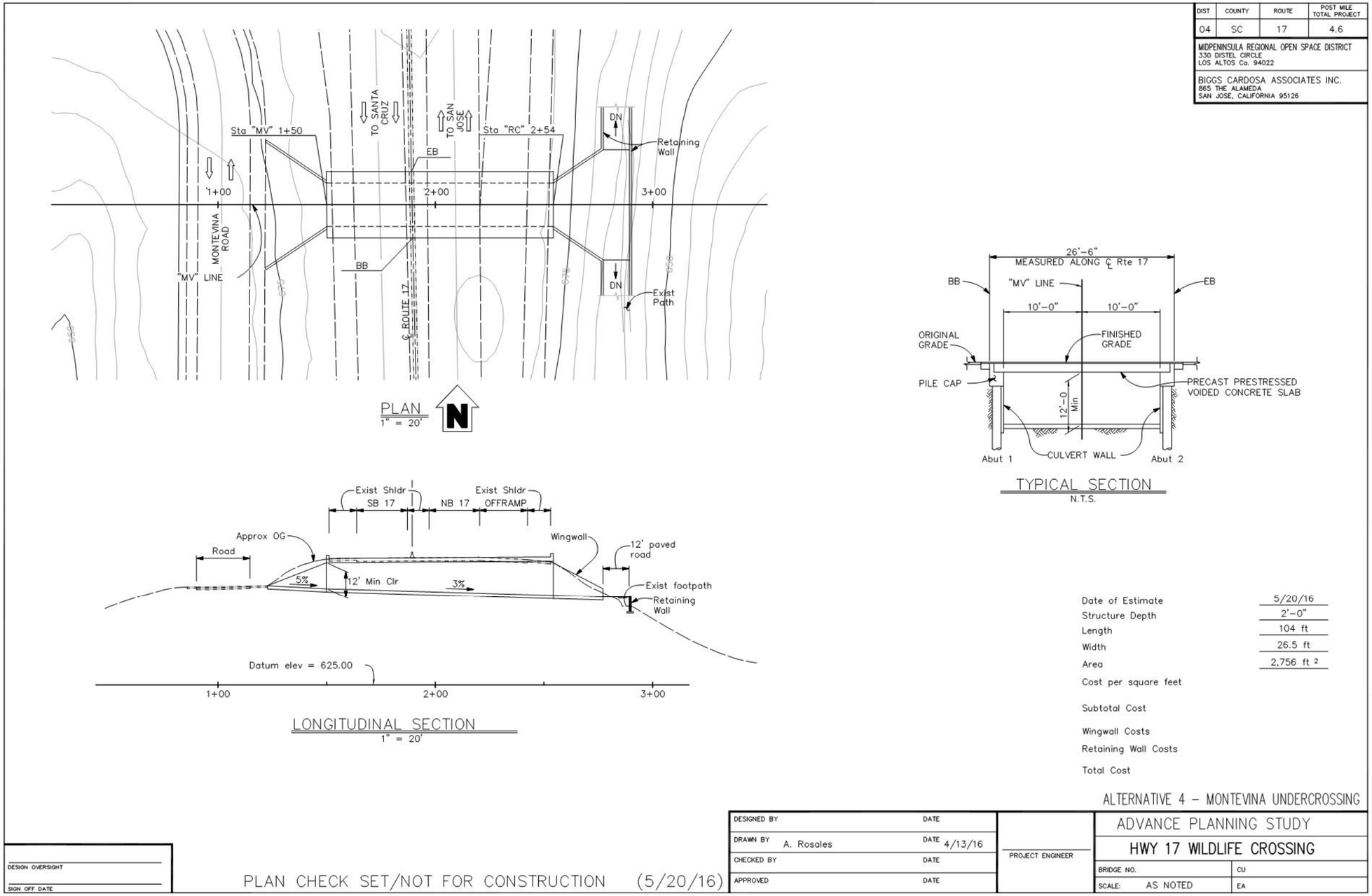


Figure 24: Montevina Rd - Alma Bridge Road Undercrossing Photos

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

Potential undercrossing opening location – east side

Figure 25: Montevina Rd. - Alma Bridge Road Undercrossing Conceptual Plan



Evaluation: Alternative 4 – Undercrossing, Montevina Road to Alma Bridge Road

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

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.	**Low**	○
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 the structure would not meet criteria for primary wildlife crossing, but would likely attract common generalist species (deer, bobcat, foxes, raccoons, small mammals).	**Medium**	◐
3. Habitat connectivity: The site does not connect to continuous habitat on the east side. The west side habitat is fragmented by roads and housing.	**Low**	○
4. Line of sight: The design will allow for clear line of sight.		
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.	**High**	●
	No Score	
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 People

1. Proximity to Ridge Trail connections. Farther from the envisioned route in El Sereno OSP, but closer to potential connections along west arm of Lexington Res. or to Bear Creek Redwoods O.S.P. Would have more barriers than other options due to need to utilize more of Alma Bridge Road for access.	**Medium**	◐
2. Appropriate dimensions. The undercrossing would provide ample space for a trail.	**High**	●

3. Non-motorized recreation and transportation connections. Good opportunities to create connection to a public roads and an ADA compliant path of travel on both sides.	**High**	●
4. Emergency and maintenance vehicle access. Good opportunity to create through access for emergency or maintenance vehicles to the west side of the highway	**High**	●

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 2 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 Support.		

8. Summary: Preliminary Findings

Table 6 summarizes and compares the cost results and Table 7 shows the preliminary overall evaluation results. Alternatives 1, the Ravine Undercrossing and 2, the Trout Creek Undercrossing, are generally tied, but Trout Creek rates better for constructability factors due to space limitations and geologic constraints at Ravine Creek. These crossing alternatives rate highly for wildlife functionality, and could potentially perform well for the Ridge Trail crossing if feasible connections could be developed, but that would interfere with performance as a wildlife crossing, and there is no potential at the first 3 alternative locations to provide a complete ADA and service road connection to a public road on the west side.

Conversely, Alternative 3, the Overcrossing, has low value as a wildlife crossing, and Alternative 4, the Montevina Road – Alma Bridge Road Undercrossing, is compromised for that purpose, but stands out as the most feasible trail crossing based on constructability and cost versus the overcrossing, and due to the fact that it would afford a direct ADA-compliant connection and access for service vehicles.

Completing a safe, enjoyable connection from these crossings to the existing eastern portion of the Ridge Trail at the Priest Rock Trail would require significant trail improvements along Alma Bridge Road, as discussed in Appendix A.

Table 6: Planning-Level Cost Estimate Comparison

		Construction Cost (million $)	Total Project Cost (million $)
Alt. 1	Ravine Undercrossing	$5.0	$7.7
Alt. 2	Trout Creek Undercrossing	$4.6	$7.2
Alt. 3	Overcrossing	$9.9	$15.1
Alt. 4	Montevina Undercrossing	$4.2	$6.6

The costs associated with this project range from $13.8 million (for Trout Creek and Montevina undercrossings) to $22.8 million (for Ravine Undercrossing and the Overcrossing) to complete all of the components of the project through construction of both a dedicated wildlife crossing and a dedicated Ridge Trail crossing. The actual cost depends on the combination of alternatives selected, and on more precise estimates and actual costs experienced based on final designs and environmental, access and permitting requirements. These numbers will be further refined as Midpen continues to work with Caltrans to select a preferred alternative.

Table 7: Evaluation Summary Matrix

	1. Ravine Undercrossing		2. Trout Creek Undercrossing		3. Overcrossing		4. Montevina Rd – Alma Bridge Rd Undercrossing		Key Differentiators
Functionality for Wildlife									
1. Proximity to wildlife corridor	High	●	High	●	Low	○	Low	○	More northerly alts are in identified corridor
2. Appropriate dimensions and design features	High	●	High	●	Medium	◐	Medium	◐	OC not preferred by mt. lions; #4 UC too close to roads
3. Habitat connectivity	High	●	High	●	Low	○	Low	○	More disturbed area, roads and facilities around southern alts
4. Line of sight	High	●	High	●	Low	○	High	●	All but overcrossing will have good vis. From adj. habitat
5. Less human exposure	Medium	◐	Medium	◐	Low	○	No Score		Increasing level of facilities and activity to the south
6. Species of special status	Low	○	Low	○	Low	○	Medium	◐	Potential access for semi-aquatic species at #4 and Lexington culvert
Functionality for People									
1. Proximity to Ridge Trail connections	Medium	◐	Medium	◐	Medium	◐	Medium	◐	First 3 have close but challenging connections; #4 a little more distant
2. Appropriate dimensions	High	●	High	●	High	●	High	●	All alts could be adequate for trail access
3. Non-motorized recreation and transportation connections	No Score		No Score		No Score		High	●	First 3 have no potential to connect to public road on west
4. Emergency and maintenance vehicle access	No Score		No Score		No Score		High	●	As above; #4 could have relatively direct access
Constructability/Cost									
1. Location with fill or cut embankments	Medium	◐	High	●	Medium	◐	Medium	◐	Only Trout Creek appears to have ample depth/ht of embankment
2. Environmental impact	Medium	◐	Medium	◐	High	●	Medium	◐	#1 and 2 involve riparian habitat; #4 is close to the reservoir shore
3. Soils and geology feasible for construction	Medium	◐	High	●	High	●	High	●	#1 Ravine has landslide potential; others relatively unconstrained
4. Can be designed to meet standards	High	●	High	●	High	●	High	●	All can be designed to meet Caltrans standards
5. Feasible construction staging and traffic impact	Medium	◐	High	●	Medium	◐	High	●	#1 and #3 have significant constrints for access on west side
6. Minimal impact on existing facilities and operations	High	●	Medium	◐	Medium	◐	High	●	#2 and #3 would require crossing and possibly modifying existing facilities
7. Lower relative cost (low cost = high score)	Medium	◐	Medium	◐	Low	○	High	●	An OC will cost more than an UC; alt #4 is less constrained than others
Future Decision Factors									
1. Project Readiness/Funding identified									
2. Access Permission/ Ownership/Right of Way									
3. Maintenance and Operation Arrangements									
4. Public Support									

Appendices:

Appendix A: Trail Connection Options and Criteria

Contents

Figures

Tables

Appendix A: Trail Connection Options and Criteria

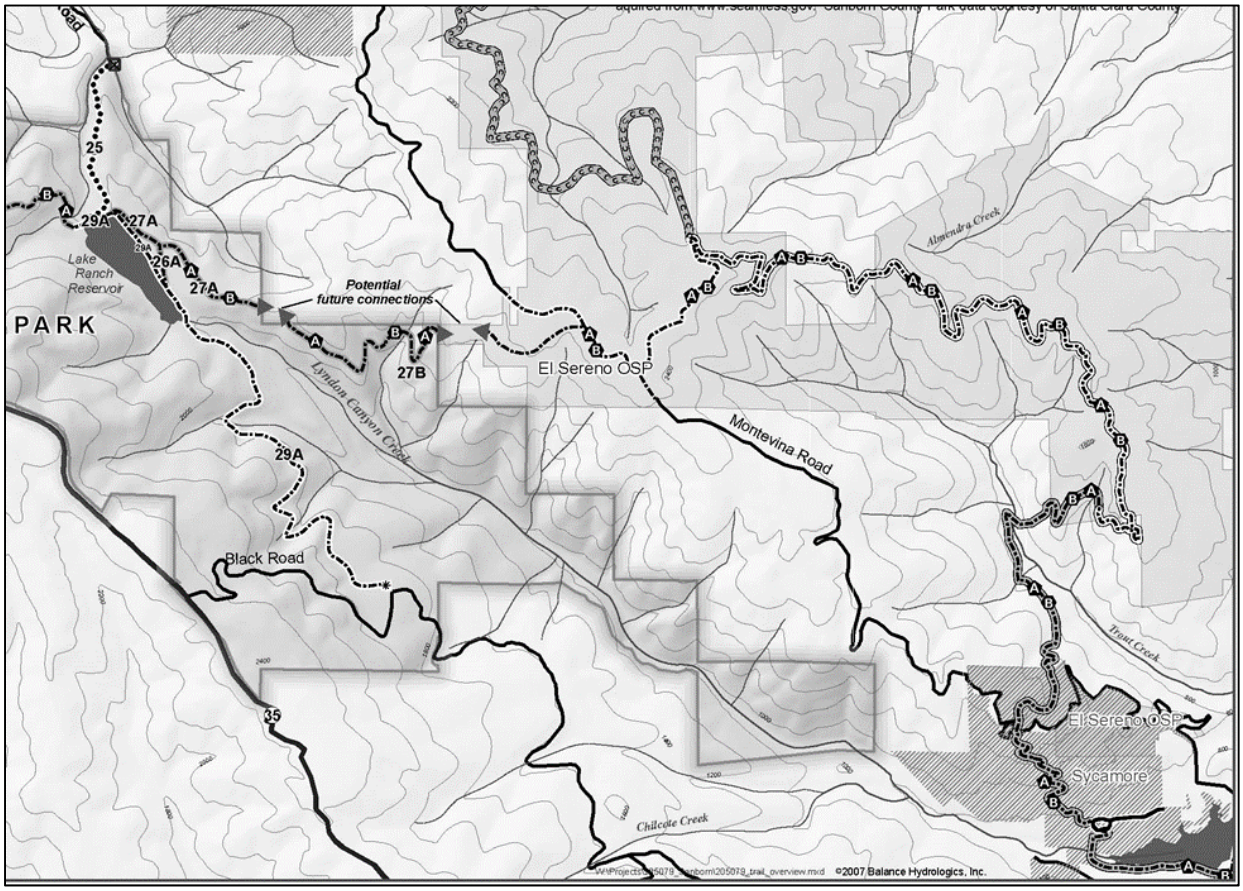
The area under study for the wildlife crossing is also the location of a significant gap in the Bay Area Ridge Trail (Ridge Trail) system and the Juan Bautista de Anza National Historic Trail (Anza Trail), which generally shares the alignment with the Ridge Trail in this vicinity. The Ridge Trail currently exists as a dedicated/designated trail in Sanborn Canyon County Park, to the northwest of the segment of Highway 17 near Lexington Reservoir, and to the east of Lexington Reservoir along the Priest Rock Trail in Sierra Azul Open Space Preserve.

Resolving the connecting route(s) for the Ridge Trail and Anza 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. Designing the improvement of Alma Bridge Road as a trail connection is also not part of the Study, but it is important to the ultimate functionality of the Ridge Trail crossing, and potentially might improve wildlife access to the crossing, and thus is included at an assessment level.

1. Ridge Trail Route Connection Options

The future route of the Ridge Trail from Sanborn County Park to Highway 17/Lexington Reservoir is not fully resolved. Various routes have been studied, as discussed in Chapter 4 of the Study, including a route down Lyndon Canyon, which was found to involve a very steep riparian canyon that would require numerous creek crossings; a route from the Sanborn County Park Master Plan (see Figure 1) across Lyndon Canyon, involving a 200 foot bridge, onto El Sereno Ridge in Midpen's El Sereno Open Space Preserve, involving building a trail up extremely steep slopes to the top of Montevina Road to the north, then across Trout Creek Canyon through the Sycamore area of El Sereno – a portion that is not yet open to the public, and finally along the south side of the arm of Lexington Reservoir that lies west of Highway 17.

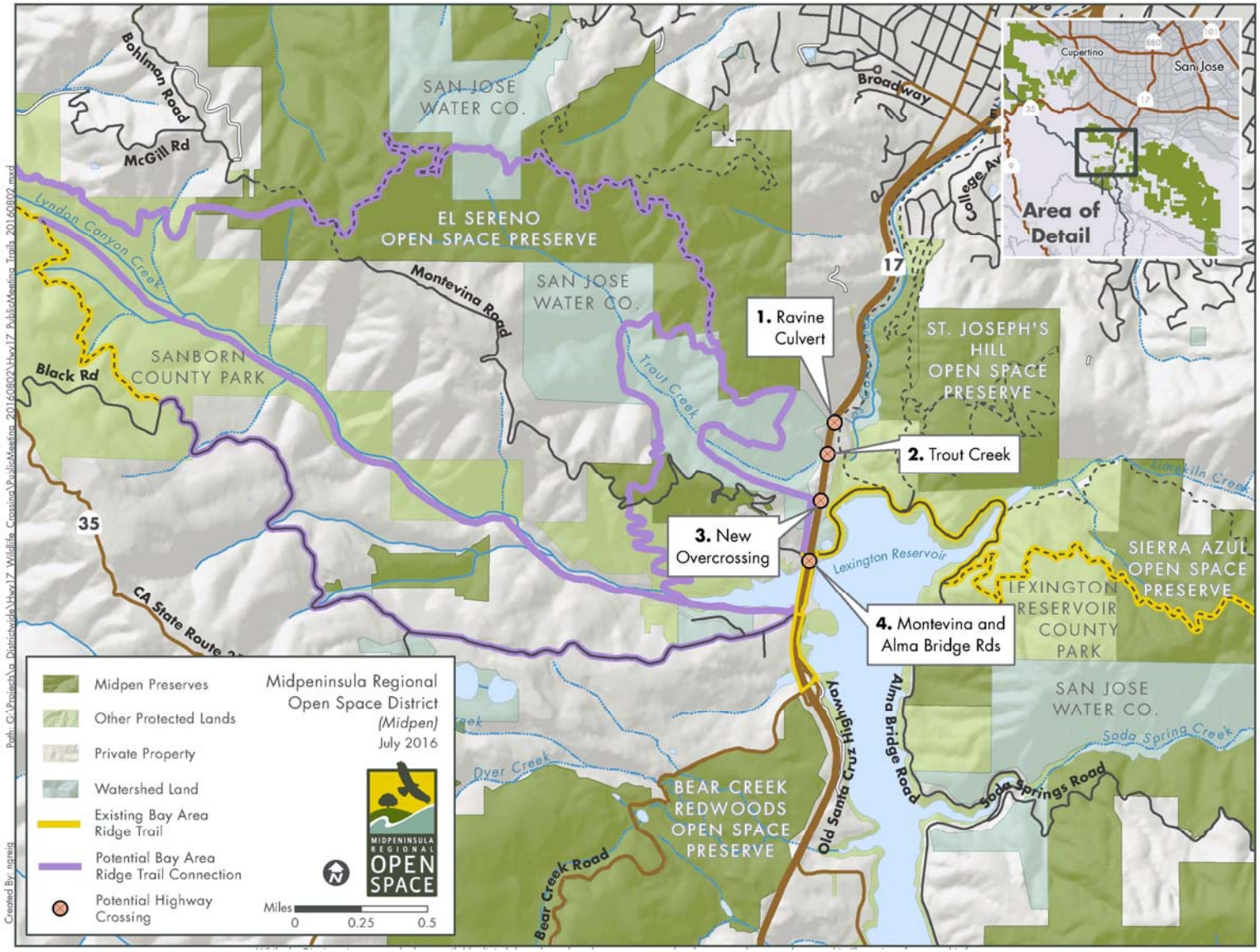
Figure 1: Ridge Trail Route Study from Sanborn County Park Trail Master Plan



The more recent concept for the west side Ridge Trail connection is to use the east-west parts of the above-described route, but continue further east on El Sereno Ridge and then south to cross Trout Creek closer to Highway 17, and potentially following the existing bench in the cut slope west of Highway 17 south of Trout Creek to access Montevina Road where it parallels 17 (Bern Smith, Trail Director, Bay Area Ridge Trail Council, oral communication, April 2016). Both routes would require permission to cross private land owned by the San Jose Water Company (SJWC). The eastern portion of this connection passes into the primary wildlife movement corridor. Ideally if this occurred some separation would be maintained from any future wildlife crossing. Figure 2 shows the routes that have been studied.

Although accommodating the Ridge Trail and Anza Trail is a primary goal for the recreational trail crossing, it would also connect nearby park and Preserve facilities, as well as local trails that are severed by Highway 17. It would be highly desirable that the trail crossing accommodate the widest feasible range of non-motorized transportation, 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 Ridge Trail and Anza Trail connection are combined with the criteria for a crossing that accommodates the full range of non-motorized transportation (see Chapter 4 of this Appendix for applicable criteria).

Figure 2: Study Area with Ridge Trail Route Connection Options



2. Potential West Side Trail Connections

There are two existing structures that could potentially serve as Ridge Trail crossings of Highway 17: the Lexington Culvert and the Bear Creek Road Overcrossing. The Lexington Culvert is described in detail in the main Feasibility Study report (See Chapter 7.1). If cleared of silt, provided with more effective drainage to prevent standing water, and equipped with a boardwalk, this culvert could function as a trail undercrossing, though it would be marginal for equestrian use, probably requiring that horses be led, and requiring that the horses be comfortable with passing through this long culvert. As stated previously SCVWD is not comfortable with this culvert being designated as an official public trail connection.

The Bear Creek Road Overcrossing is minimally functional as a crossing for hikers and mountain bicyclists, and although technically it is designed to accommodate horses (with the requirement that they be 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. More physical separation from high speed traffic is desirable for all users.

Both the overcrossing and the Lexington Culvert are also quite distant from the more recently envisioned Ridge Trail connection at Trout Creek or Montevina Road on the west, or Alma Bridge Road on the east, making these crossings less preferred since trail users prefer direct crossing routes. , However, an existing connecting trail on the east side of Highway 17 (an extension of the Los Gatos Creek Trail) and room to construct a trail in the ROW of Montevina Road on the west side could potentially be utilized to establish a paved trail connection tied into the existing structures.

Two new trail crossing locations were identified and assessed as part of the feasibility study: 1) an overcrossing north of the existing water storage tank on the east side of the highway; and 2) an undercrossing between Montevina Road and Alma Bridge Road south of the water storage tank (see Figure 3). These potential crossings were sited to take advantage of the existing grades on either side of Highway 17. The benches on the cut slope west of the highway that are envisioned as potential trail connection routes for either of the potential new crossings are relatively wide and level, and would physically accommodate construction of a trail if approval from Caltrans could be obtained (see Figure 4). However, there is an intervening wooded canyon between the cut slope closest to Trout Creek Canyon, and the cut slope closest to Montevina Road. This area is owned by SJWC and access permission would also have to be obtained for this connection. The slopes descending from the benches above the highway into this canyon are steep, and the slope descending from the bench above the highway to Montevina Road is even steeper. A "back county" trail across these slopes may be feasible, but a paved connection that meets the above standards is not likely to be feasible.

Montevina Road extends for approximately 0.53 mile along the west side of Highway 17 from Bear Creek Road, north past Black Road, to the location where Montevina Road turns west up the ridge to a series of residential properties. It includes space in the road ROW this entire distance to create an unpaved "single track" trail or potentially a paved Class I trail. It offers efficient trail connections from the planned trails in Bear Creek Redwoods Open Space Preserve, a Ridge Trail connection along either the south or north sides of the arm of Lexington Reservoir, or potentially from Trout Creek Canyon via discussed above. There are significant opportunities and constraints associated with potential trail alignment. Therefore, none would be considered the preferred alignment and this consideration will not

influence the selection of a preferred crossing alternative. Additional study and analysis of the western trail connection will occur in conjunction with future trail development and will involve landowners and community stakeholders.

Figure 3: Alternative Ridge Trail Crossing and Connection Locations

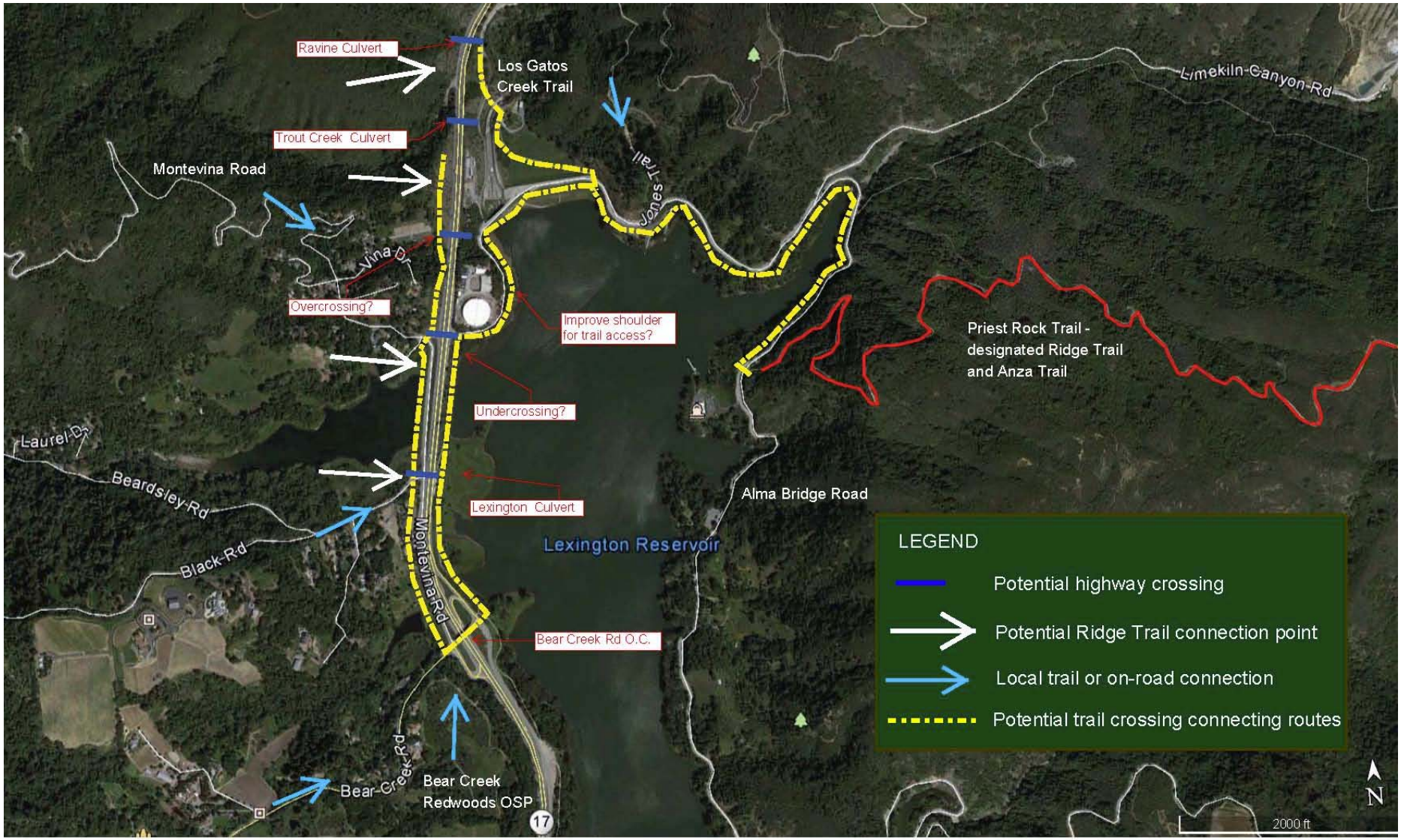
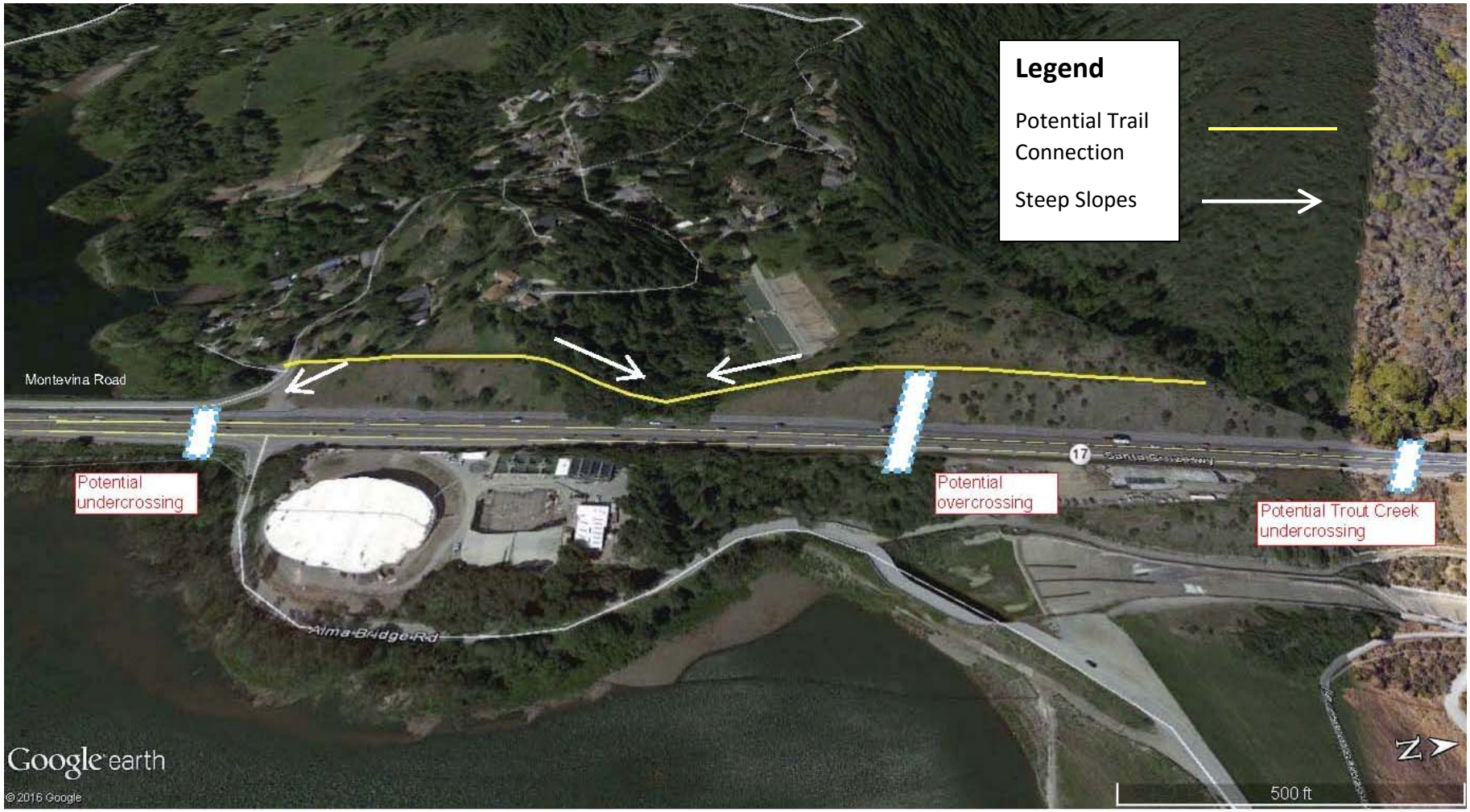


Figure 4: Potential Ridge Trail Connection on West Side of Highway



3. East Side Trail Connection – Alma Bridge Road

The barrier presented by the reservoir and the steep, rugged terrain to the north dictate that access to the existing eastern portion of the Ridge Trail/Anza Trail and to the Los Gatos Creek Trail and other trails in St. Joseph's Hill OSP and Sierra Azul OSP must follow Alma Bridge Road.

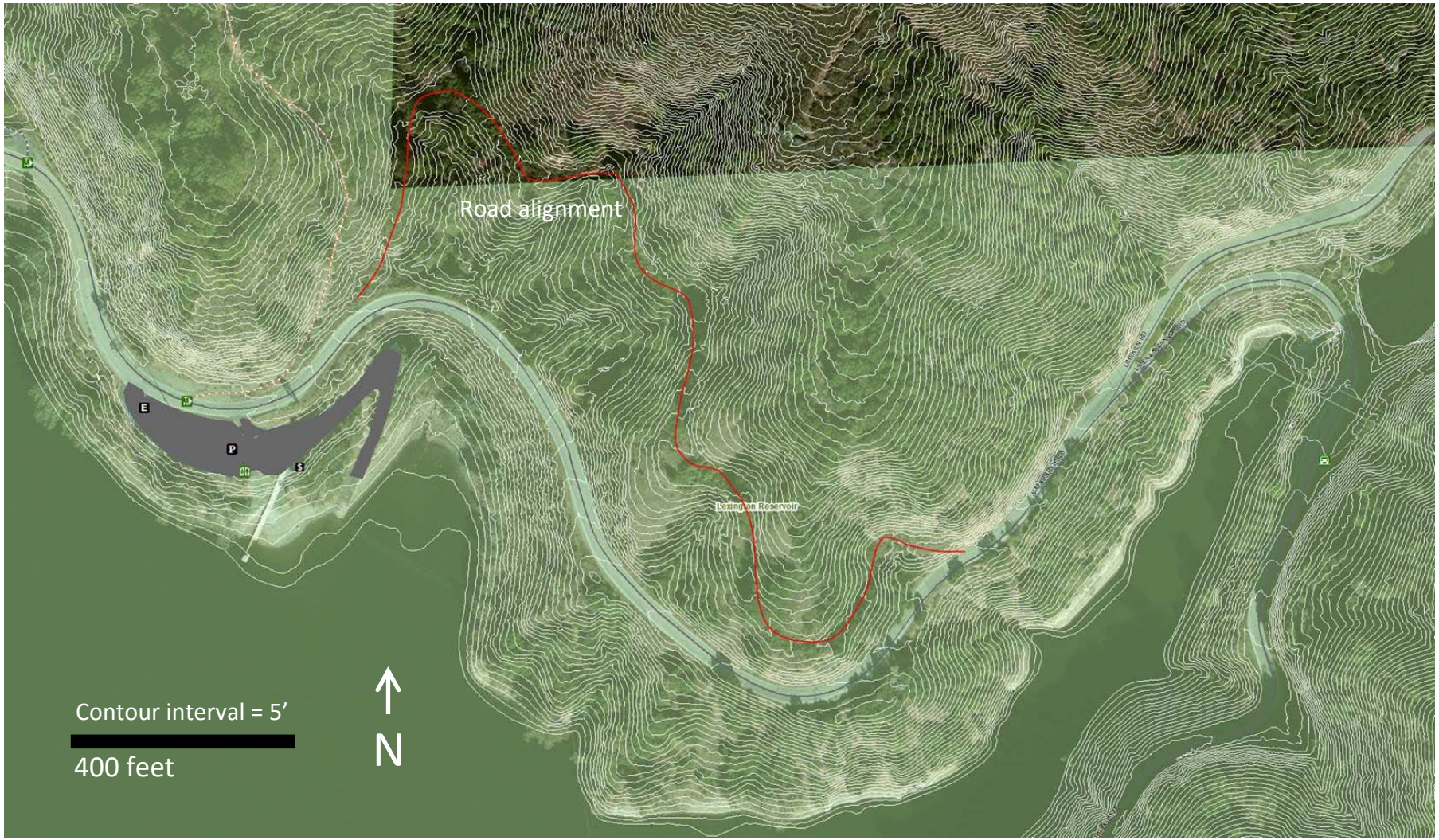
There is an existing unpaved road/trail in Lexington County Park just east of and parallel to Alma Bridge Road extending from where the road turns east from the highway south to the Bear Creek Road overcrossing. This is designated as an extension of the Los Gatos Creek Trail and part of it would serve as the access to the Montevina – Alma Bridge Road Undercrossing currently being studied. It would be desirable in any case that this trail be paved to accommodate road bicyclists travelling to and from the main Los Gatos Creek Trail to the overcrossing and to Old Santa Cruz Highway, and to the trail undercrossing if it is constructed.

Alma Bridge Road is a two lane County-maintained road that winds along the north and east sides of the reservoir, including on a bridge across the spillway. On the east side of Highway 17 there is a separate lane from the Bear Creek Road Overcrossing north to Alma Bridge Road that acts as an on-ramp for the overcrossing and an off-ramp to Alma Bridge Road.

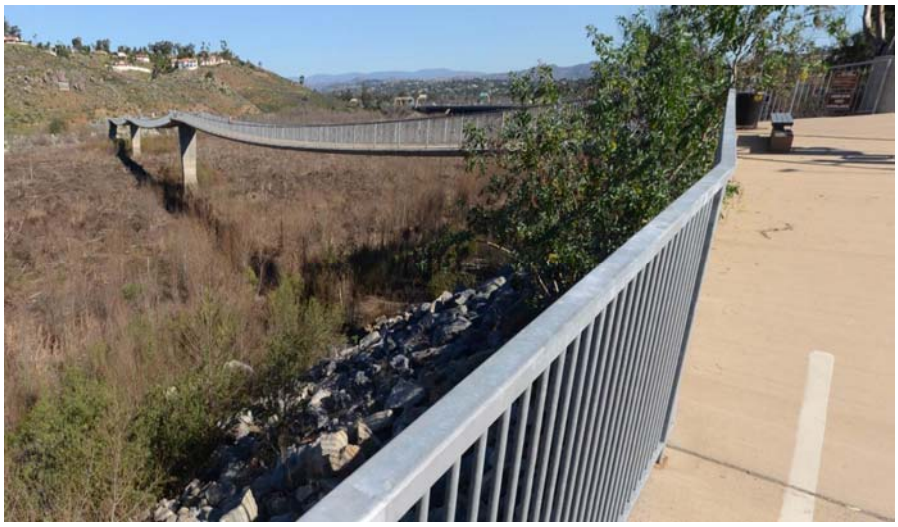
This road is a challenging route for trail users or road bicyclists because it is narrow and winding, often with little or no shoulder, and with slopes dropping off steeply from the hills above and to the reservoir below. The challenge is compounded by heavy truck traffic generated by the Lexington Quarry to the northeast of the reservoir, local residential and recreational traffic, and periodically construction traffic for work related to the dam and water facilities. The current water treatment plant improvement project of SJWC includes frontage improvements that will provide some additional shoulder on the north and west sides, but this is not intended to address recreational trail traffic. The road is a popular route to access parking areas for Lexington Reservoir County Park east of the dam, which also provides staging for access to the Los Gatos Creek Trail to the west, and Midpen's St. Joseph's Hill OSP to the north and Sierra Azul OSP and the continuation of the Ridge Trail to the east on the Priest Rock Trail.

There is a potential opportunity to bypass part of Alma Bridge Road on an old graded road alignment that exists in St. Josephs Hill Open Space Preserve (see Figure 5). This alignment is approximately 0.4 miles long and has average gradients of approximately 10% and has a steep drop off at the eastern end, where Alma Bridge Road was apparently constructed or widened, severing the old road connection. It might be feasible to develop a trail for hikers, horses and mountain bikes, but it would be more challenging to improve the alignment for road bicyclists, which would require a paved trail that might not be compatible with the open space setting, require more extensive construction, and would still feature gradients that would be challenging for some bicyclists. This alternative has a significant constraint in that it would require two road crossings to connect to the other segments, but one of the crossings would be desirable in any case to connect to the Jones Trail.

Figure 5: Old Graded Road in St. Josephs Hill Open Space Preserve



An alternative concept for bypassing part of Alma Bridge Road was discussed at a meeting with Santa Clara County Parks (J. Falkowski, Santa Clara County Parks, oral communication, April 2016): creating a floating bridge or suspension bridge across the arm of Lexington Reservoir from the boat launch ramp to north of the rowing club facility. An example of a suspension trail bridge across an estuary in San Diego is shown below, along with an example of a floating bridge made with aluminum marina and float components. These options would require construction of accessible connections to the road at each end, which is accounted for in the assessment. They would probably not be viable structures for horses to use. The design of any such structures would need to take into account the fact that reservoir levels fluctuate considerably from year to year and during each year as rainfall occurs and releases are made for water supply uses.



Trail suspension bridge in San Diego County (photo J. Falkowski)

Example of a floating prefabricated aluminum bridge (photo: the Maadi Group, Quebec, Canada)

3.1. Assessment Objectives

The improvement of Alma Bridge Road as a trail connection is not part of the Highway 17 wildlife or Ridge Trail crossing project, but it is important to the ultimate functionality of the trail crossing, and potentially might improve wildlife access to the crossing, and thus is included in this Feasibility Study at an assessment level.

The need for a better trail connection alternative to using the shoulder of Alma Bridge Road in the area near the SJWC water tanks and treatment plant was discussed with Santa Clara County Roads and Airports Department staff and SCVWD staff (D. Boyd and R Salinas, County Roads Department; S. Tippets, SCVWD; oral communication, May 2016) including the concept of a trail at an elevation below the road but above the high water level, in an area forested with eucalyptus trees. A portion of Alma Bridge Road has a *de facto* trail – a maintenance road along the dam. Other portions have varying shoulder widths and challenges for widening as discussed below.

3.2. Assessment Methodology

The condition of the road shoulders and slopes within the Alma Bridge road ROW were assessed from Highway 17 to the Priest Rock Trail. The assessment focused on the reservoir side of the road, because this is where most of the opportunity space is, and because trail users are likely to prefer to be on the water side of the road. This area is owned by Santa Clara Valley Water District and is further encumbered by easements and agreements held by Santa Clara County Parks and others. Access permissions and agreements would have to be obtained for this connection. The assessment looked at some options for bridges across the reservoir that would eliminate part of the improvements along the roadway, as explained below.

The objective would be to create a separate Class I paved trail at least 8 feet wide with grades that would be ADA compliant. Ideally the trail would be separated from the roadway by a guardrail and/or be located down the slope with a vegetated buffer between the trail and the road. Improving trail access along Alma Bridge Road would be a significant project in its own right, but it would be very beneficial in completing the regional trail connection and supporting the anticipated higher levels of recreational trail and non-motorized transportation use in the Lexington Basin.

Trail Improvement Condition Types

The shoulders or ROW adjacent to the road were classified into four categories based on the challenge of creating a trail parallel to the road in the road ROW or connecting to bridges across the reservoir, as described below, with colors corresponding to the segment lines on Figure 5.

Type 1 – Green: Has an existing trail approximately 8' wide. This only occurs at the maintenance road along the dam that doubles as trail. There is a "pinch point" at the control structure shown in the photo. A retaining wall would be needed to create a full width bypass.

Type 2 – Yellow: Has space to construct a trail – relatively level wide turnouts, or areas where there is a berm adjacent to the road that could be graded down to create at least 8 feet of space for a trail. Some of these also function for maintenance access to water facilities, and this would have to take precedence over trail access. Some are pullouts or roadside parking. The trail would reduce the amount of available parking.

A trail could potentially be routed through the existing County parking lot if the parking was reorganized

Typical Type 2 segment: assumes the berm could be graded down to create more space

Type 2 segment where trail would displace roadside parking

Type 3 – Orange: Has narrow shoulder and steep slope (approx.2:1 to 1:1) beyond, often with guardrail. Creating a trail would require constructing a retaining wall or cantilevered surface. Many portions are heavily wooded. Near the water treatment plant eucalyptus trees would have to be removed to create space for the trail; in some other areas native trees would need to be removed.

Typical Type 3 segment east of the dam

More challenging Type 3 segment east of the dam

Typical Type 3 segment west of the dam

Type 4 – Red: A nearly vertical drop-off or washout that would have to be repaired, or a bridge with no shoulder; a parallel trail bridge or sidehill viaduct would have to be constructed.

Type 4: Drop-off at culvert just east of where Alma Bridge Road connects to Highway 17

Type 4: Bridge over the spillway: a parallel bike/pedestrian bridge would be required

Type 4: Large culvert at Limekiln Creek

3.3. Assessment Results

The assessment is conceptual, based on general information on site conditions. The cost and feasibility of the trail improvements would depend on the design objectives and standards, and on more specific evaluation of site conditions. The alternatives included scenarios where a 5' wide unpaved trail would be constructed east of the County Parks parking lot at the boat launch ramp – near the termination of the Los Gatos Creek Trail and the Jones Trail through St. Josephs Hill Open Space Preserve.

Figure 5 shows the assessment map and Table 1 summarizes the results of analysis of the alternatives, which include four basic options, with sub-options for an unpaved trail east of the boat launch parking:

1. A route to create a trail the entire distance along Alma Bridge Road to the Priest Rock Trail;
2. A route to create a trail along those portions of Alma Bridge Road that would connect to the Priest Rock Trail via a floating bridge or suspension bridge from the boat launch ramp to near the Los Gatos Rowing Club;
3. A route to create a trail along those portions of Alma Bridge Road that would connect to the Priest Rock Trail via a fixed 240 foot bridge to span the narrower arm of the reservoir.
4. A route to create a trail along Alma Bridge Road to the Priest Rock Trail, except that the old graded road in St. Josephs Hill OSP would be used as a bypass for segments I – M (see Figure 5).

An alternative with a greater extent in the higher constraint categories (3 and 4), will be more constrained and thus expensive to construct. The unpaved trail categories 2U and 3U will be much less expensive to construct than their paved counterparts. Type 4 is assumed to require a similar bridge in either the unpaved or paved scenarios.

Table 1 illustrates that, compared to Alternative 1, trail improvement the entire way on Alma Bridge Road, Alternative 3, the 240' bridge alternative, eliminates 1607 feet (0.3 miles) of trail construction. The bridge would likely be significantly less expensive than that extent of paved trail, but more expensive than the equivalent unpaved trail, so it has more benefit if a Class I path the entire distance is desired.

Alternative 2, the "Floating Bridge" would likely be significantly more expensive than the other alternatives due to the length of that structure.

Compared with Alternative 1b, Alternative 4, a bypass of part of Alma Bridge Road using the old graded road in St Josephs Hill OSP, is interesting, because it eliminates a significant amount of Type 3U heavy construction for presumed Type 2U light construction. Alternative 4 could potentially be combined with Alternative 3, featuring the 240' bridge.

These assessment results are not intended to result in a decision, but are provided to support further studies of the alternatives. The GIS maps and Excel spreadsheets created for the assessment should be useful tools for this purpose.

Table 1: Alma Bridge Road Trail Improvement Assessment Summary

		Type 1	Type 2 U	Type 2	Type 3 U	Type 3	Type 4		
		Trail Exists	Light Construction Unpaved	Light Construction Paved	Heavy Construction Unpaved	Heavy Construction Paved	Bridge Required	Total Lineal Feet	Total Miles
1	**Alma Bridge Road Trail Improvements - Highway 17 to Priest Rock Trail**								
a	Class I Path Entire Way	527		1,799		4,935	341	7,602	1.4
b	With 5' Unpaved Trail beyond Parking Area	527	1,114	685	3,291	1,644	341	7,602	1.4
2	**Alternative with Floating Bridge from Boat Launch to Rowing Club**								
a	Class I Path Entire Way	527		1,576		1,762	1,366	5,231	1.0
b	With 5' Unpaved Trail beyond Parking Area	527	689	887	118	1,644	1,366	5,231	1.0
3	**Alternative with 240' Fixed Bridge at Reservoir Arm**								
a	Class I Path Entire Way	527		1,410		3,146	516	5,599	1.1
b	With 5' Unpaved Trail beyond Parking Area	527	725	685	1,502	1,644	516	5,599	1.1
4	**Alternative with Old Graded Road Bypass**								
a	Class I Path Entire Way (not applicable)								
b	With 5' Unpaved Trail beyond Parking Area	527	2,752	685	2,070	1,644	341	8,019	1.5

Figure 6: Alma Bridge Road Trail Improvement Assessment

4. Standards for Bicycle and Pedestrian Connections

Per the Caltrans Highway Design Manual (HDM), Chapter 1000 a two-way bike path shall have a minimum 8-ft wide paved travel way and minimum 2-ft wide shoulders adjacent to the traveled way of the path when not on a structure. The HDM requires a minimum 2-ft horizontal clearance from the paved edge of a bike path to obstructions. Ideally three feet should be provided. Adequate clearance from fixed objects is needed regardless of the paved width. If a path is paved contiguous with a continuous fixed object (e.g., fence, wall, and building), a 4-in white edge line, 2 feet from the fixed object, is recommended to minimize the likelihood of a bicyclist hitting it. The clear width of a bikeway in or on a structure (e.g., an undercrossing or overcrossing) between railings shall not be less than 10-ft wide, and it is desirable that the clear width of structures be equal to the minimum clear width of the path plus shoulders (i.e., 14 feet wide total).

Santa Clara Valley Transportation Authority (VTA) Bicycle Technical Guidelines encourage a minimum effective trail width of 10 ft.

According to the HDM, the target design speed for a trail overcrossing or undercrossing is 20mph, which corresponds to a minimum curve radius of 90 ft. These curve design speeds may not be achievable or desirable for the approaches to the crossing given the site constraints and alignments considered in the Study. The design of turns should also factor in the degree lean of angle as identified by the American Association of State Highway Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities.

According to ADA standards, a path with a slope greater than 5% is defined as a ramp. The maximum allowable slope is 8.33% and ramps must provide a level landing for every 30 in. of elevation rise. Furthermore, Section 1023.6 (currently Section 1133B.7.6) in Part II of Title 24 California Code of Regulations (CCR) states that walks with continuous gradients (slopes between 2% and 5%) shall have level areas (2% max) at least 5 ft. in length at intervals of at least every 400 ft.

Appendix B: Existing Culvert Plans and Photos

There are a total of six significant Caltrans-owned drainage culverts that pass under the highway in the Study Area, plus one low-elevation cross-connection culvert between the main body of Lexington Reservoir and the arm of the reservoir to the west of the highway that is part of the reservoir facilities rather than the highway. These are shown on the following 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:

1. At an unnamed drainage, Station 188+82 – a 30" diameter by 252' Reinforced Concrete Pipe (RCP).
2. At Black Creek, Station 203+48 – a 48" diameter x 464' RCP.
3. 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.
4. A very long low-elevation reservoir cross-connection that is normally below the water line even when the level is low.
5. At Montevina and Alma Bridge Roads, Station 235+37.5 – a 30" diameter x 136' RCP.
6. The "Trout Creek Culvert", Station 250+25 – a 4' x 4' x approximately 333' Concrete Box Culvert.
7. The "Ravine Culvert", Station 255+33 - a 4' x 4' x approximately 372' Concrete Box Culvert

In addition, there is another Highway 17 culvert crossing to the south of the Study Area in the Bear Creek Redwoods Open Space Preserve at Briggs Creek. This could only be visited by staff from the Preserve side. There is a trash rack at the inlet that may deter access by wildlife. The outlet isn't accessible because it is off a private road, but based on Google imagery it appears to terminate in a concrete-lined retention pond. The inlet trash rack (and associated drop off rom the rack into the culvert) and pond at the outlet appear to limit its potential for wildlife. This culvert has not been formally studied.

Site photos of the more significant existing culverts are followed by the as-built plans.

Briggs Creek Culvert

This concrete pipe culvert has an opening roughly 4 feet wide by 8 feet tall. It is not shown on the as-built layout and plans. It located approximately ½ mile south of the Bear Creek Road/Alma Bridge Road overcrossing. It has a trash rack on the inlet side and discharges into a retention pond on the outlet that may limits its potential for wildlife use.

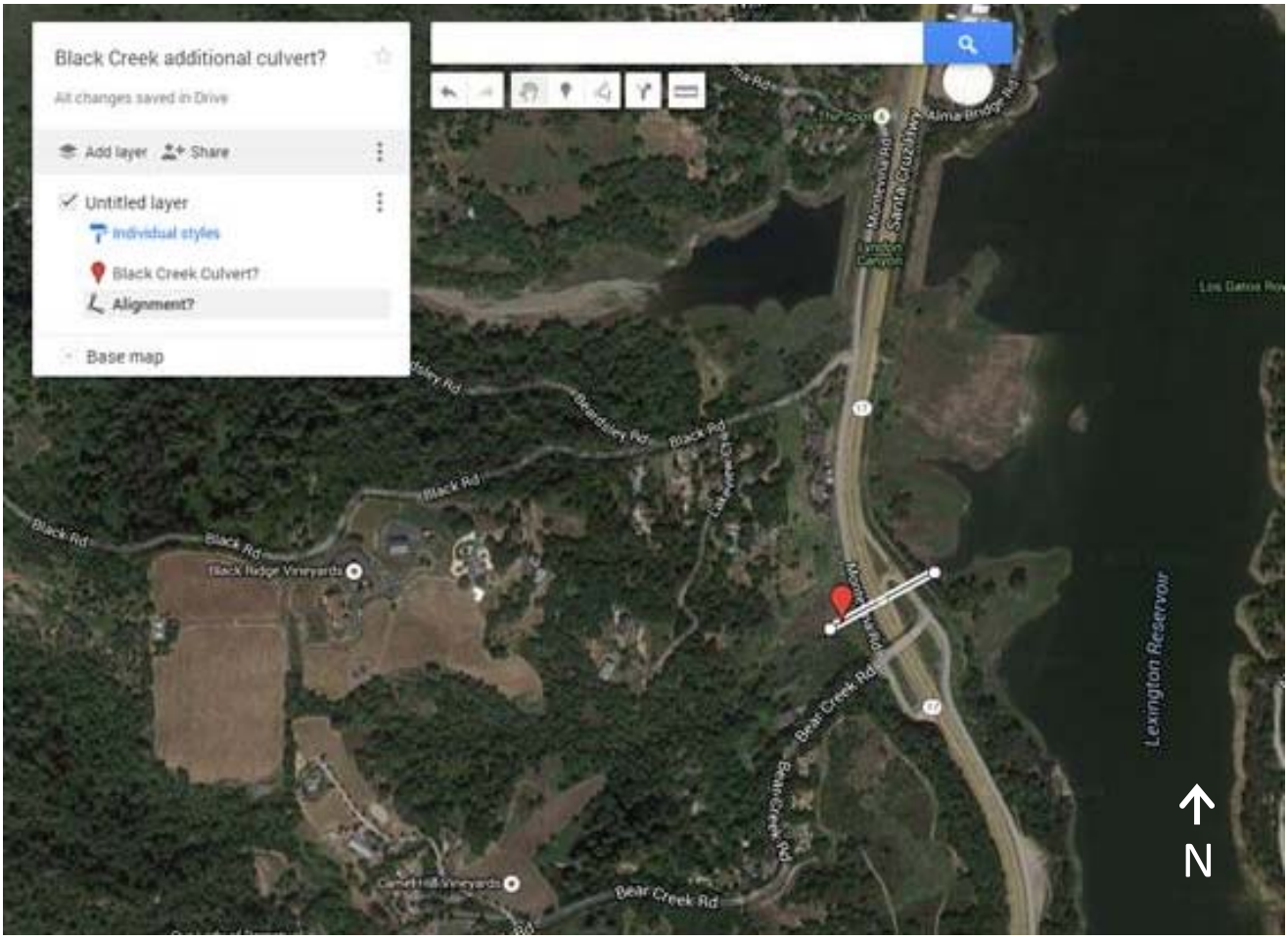
Approximate Culvert Location

Overview showing pond at outlet on east

Briggs Creek culvert inlet

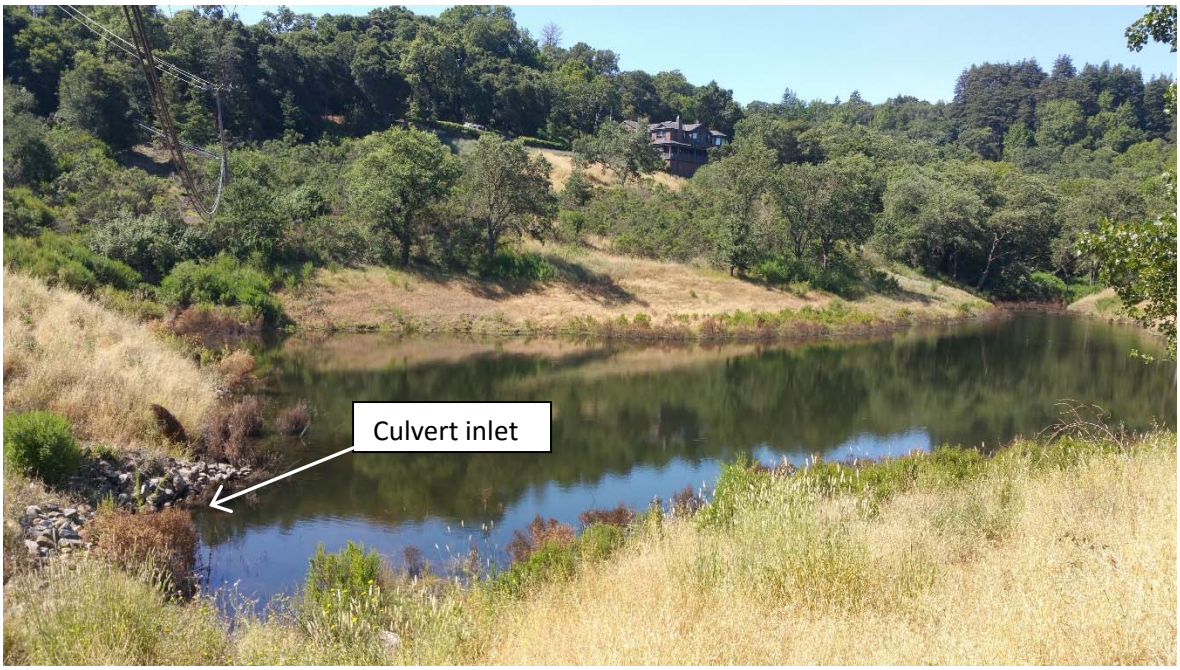
Black Creek Culvert

Black Creek culvert is located just north of the Bear Creek Road/Alma Bridge Road overcrossing. This is a 48" diameter reinforced concrete pipe that leads to a small arm of the reservoir. An accumulation of debris at the inlet may currently limit its use by small wildlife – see photos on following page.

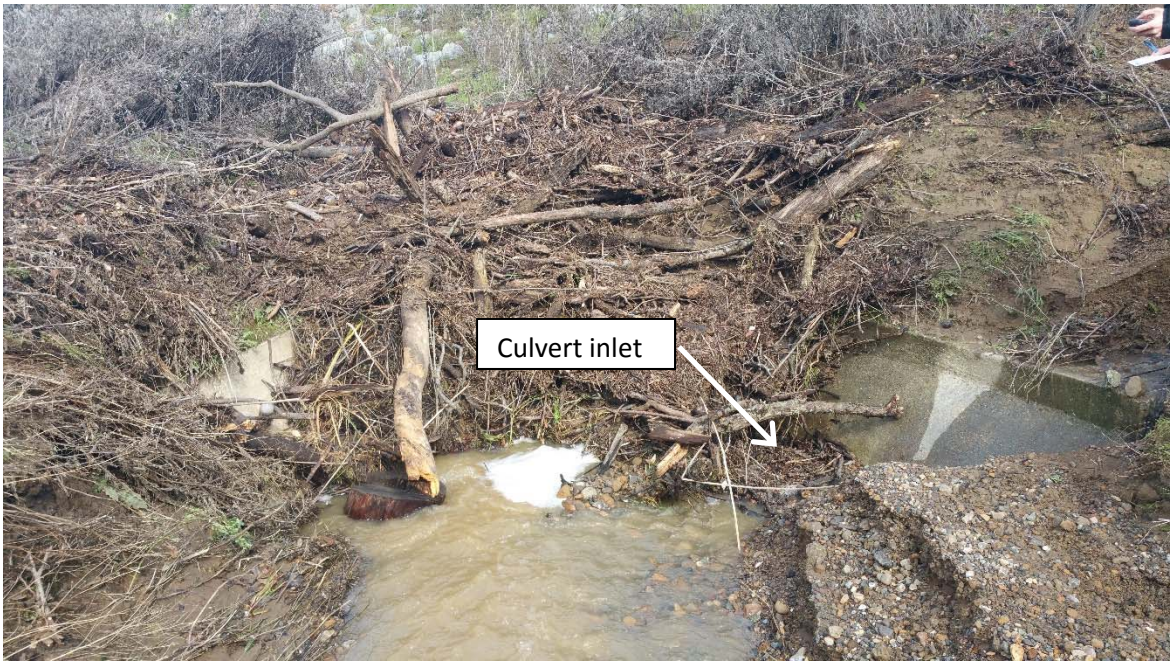


Approximate alignment of Black Creek Culvert

Black Creek Culvert, West Side, June 9, 2016



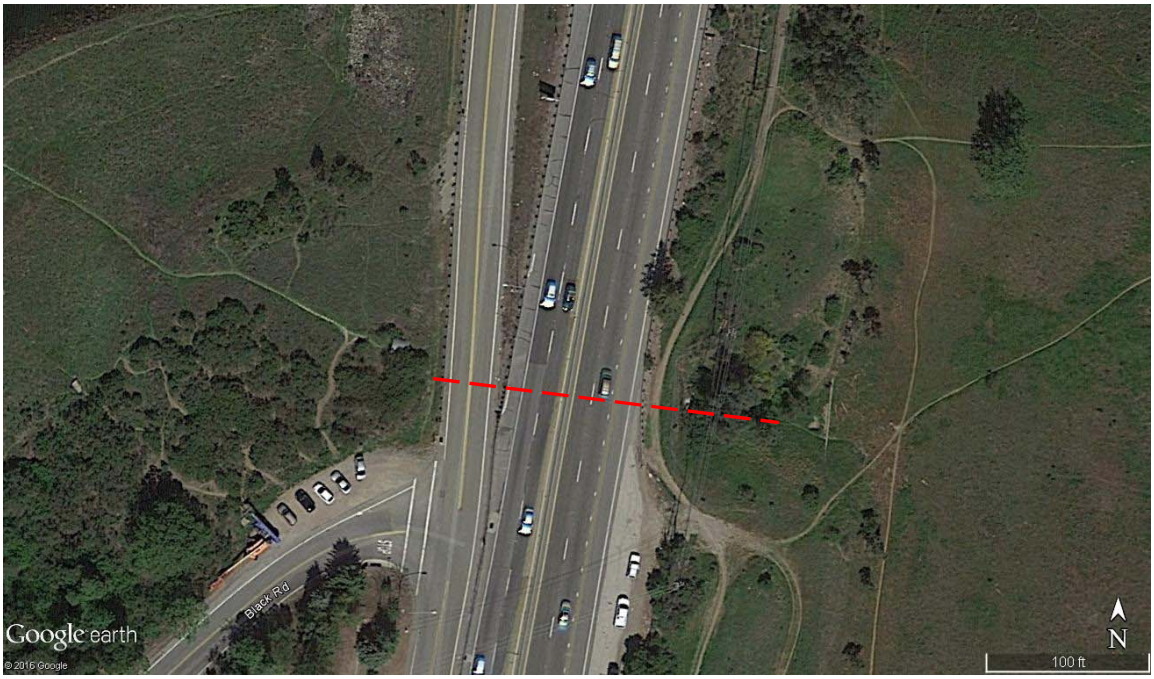
Black Creek Culvert Inlet, March 7, 2016



Lexington Culvert

This 10’ diameter corrugated steel pipe culvert is located just north of Black Road.

Lexington Culvert Location



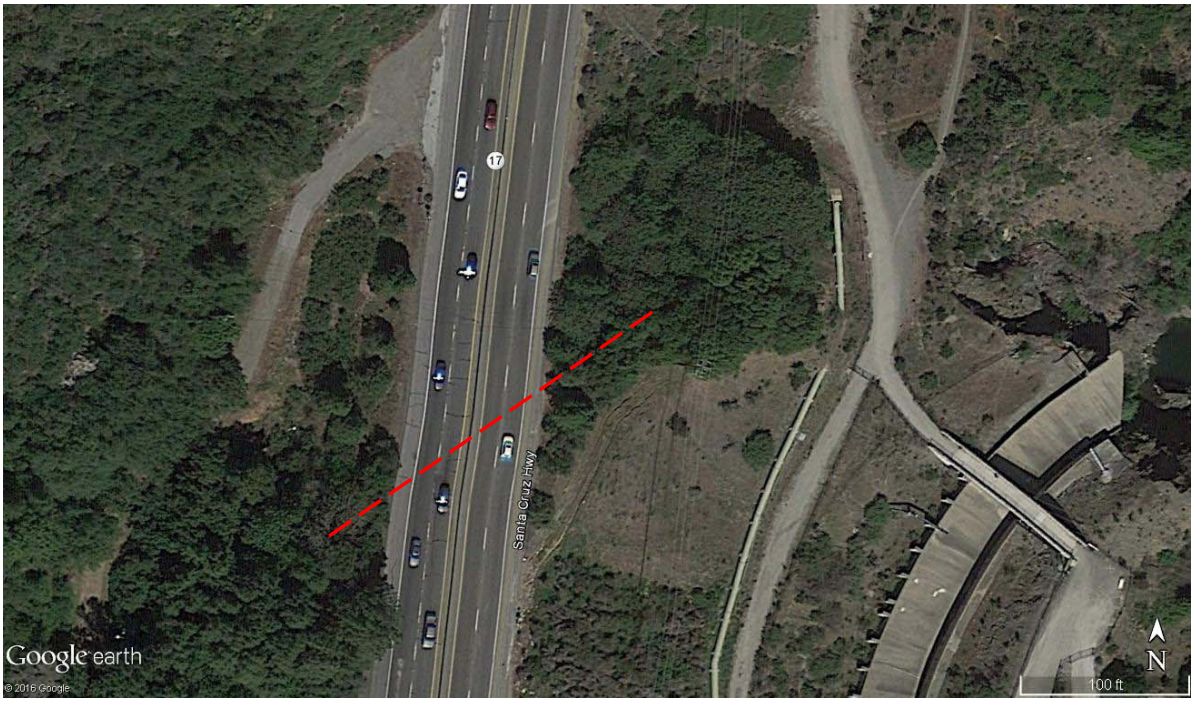
Lexington Culvert Inlet

Lexington Culvert Outlet

Path to Lexington Culvert outlet – vegetation could be thinned to improve wildlife access

Trout Creek Culvert

This 4’ x 4’ concrete box culvert is located in a canyon to the north of the Lexington Reservoir Dam, approximately paralleling the spillway.



Inlet of Trout Creek Culvert west of Highway 17

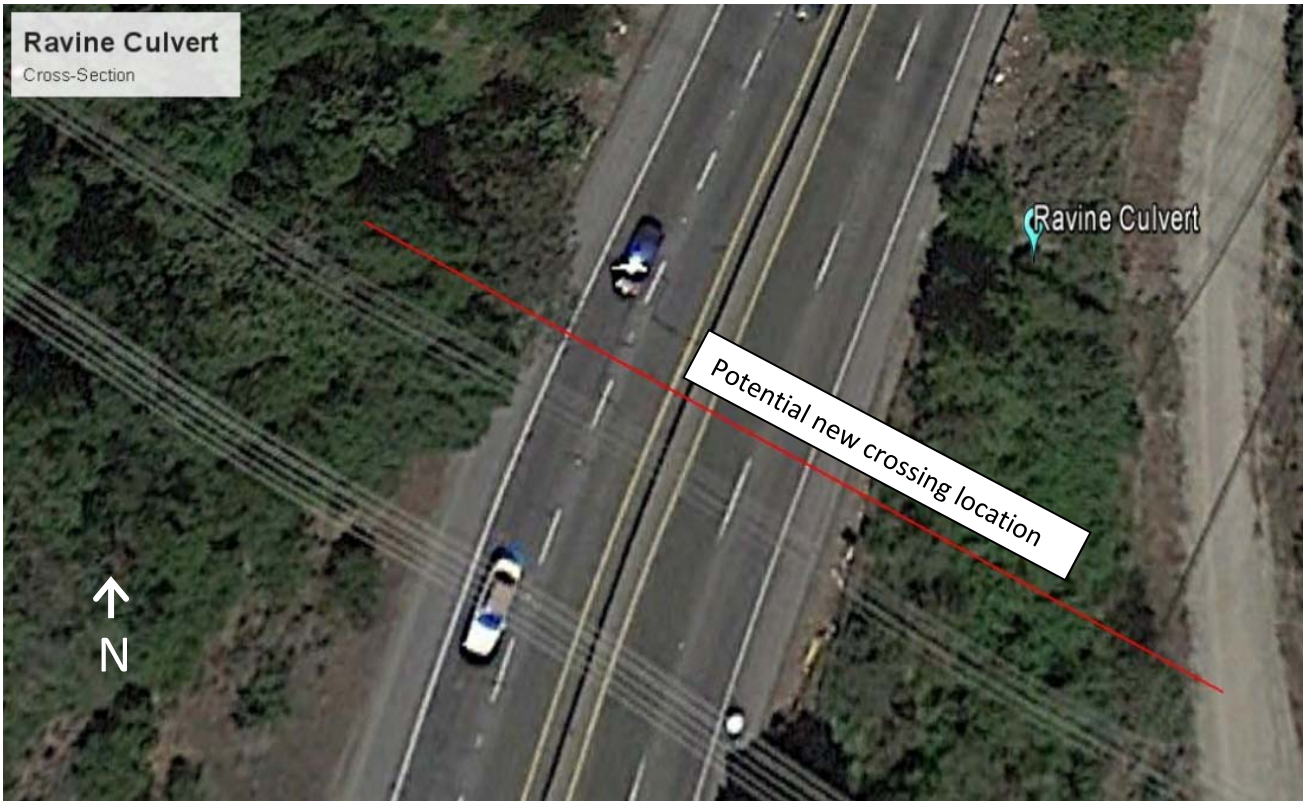
Trout Creek Culvert outlet

“Daylighted” portion of Trout Creek east of outlet

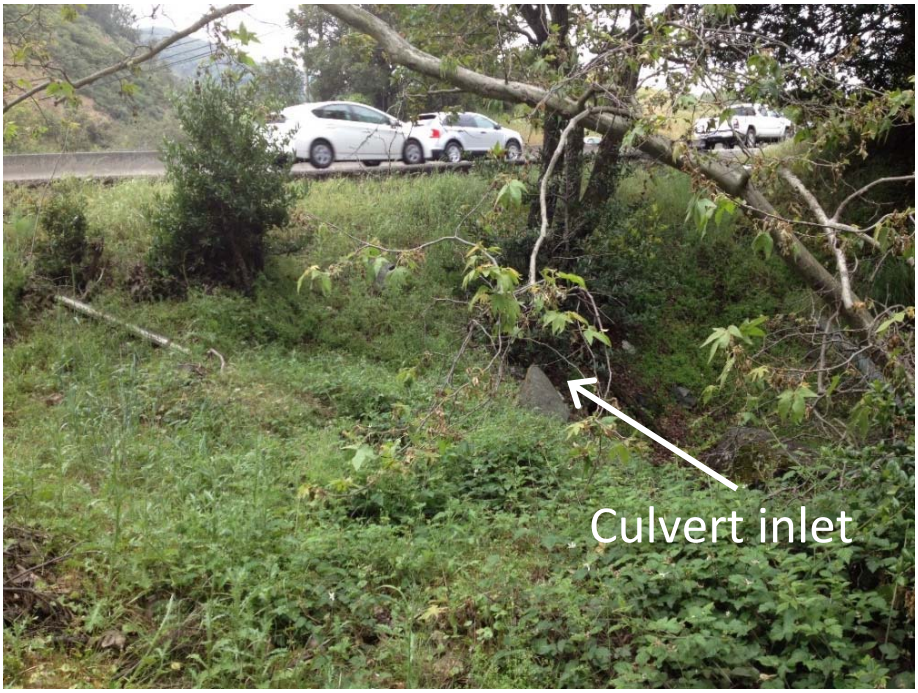
Outlet of the eastern portion of Trout Creek Culvert plunges into a deep gorge at the Lexington dam spillway

Ravine Culvert

This 4' x 4' concrete box culvert is locate approximately 500 feet north of the Trout Creel Culvert. Its outlet is apparently on a rugged wooded hillside above the west bank of Los Gatos Creek; It could not be found during field investigations.



View toward inlet of Ravine Culvert (on lower right)



Ravine Culvert inlet (Ravine Culvert outlet could not be found)

PRA DIV. NO.	STATE	FEDERAL PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	CALIF.				

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	S.CL.	5	C	12	37

Hugo N. Trezzo.
ASST. STATE HIGHWAY ENGR. DIST. IV

APPROVED March 27, 1950

J. Mathey
ASST. STATE HIGHWAY ENGINEER
CIVIL ENGINEER LICENSE NO. 3094

BEGINNING OF PROJECT
STATION 176+00.00

To Santa Cruz

N. 24°25' E.

Conform

C 177+66.29 P.O.T.=
O 177+69.06 B.C.

R. 3000'
Δ. 4°57'48"
T. 130.02'
L. 259.88'

166.29'

R. 3000'

Δ. 6°37'32"

L. 364.37'

180+28.94 P.C.C.

R. 1400'
Δ. 47°22'27"
T. 614.18'
L. 1157.57'

R/W Line

177+21 - 178+09 REPLACED EXISTING E.M.P. AT A LOWER ELEV. TO CLEAR SELECT MATERIAL 6'+ 3C' P.M.P.

R. 3000'
R. 1600 Δ. 3°46'30" L. 161.19'
R. 1429 Δ. 4°57'43" L. 123.79'
Δ. 6°42'57"
180

Plant-Mixed Surfacing

Shoulder

Metal Plate Guard Railing
378-Lin. Ft.

Shoulder

℄ LINE

Sta. 0 179+40 to Sta. C10 196+20
Raised Traffic Bars, 1190-Lin. Ft.

R. 1600' Δ. 22°00'53" L. 614.77'

Drop inlet with trash rack may block access

1) Sta 188+82
30" RCP x 252'

182+10 TO 194+40 PLACE FRENCH DRAINS

R/W Line

AS BUILT PLANS
Contract No. 51-4TC3
Date Completed
Document No. 40000724

Note:-
For Shoulder Treatment
See Typical Cross-Sections.

PAVING PLANS
Scale:- 1"=50'

51-4TC3

PRA DIV. NO.	STATE	FEDERAL PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	CALIF.				

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	S.CL.	5	C	13	37

ASST. STATE HIGHWAY ENGR. DIST. IV

APPROVED March 27, 1950

ASST. STATE HIGHWAY ENGINEER
CIVIL ENGINEER LICENSE NO. 3094

CURVE ALIGNMENT DATA

No.	Radius	Delta	Length
1	120'	19°24'33"	40.85'
2	32'	130°19'04"	72.78'
3	120'	30°16'23"	63.40'
4	66'	90°	103.67'
5	32'	70°34'22"	39.42'
6	120'	14°32'03"	30.44'

BEAR CREEK ROAD (DOUGHERTY MILL RD.)

Conform +10.94

6" FB LINE N. 50°38'45" E. 100.00'

+70

3' RT. F B 2+10.94 P.O.T. = S1 14+61.98 B.C.

+69.21

R. 125'
Δ. 10°25'
T. 152.77'
L. 221.26'

16+83.24 E.C.

R. 55'
Δ. 90°
T. 55'
L. 86.39'

8 S1 LINE 7 S. 27°55'15" E. 149.76'

Plant-Mixed Surfacing

FRENCH DRAIN

8" C.M.P. DITCH

18+33.00 B.C.

19+19.39 E.C.

R. 1400'
Δ. 47°22'27"
T. 614.18'
L. 1157.57'

O 191+86.51 E.C. =
C to 191+86.51 P.O.T.

3' Q LINE

Raised Traffic Bars

R. 1600'
Δ. 22°00'53"
L. 614.77'

Shoulder

Plant-Mixed Surfacing

C to C LINE N. 27°55'15" W.

180' Std. Taper

Type 3A Curb P.C.C. 1.20-C.Y. Stl. 64-Lbs. Dowels 25-Ea.

45° Parabolic Flare R. 2'

N. 62° 04'45" W. 78.00'

Type 3A Curb P.C.C. 1.20-C.Y., Stl. 64-Lbs., Dowels 25-Ea.

45° Std. Flare

180' Std. Taper

1117.65'

Sta. C to 198+20 to Sta. 215+00
Raised Traffic Bars, 970-Lin. Ft.

240' Std. Taper

Metal Plate Guard Railing

Shoulder

R/W Line

S1 19+97.39 P.O.T. =
C to 197+12.00 P.O.T.

3" PIPE LINE

PLANT MIX LINED DITCH

2+13 Begin Pipe

3+93 End of Pipe

6" C.M.P.

I-J INLET

STA. PLACE

63.21 END OF DITCH

1) Sta 188+82
30" RCP x 252'

Culvert deleted on plans

AS BUILT PLANS
Contract No. 51-4TC3
Date Completed
Document No. 40000724

Notes:-
* All Ties to Island Curb Noses are to Center of Radius.

For Shoulder Treatment See Typical Cross-Sections.

PAVING PLANS
Scale:- 1" = 50'

51-4TC3

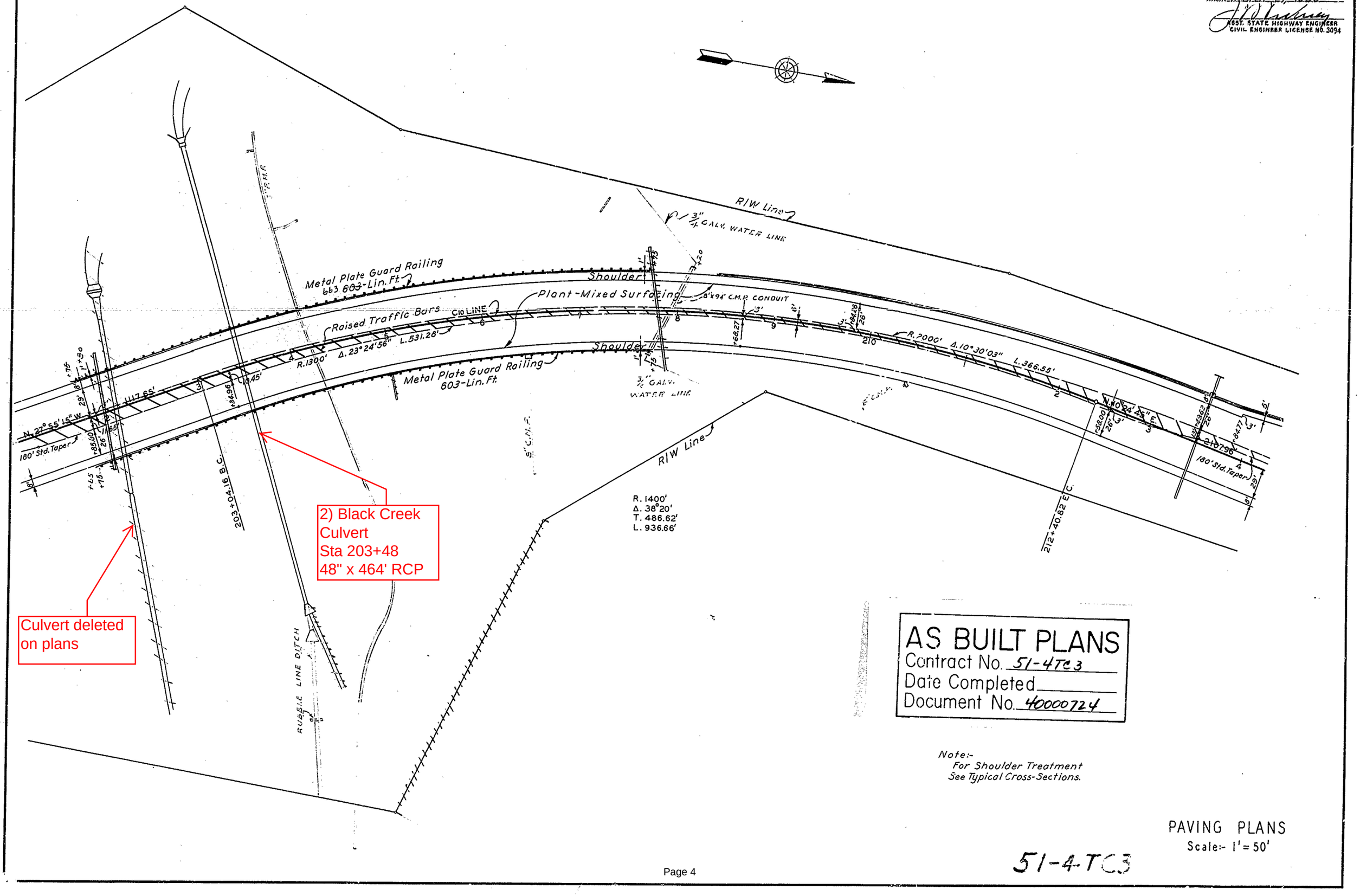
FHA DIV. NO.	STATE	FEDERAL PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	CALIF.				

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	S.CL.	5	C	14	37

Asst. State Highway Engr. Dist. IV

March 27, 1950

Asst. State Highway Engineer
Civil Engineer License No. 3094



AS BUILT PLANS
Contract No. 51-4TC3
Date Completed
Document No. 40000724

Note:-
For Shoulder Treatment
See Typical Cross-Sections.

PAVING PLANS
Scale:- 1" = 50'

51-4TC3

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	S.CL.	5	C	15	37

FRA DIV. NO.	STATE	FEDERAL PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	CALIF.				

CURVE ALIGNMENT DATA

No.	Radius	Delta	Length
1	120'	25°05'51"	52.56'
2	30'	82°57'53"	43.44'
3	120'	20°57'02"	43.88'
4	120'	21°16'42"	44.57'
5	32'	19°18'56"	10.79'
6	120'	19°24'22"	40.64'
7	264'	22°43'44"	104.69'

3) Lexington Culvert
Sta 216+80
120" x 166'
Corrugated Steel
Pipe

4) Low elevation reservoir cross-drain approx. Sta 225+50 - apparently not Caltrans facility, no info

Conform

2' LT. PIB 15+34.20 P.O.T. = S2 15+34.53 B.C.

PIB LINE N 70° 24' 35" E. 10000'

ROCK DRAIN

DRAIN ROCK BLANKET

DRAIN ROCK DITCH FRENCH DRAIN

PI-Mix Surf.

S2 LINE

END OF FRENCH DRAIN

17+55.58 B.C.

R 300' Δ 24°54'45" T 66.27' L 130.44'

16+86.02 E.C.

RIW Line

PLANT MIX. LINED DITCH 18" C.M.P.

Metal Plate Guard Railing 1163 1223-Lin. Ft.

Shoulder

Plant-Mixed Surfacing

Sta. C10 217+30 to Sta. O1 227+30 Raised Traffic Bars, 860-Lin. Ft.

Raised Traffic Bars

180' Std. Taper

45' Std. Flare

Type 3A Curb, P.C.C. 1.20 C.Y., Stl. 64-Lbs., Dowels 25-Ea.

Type 3A Curb, P.C.C. 1.25 C.Y., Stl. 67-Lbs., Dowels 26-Ea.

CL LINE

N 10° 24' 45" E. 2107.96'

Metal Plate Guard Railing 1198-Lin. Ft. 1193

C10 225+75.97 B.C. = O1 225+75.97 P.O.T.

C10 216+31.00 P.O.T. = S2 19+94.32 P.O.T.

STA. 222+92 TO 225+84± ON L.T. PLACE 18" C.M.P. 1 STA. M.V.

R/W Line

AS BUILT PLANS
Contract No. 51-4TC3
Date Completed
Document No. 40000724

Notes:-
* All Ties to Island Curb Noses are to Center of Radius.

For Shoulder Treatment See Typical Cross-Sections.

PAVING PLANS
Scale:- 1" = 50'

51-4TC3

Page 5

PRA DIV. NO	STATE	FEDERAL PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	CALIF.				

DIST.	COUNTY	ROUTE	SECTION	SHEET NO	TOTAL SHEETS
IV	S.CL.	5	C	16	37

Approved: *Fred C. Finney*
ASST. STATE HIGHWAY ENGR. DIST. IV.

March 27, 1950

J. H. Lindsay
ASST. STATE HIGHWAY ENGINEER
CIVIL ENGINEER LICENSE NO. 3084

AS BUILT PLANS
Contract No. 51-4TC3
Date Completed
Document No. 40000724

CURVE ALIGNMENT DATA

No.	Radius	Delta	Length
1	120'	10°09'42"	21.28'
2	60'	66°29'34"	69.63'
3	120'	65°20'48"	136.86'
4	32'	62°39'26"	34.99'
5	120'	14°30'56"	30.40'
6	75'	56°06'45"	73.45'
7	32'	44°04'01"	24.61'
8	100'	76°00'41"	132.67'
9	100'	70°47'51"	123.57'
10	92'	82°48'27"	132.96'
11	108'	77°35'37"	146.26'

5) Sta 235+37.5
30"x 136' RCP

PAVING PLANS
Scale:- 1"=50'

51-4TC3

PRA DIV. NO.	STATE	FEDERAL PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	CALIF.				

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	SCL.	5	C	17	37

Asst. S. C. Scoggs
ASST. STATE HIGHWAY ENGR. DIST. IV

APPROVED March 27, 1950

J. P. Kashmay
ASST. STATE HIGHWAY ENGINEER
CIVIL ENGINEER LICENSE NO. 3094

AS BUILT PLANS
Contract No. 51-4TC3
Date Completed
Document No. 40000724

Note:-
For Shoulder Treatment
See Typical Cross-Sections.

PAVING PLANS
Scale:- 1" = 50'

51-4TC3

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	S.CL.	5	C	18	37

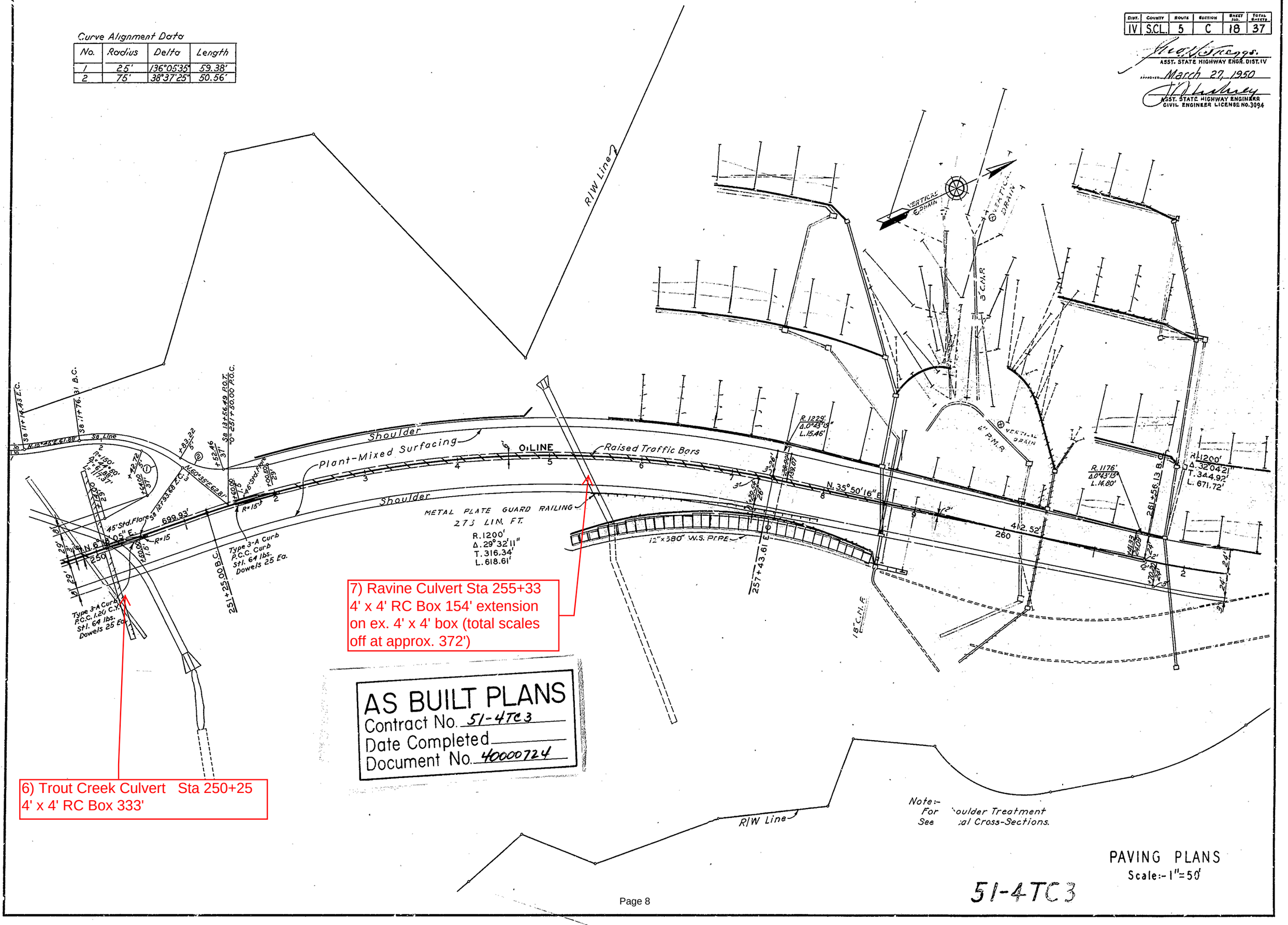
ASST. STATE HIGHWAY ENGR. DIST. IV

APPROVED March 27, 1950

ASST. STATE HIGHWAY ENGINEER
CIVIL ENGINEER LICENSE NO. 3094

Curve Alignment Data

No.	Radius	Delta	Length
1	25'	136°05'35"	59.38'
2	75'	38°37'25"	50.56'



AS BUILT PLANS
Contract No. 51-4TC3
Date Completed
Document No. 40000724

PAVING PLANS
Scale:-1"=50'

51-4TC3

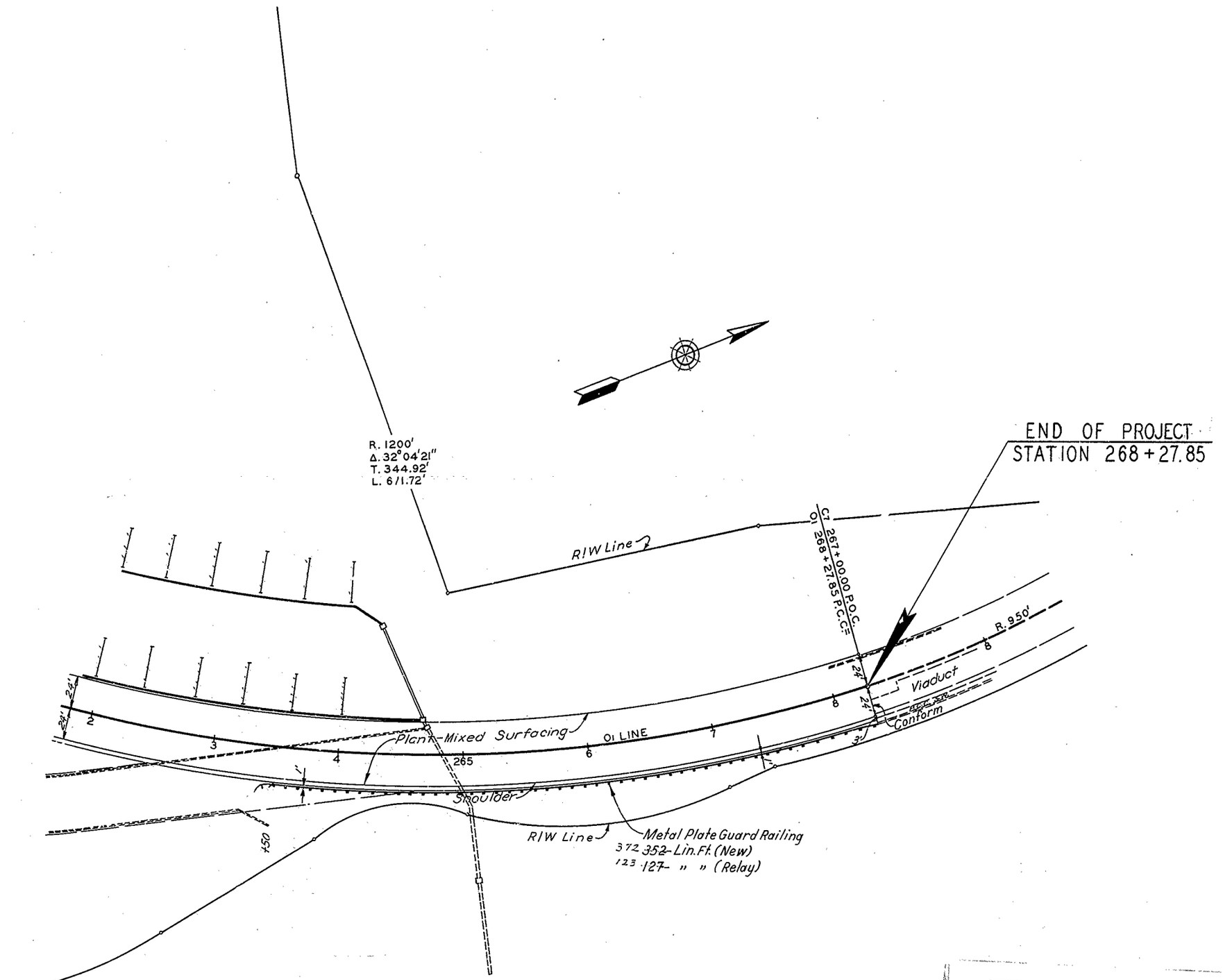
FRA DIV. NO.	STATE	FEDERAL PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	CALIF.				

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	S.CL.	5	C	19	37

Asst. State Highway Engr. Dist. IV

March 27, 1950

Asst. State Highway Engineer
Civil Engineer License No. 3094



AS BUILT PLANS
Contract No. 51-4TC3
Date Completed
Document No. 40000724

Note:-
For Shoulder Treatment
See Typical Cross-Sections.

51-4TC3

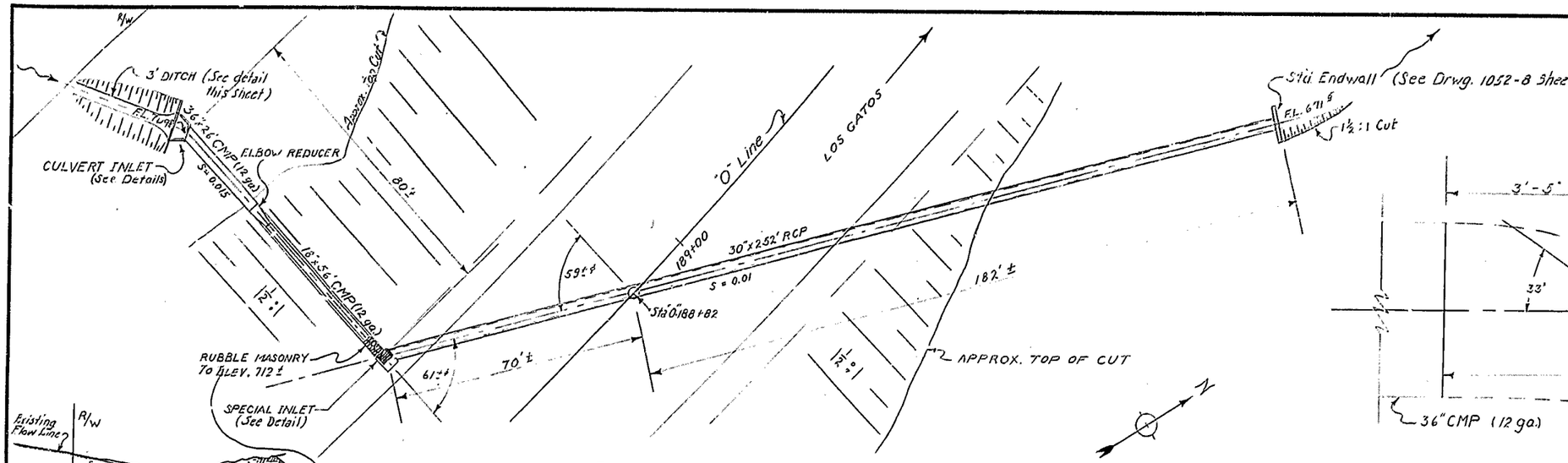
PAVING PLANS
Scale:-1"=50'

DIV. NO.	STATE	FEDERAL PROJECT NO.	YEAR	NO.	SHEETS
	CALIF.				

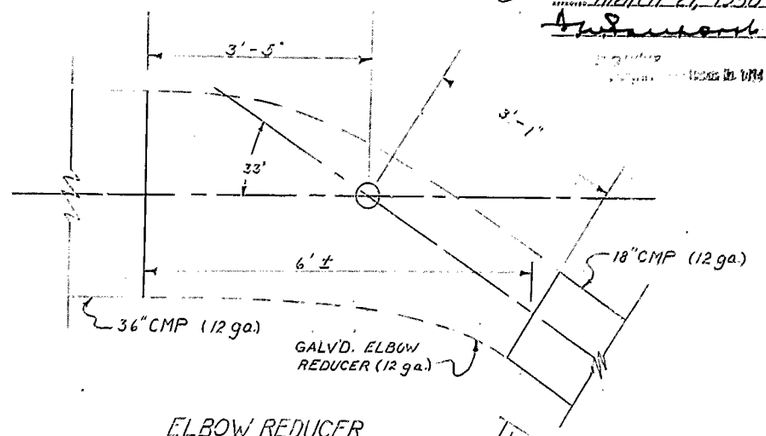
DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	SCl	5	C	25	37

Asst. State Highway Engineer Dist. IV

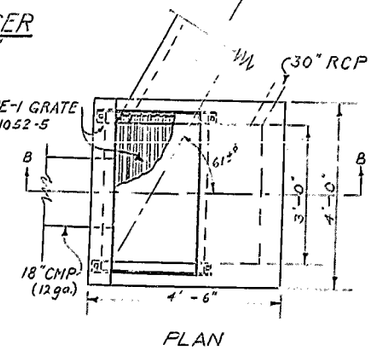
March 27, 1950



PLAN
Scale = 1" = 20'



ELBOW REDUCER
Scale - ¾"=1'-0"



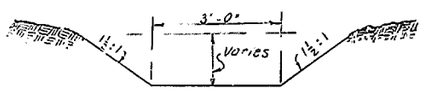
PLAN

PLAN

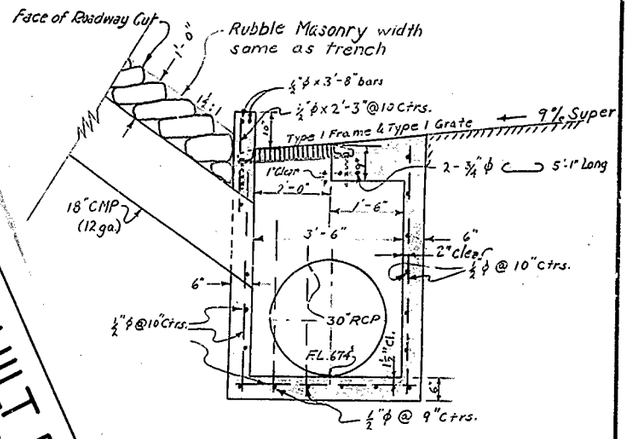
DEBRIS RACK (DETAILS)
All parts to be hot dipped galvanized after fabrication.
Scale 1" = 1'-0"

SECTION ℄

CULVERT PROFILE
Scale = 1" = 20'

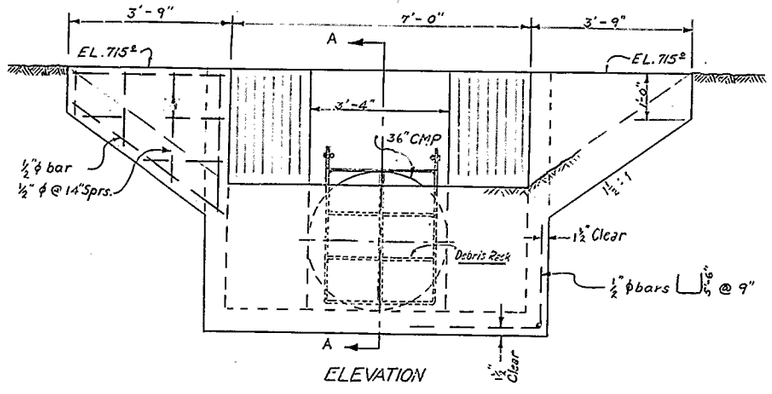


DITCH SECTION
Scale = ½" = 1'-0"

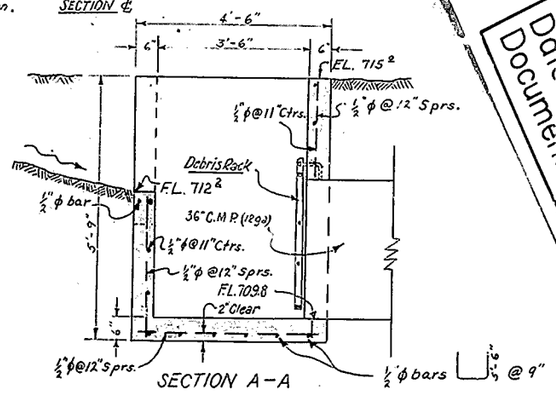


SECTION B-B

SPECIAL INLET
Scale = ½" = 1'-0"



ELEVATION



SECTION A-A

CULVERT INLET
Scale = ½" = 1'-0"

AS BUILT PLANS
Contract No. 51-4TC3
Date Completed
Document No. 4000724

DETAILS OF CROSS DRAIN AT STA. "O" 188+82

SCALE As Shown

DRAWING NO. 1052-1

51-4TC3

Structural Details
Recommended
Paul Sletten
Asst. State Bridge Engineer
DR 2/50

DFH

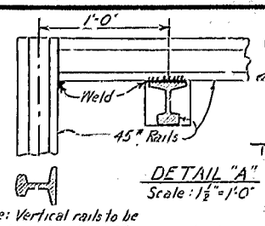
DIV. NO.	CALIF.		YEAR	NO.	SHEETS

Dist.	County	Route	Section	Sheet No.	Total Sheets
IV	SCI	5	C	26	37

Approved March 27, 1950

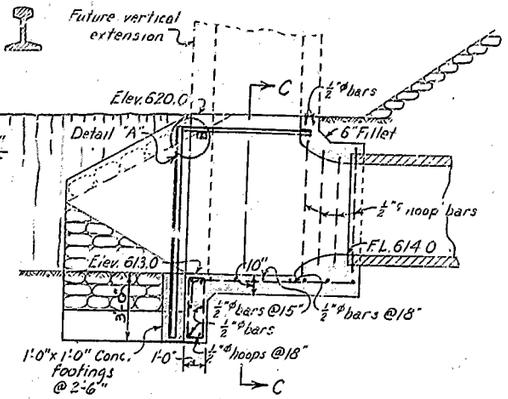
Bridge Engineer

Standard Highway Bridges Dr. 1946

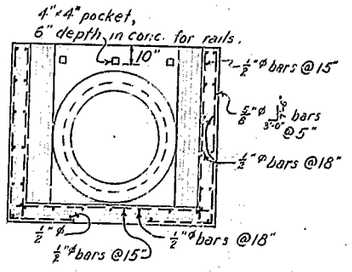


DETAIL "A"
Scale: 1½"=1'-0"

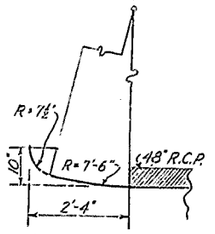
Note: Vertical rails to be imbedded 2'-10' in 12" square footing. Horizontal rails to be placed in 4"x4" pockets, not grouted.



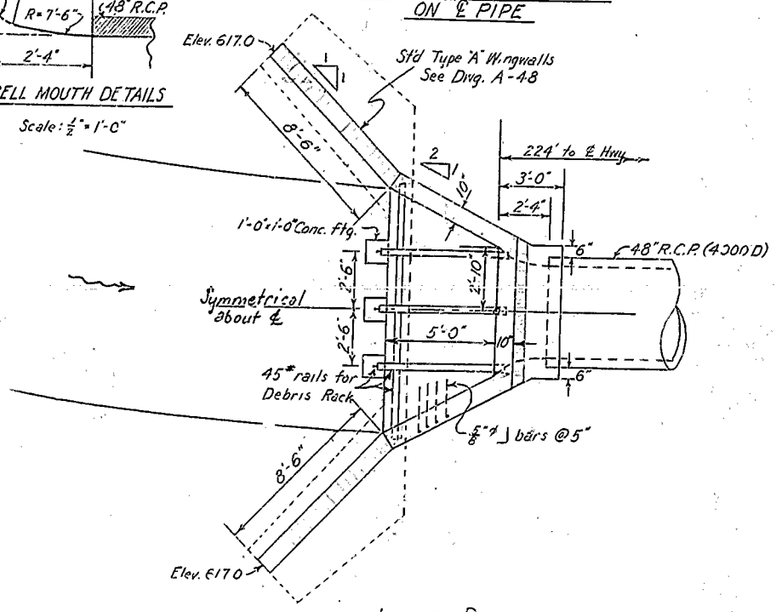
SECTIONAL ELEVATION ON ℄ PIPE



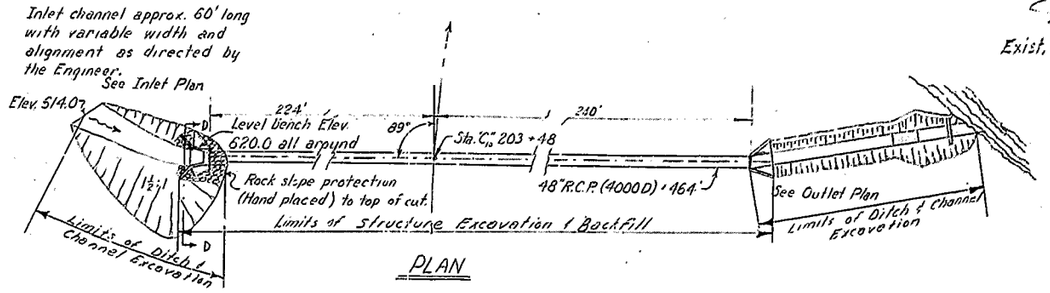
SECTION C-C



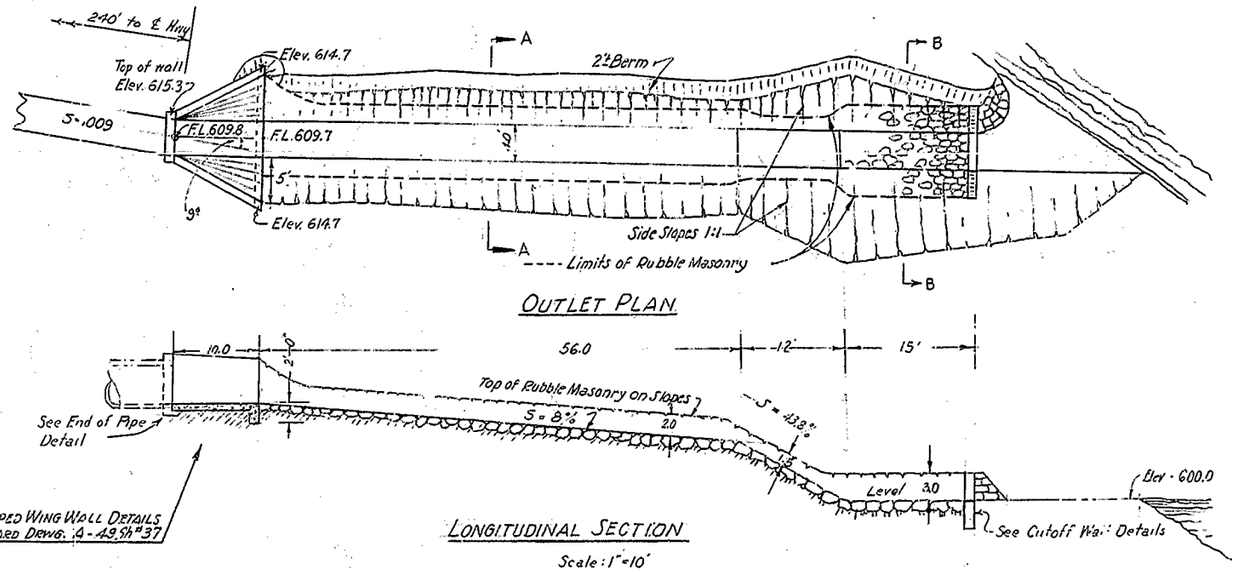
BELL MOUTH DETAILS
Scale: ½"=1'-0"



INLET PLAN
Scale: ¼"=1'-0"



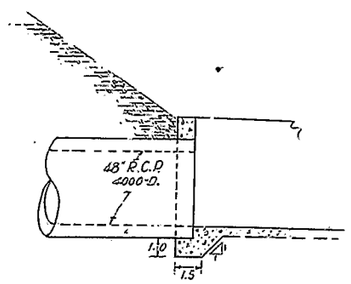
PLAN



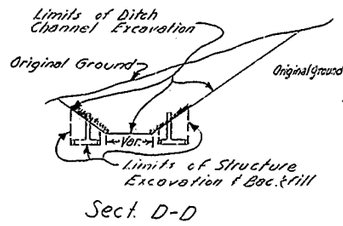
OUTLET PLAN

NOTE! For Warped Wing Wall Details See Standard Drwg. A-49 Sh #37

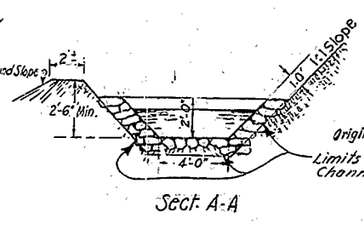
LONGITUDINAL SECTION
Scale: 1"=10'



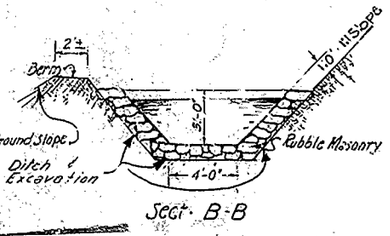
END OF PIPE DETAIL
Scale: 1"=5'



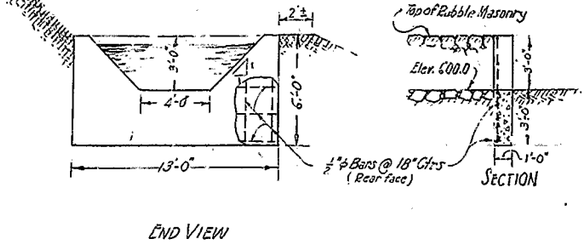
Sect. D-D



Sect. A-A



Sect. B-B



END VIEW

SECTION

CUTOFF WALL
Scale: 1"=5'

AS BUILT PLANS
Contract No. 51-4TC3
Date Completed
Document No. 40000724

51-4TC3

DETAILS OF CROSS DRAIN AT STA. C10 203+48.

SCALE As Noted

DRAWING NO. 1052-2

Structural Details
Checked By DR 2-50
Reviewed Bud 1-18
Approval Recommended

DIV. NO.	STATE	FEDERAL PROJECT NO.	YEAR	NO.	SHEETS
	CALIF.				

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	SCl	5	C	27	37

Geo. W. Trepp
ASST. STATE HIGHWAY ENGINEER DIST. IV

APPROVED March 27, 1950

Bridge Engineer
Structural Steel Specifications Dec. 1944

Top of Wall Elev 571.0
Elev. Bot. of Cut Off Wall 564.0
Back Fill to Elevation 571.0
4.5
1.0
60°
5.0
F.L. Elev. 564.8
Top H.W. Elev. 571.0
Bottom slab anchor, see detail.
Elev. 568.0
Elev. 571.0
Approx. Toe of Fill

NOTE: FOR DETAILS see STANDARD REINFORCED CONCRETE WARPED WINGHEADWALLS, CURVEWALLS DRAWING A-49 Sh. #37

Sta. 0, 255+33
STANDARD 4×4 × C-VIII × 154'± R.C.B.
(See Drwg. A-36)
Sheet No. 34
S = 0.26±
78.0'±
76'±
49'
Existing 4'-4' Box Culvert
Remove existing Concrete Ret. Walls
For connection details see Standard Single Box Culverts 2, 3, 4' & 4' Fl Spans. Drwg A-36

PLAN FOR EXTENDING 4'×4' SINGLE BOX CULVERT
STA 0, 255+33
Scale 1" = 10'

PROPOSED EXTENSION
EXISTING 4'-4' R.C.B. CULVERT
5'-0"
1'-0"
1:1 Slope
½" ϕ bars.
¾" ϕ × 24" Dowels @ 18" Ctrs. (Staggered)
Scale 1" = 4'

1'-6" ± 1'-6"
bar 5'-6" lg. @ 12"
1'-6"
Note: Place anchors @ 25'± ctrs. (Total of 5)
5'-6" bar
1'-6"
4'×4' R.C.B. ANCHOR DETAIL
Scale: 1" = 4'

Relative compaction, 80% maximum
Roadway Embankment
Backfill to not less than 90% relative compaction.
Limits of Structure Excavation & Backfill
4'×4' R.C. BOX SECTION & EXCAVATION DIAGRAM (STA. 255+33)
Scale = 1" = 5'

See Sheet No. 29
STANDARD HEADWALL
Flow LINE Elev. 685.0
Sta. 0, 235+37.5
30"×136' R.C.P.
PLAN FOR PLACING 30"×136' R.C.P.
STA 0, 235+37.5
Scale 1" = 10'

HeadWall Elev. 663.8
Flow Line Elev. 660.0
Slope 1:1
2'-0"
Rock Slope Protection (Hand Placed)
Elev. 660.5
Elev. 658.7
For Warped End Wall See Drwg. A-49 Sh. No. 37

6.0
0.47
13°
Wing Wall Flare
Scale 1" = 5'

Vor. Slope 1:1 to ½:1
Original Ground
Vor. Slope 1:1 to ½:1
120" Culvert
Limits of Backfill
Limits of Payment for Channel Excavation.
12'-0"
Limits of Payment for Backfill to be to original ground, but not to exceed height to top of Pipe.
DIAGRAM SHOWING PAYMENT LIMITS ALONG 120"ϕ PIPE
Scale ⅛" = 1'-0"

Limits of Ditch & Channel Excavation
1:1 Slope
1:1
2.0'
Limits of Structure Exc.
Outlet Ditch Section
Scale 1" = 4'

Rock Slope Protection
1:1 Slopes
2.0'
2'-0"
Section showing End Return
Scale 1" = 4'
View a-a

120" Field Assembled Plate Culvert (6-10 Gauge)
Elev. Top Earth Plug = 657.5
Sta. C 216+80
Sta. F 10+00
Flow LINE Elev. 646.3
Δ = 30°
R = 100'
T = 52.6
Elev. 647.0
Elev. 647.0
S = .003
S = .003
Elev. 642.9
60'
30"
185.0'
Flow Line Elev. 646.8
80.2'
142.8'
1:1 Cut Slopes
Trans. 1½:1 to 1:1
1½:1 Cut Slopes
Trans. 1½:1 to 1:1
1:1 Cut Slopes
PLAN FOR PLACING 120" OVERFLOW FIELD ASSEMBLED PLATE CULVERT
STA "C" 216+80
Scale 1" = 50'

Structural Details
Checked by DR 2/50
Revised Plan 3/13
Approval Recommended

AS BUILT PLANS
Contract No. 51-4TC3
Date Completed
Document No. 40000724

51-4TC3

DETAILS OF CROSS DRAINS at - Sta C 216+80 - Sta 0, 235+37.5 & Sta 0, 255+33

SCALE As Shown

DRAWING NO. 1052-3

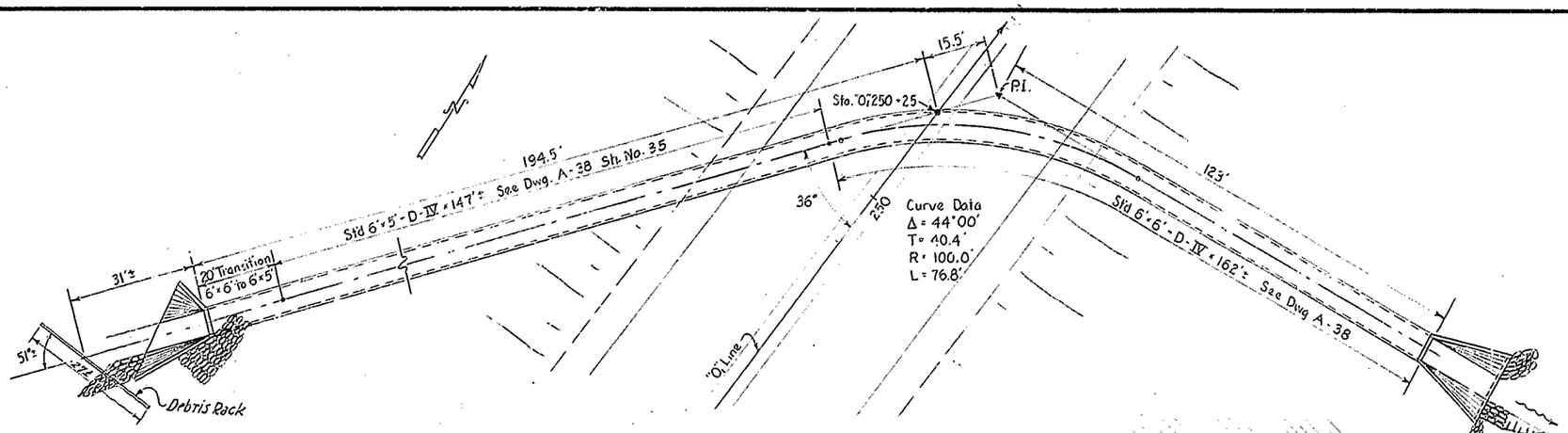
DIV. NO.	STATE	FEDERAL PROJECT NO.	YEAR	NO.	SHEETS
	CALIF.				

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	SCl	5	C	28	37

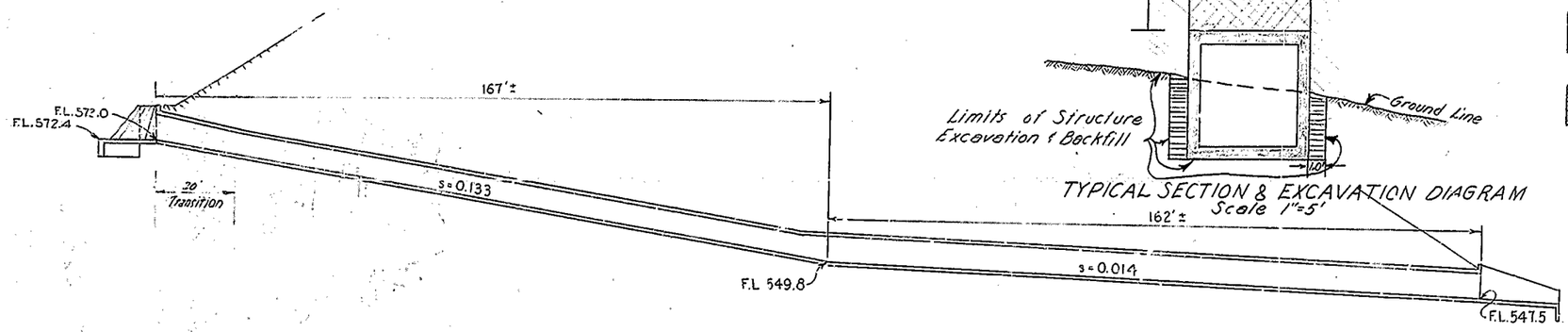
Theodore Craggs
ASST. STATE HIGHWAY ENGINEER DIST. IV

APPROVED March 27, 1950

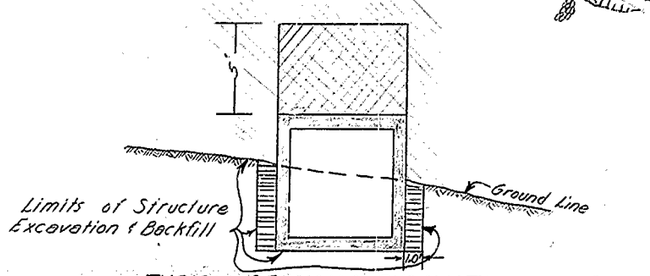
Bridge Engineer
Structural Engineer License No. 1914



PLAN
Scale: 1"=20'



LONGITUDINAL SECTION
Scale: 1"=20'

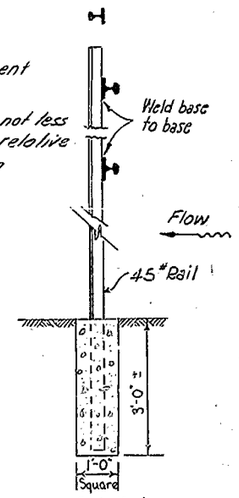


TYPICAL SECTION & EXCAVATION DIAGRAM
Scale 1"=5'

Relative compaction 80% maximum

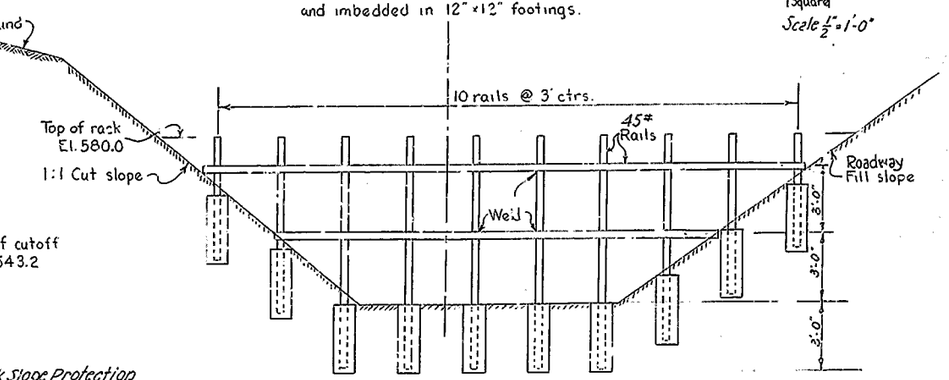
Roadway Embankment

Backfill to not less than 90% relative Compaction

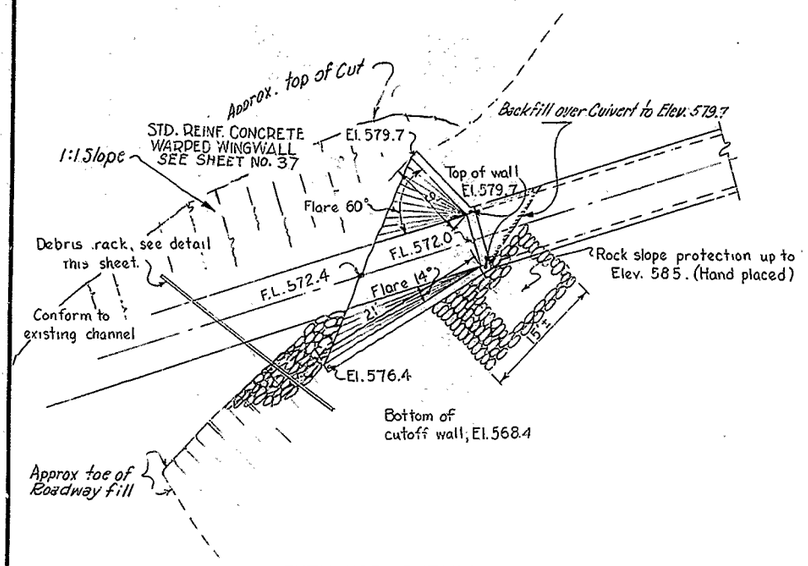


Scale $\frac{1}{2}$"=1'-0"

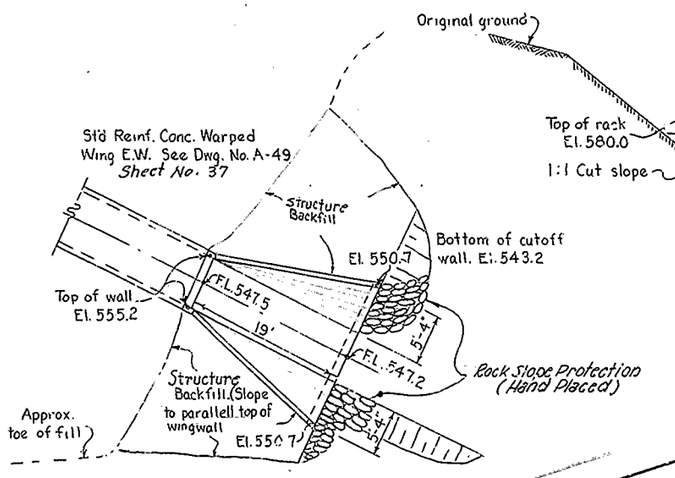
Note: Horizontal rails shall be placed on upstream side of vertical rails.
Vertical rails shall be spaced on 3'-0" centers and imbedded in 12"x12" footings.



DEBRIS RACK
Scale: $\frac{1}{4}$"=1'-0"



ENTRANCE DETAILS
Scale 1"=10'



OUTLET DETAILS
Scale: 1"=10'

Structural Details
Drawn by DB 2/50
Revised by [illegible]
Approved Recommended
V.C. Charlotte

AS BUILT PLANS
Contract No. 51-4TC3
Date Completed
Document No. 40000724

51-4TC3

DETAILS OF
CROSS DRAIN AT STA. "0" 250+25

SCALE As Noted

DRAWING NO. 1052-4

MAV

Dist.	County	Route
04	SCl	17

DESIGN ENGINEER

DATE APPROVED Apr

Bench

R/W

8"×50' CSP

12"×268' Bit.ctd.CSP FL 651.00 ① *

18"×74' CSP

PM 5.05

DI

C13

To Santa Cruz

ROUTE 17

S LINE

3 4 5 6 7 8 9 10 11 12 13 14 15

C18

18"×355' CSP

DI

* ② 8"×272' APUD

③ G2 Inlet TG 631.50 FL 631.03 +00,37' 38.5'

SJWW

6'×6' Box Culvert

Trout Cr

④ 8"×152' APUD

12"×146' Bit. Ctd. CSP ⑤

⑥ G2 Inlet TG 626.50 FL 621.75 +50, 37' 38.5'

⑦ 12"×58' Bit. Ctd. CSP

C18

N T°03'51"E

Pt "A"

Pt "B"

To San Jose

C13

Connect to Existing DD

FL 620 ±

Existing DI ~~285~~ +29

530' of French Drain

Terminal Riser TOC 656.00

660

640

630

620

610

600

590

580

570

Remove 6"CSP

** Sacked ⑨ Concrete Cut-Off Wall

Catch Basin

Terminal Riser TOC ~~639.50~~ 638.60

Replace Shoulder

#4 138' +10%

#3 38' +10%

12"×120' CSP

** Horiz Drain +50,190

Elev 565.00

APUD FL 557.40

⑮ ** OS Inlet Top or Cover ~~569.61~~ 561.67 Side Open. FL ~~555.00~~ 556.00 +00, 200'

561.00

Remove 12"×200' CSP

⑳ Backfill CMP Ditch

Terminal Riser

⑩ 120' 12"×165' CSP-DD

⑱ ** Horiz. Drain #7 100' +10%

Elev ~~594.00~~ +85.235'

Spring

Grade to Drain

⑪ OS Inlet Top of Cover ~~576.20~~ 577.9 SOFL ~~577.30~~ 577.00 FL ~~572.00~~ 573.00 +85,210'

⑫ 18"×30' Bit Ctd CSP

~~570.76~~ 570.60 FL ~~588.50~~ +90,240'

⑬ 8"×~~256'~~ 256' APUD

12"×125' SP +50,185'

FL 566.90

** 50' AC Ditch +50 Grade to Drain ⑭

Road

GTE UG CABLE

18"×30' CSP

Box Culvert

98'

⑯ 18"×~~74'~~ Bit. Ctd. CSP

FL 538.50

Remove 18"×30' SP ㉑

SJWW

Catch Basin

Right of Entry Acquired

R/W

SJWW 12" High Pressure Water Line

Access Road

Bench Mark USC & GS "K878" Brass Disk Elev 666.75

Spillway Chute

GTE Overhead Line

Lexington Reservoir

SJWW Pipeline

Los Gatos Cr.

R/W

LEGEND

Sign

Existing Pipe & Inlet

Remove existing system

1½" Horizontal Drain

Distressed Ground

MONUMENTS

Point	Coordinates N	Coordinates E	Locat
A	259474.490	565795.262	RR Sp Right
B	259777.464	565835.807	RR Sp 35.0'

CONSTRU

CONTRACT No. 04-

DATE ACCEPTED Oct

AS

LEGEND

SYMBOL	OWNERSHIP
GTE	General Telephone & Electronics

Appendix C: Stakeholder Meeting Notes

Contents

Caltrans District 4 Meeting, March 16, 2016

10AM 111 Grand Avenue, Oakland, CA Conference Room: 15-559

Attendees:

Caltrans District 4

Nick, Saleh, Project Oversight (510) 286-6358
Hassan Nikzad, Design, (510) 622-0767
Daniel Cuellar, (510) 286-5271
Joe Peterson, Hydrology, (510) 286-6377
Jasjeet Sikand, Hydraulics, (510) 286-4861
Tom Ly, Design, (510) 286-5076
Gregory Pera – Biologist, (510) 286-5617
Dina El-Tawansy, Project Manager (on phone)

Midpeninsula Regional Open Space District (Midpen)

Julie Andersen, Resource Specialist III
Kirk Lenington, Natural Resources Manager

Consultants:

Randy Anderson, TrailPeople (consultant team leader and notes preparer)

Meeting began with brief introductions

Discussion Items:

1. Kirk gave a brief **review of Caltrans meetings/involvement to date**, including site meeting approx. a year ago and background and status of the project

2. Randy gave a Powerpoint (copy attached) with **overview of the study area and preliminary alternatives** identified to date, during which there was questions and discussion as noted below.
    - (Slide #s 3, 6, 7) - Larger **culvert above and south of ex. Trout Creek culvert** for wildlife: based on multiple connectivity models and wildlife data collection to date, this is the primary desired/attempted crossing location for wildlife;
    - (Slide #s 8, 9) - **Overcrossing in cut area to the south**; a land bridge that would be primarily for the Ridge Trail; secondarily for wildlife (farther from habitat, and mt. lions prefer tunnel but will use land bridge if vegetated). Likely additive rather than alt. to above unless designed as a very large (and more expensive structure) which may not be supported by the site constraints;
    - (Slide #s 10, 11) - **Undercrossing south of water tank at Alma Bridge Road** connecting to Montevina Road – same premise as option above;

- (Slide #s 4, 5) - **Existing Lexington Culvert** – - drainage and boardwalk improvements recommended to better accommodate wildlife and people, but not really the solution for either (limited large mammal use and difficult for equestrian users); a back-up.

3. **Construction approach for the new Trout Creek culvert** was discussed. Joe asked if it would have a slight angle to drain. Randy replied that it would, though it wouldn't be designed to carry creek flows – only incidental water. Joe noted that we would want to jack uphill if that would be the construction method. But jacking would require a large reaction wall to be built on the downhill side which would impact the S.J. Water Co. high pressure line. Would also need a receiving pit on the west side that could impact the creek.

   Joe described a tunneling approach from the east side involving tunneling and the use of steel plate pipe that would avoid impact on outlet side and on the water line.

4. Jasjeet said that **conventional cut-and-cover approach at Trout Creek is infeasible** due to conflicts with heavy traffic; a big "I don't think so" on Highway 17. Hassan noted that construction would have to be done in summertime (due to environmental constraints?) when traffic is even heavier. Joe mentioned a project at San Mateo Creek on U.S. 101 that used piles and decking. It was installed between midnight and 5 am using movable barriers. The final product had a natural bottom (which is desirable for wildlife).

5. The **status of potential improvement of the existing Trout Creek culvert** was discussed. Jasjeet said that the culvert is not in need of replacement and is performing well from a hydrological standpoint, though the question of its structural integrity might be need to be considered. There is no pending project to repair or improve it.

6. Julie wants to make sure that a new **wildlife crossing structure at this location wouldn't conflict with the existing structure**. Per Jasjeet it could be complementary, acting as an overflow for the existing Culvert.

7. Hassan noted that the conceptual Trout Creek undercrossing shown appeared to **allow for adding lanes to 17**, which is important, though not in any current plan.

8. Joe noted that the **challenge of conventional cut and cover approach**; would require the use of steel plates which aren't allowed on a highway – the excavation would have to be filled and temporarily paved every night. It would also be infeasible to jack a culvert 20 feet wide or wider. He described staged projects on 101 at San Mateo Creek and on I-880 at Ora Loma Creek that involved driving piles, pouring pile caps and placing pre-cast concrete decking, then mining out the soil beneath. These created spaces approx.25 – 26' wide. He offered to provide those plans [were transmitted the next day].

9. Kirk asked about the **feasibility of re-routing Hwy 17 traffic onto Montevina Road** and/or Alma Bridge Road in conjunction with construction of an undercrossing at that location. Per Nick this would have to be worked out with County Roads Division.

10. The initial draft feasibility study schedule was reviewed and discussed, and **coordination with Caltrans process/schedule**. Nick is primarily interested in the schedule beyond the September completion of the feasibility study and how/when it would transition to the Caltrans project development process. He described the basic stages:
    - Project Study Report (PSR) – a scoping document;
    - Project Report and Environmental Documents – detailed design development and review, and;
    - Plans, Specifications and Estimate (PS&E) – fully designed documents for bidding and construction.

11. Kirk said **Midpen anticipates 2 – 3 years before construction**. Jasjeet noted that environmental review is typically a roadblock – it helps to start engaging with those Caltrans groups early.

12. Per Jasjeet we should start looking at **long-term maintenance**; a financial as well as jurisdictional issue. The structure would not be considered a state facility; there would need to be a maintenance agreement for the portion w/in the state row.

13. **Caltrans participation and funding** was discussed – potential scenarios and process. Nick described three levels:
    - A simple encroachment permit would be for a project of less than $1 million (not this case);
    - An encroachment permit through the PEER process is for projects of $1 million to $3 million, where in Caltrans takes a more active role (also probably not applicable)
    - For projects above $3 million Caltrans provides complete oversight from day 1 (of the formal Caltrans process starting with a PSR)

14. Nick mentioned that Midpen could consider doing a **combined Feasibility Study/PSR** to save some time. This would entail defining the project Purpose and Need, and would give the project an official name and Caltrans project number. The downside is that Caltrans would need to charge for staff time during the project development stage (but not thereafter). There is a designated amount of funding statewide for “Fast Lane Projects.” This project might be eligible.

15. The question of **ownership of the future structure(s)** was discussed, and **responsibility for their maintenance**. It was noted that homeless encampments in Los Gatos Creek are a current problem and the undercrossing(s) would be attractive for encampments. Who would be responsible for preventing this and other needs? Per Kirk it would be a combination of County Sheriffs Department, and possibly town of Los Gatos Police. It is envisioned to be a County-owned structure.

    Joe said that any structure under the highway with a span exceeding 20 feet gets a structure/bridge #, but is not necessarily a state owned bridge. Jasjeet said that even if the new Trout Creek culvert was designed to function as an overflow, Caltrans would not have ownership because the ex. Trout Creek culvert functions and doesn't back up.

16. It was noted that the **project will likely require an EIR** and have a high degree of local scrutiny.

17. The **Laurel Curve wildlife crossing project** of the Land Trust of Santa Cruz County was discussed. It is outside of Midpen jurisdiction and is a Caltrans District 5 project.

18. Nick asked about **Midpen's agency form and funding for the project**, and whether there was a sunset for the funding. Kirk explained that the Midpeninsula Regional Open Space District is a 2 county special district, same as East Bay Regional Park District. A general obligation bond for a total of $300 million was approved by the voters in 2014, which is to be spread over 20 – 30 years to fund public access and stewardship projects, the wildlife and Ridge Trail crossing being one of the highest priorities. This is in addition to the District's ongoing property tax funding.

19. Nick mentioned a "**Safe on 17**" group that meets in the Redwood Estates area regularly that would be good to coordinate with for informational purposes.

20. **Digital As-Built or ROW Maps**. The consultant team is hoping to obtain digital (CAD) files for this stretch of the highway. Joe and Jasjeet offered to look for these [Jasjeet subsequently confirmed that no such files exist].

The meeting concluded at approximately 11:50 AM

Santa Clara County Parks Meeting, April 19, 2016

10AM, 298 Garden Hill Drive, Los Gatos

Attendees:

Santa Clara County Parks Don Rocha, Natural Resource Manager, Interim Deputy Director John Falkowski – GIS Analyst Hannah Cha, Park Planner II	Midpeninsula Regional Open Space District Julie Andersen, Resource Specialist III Leslie Chan, Planner II Consultants: Randy Anderson, TrailPeople (consultant team leader and notes preparer)

Discussion Items:

1. Julie and Randy provided brief review of background and status of the project – initial crossing concepts

2. The group discussed background, site conditions and relationship to County facilities and operations –
   - Factors that would influence best crossing location and configuration
   - Wildlife fencing and routes vs. human routes
   - Paving the Los Gatos Creek Trail?
   - Alma Bridge Road improvements
   - Long-term implications of trail connections and opening new areas
   - Crossing operations and maintenance – what is likely to be needed and who could provide?

   See notes below:

3. John described a positive response from SJWC on City of Saratoga trail connection from Quarry Park to Sanborn County Park (Iveta Harnik, City Engineer, is contact for more info)

4. John thinks potential dog access on the trail could be a challenge relative to wildlife crossing – see 2006 City of Boulder study on dog access.

5. The Los Gatos Creek Trail formerly used the road west of the spillway for access – could potentially be re-opened as a detour or alternate route.

6. There are old concrete footings in the creek – 10 years ago John discussed with Town of Los Gatos potential for use to improve access. Per Julie, Chris Wilmers of UCSC Puma Project says

the animals are negotiating the area below the dam (with the exception of the highway) just fine and there is no need to improve access for them.

7. Apparently no agency is currently patrolling the Los Gatos Creek Trail in this area. County Parks staff patrols paved portions of the Los Gatos Creek Trail from the eastern abutment of the spillway up to the top of the dam. This item will be investigated/discussed at future meetings with law enforcement representatives.

8. About 20 years ago, former Parks Director Lisa Killough tried to get Caltrans to consider an undercrossing from Alma Bridge Rd to Montevina – they would not consider it then.

9. Per John there was supposed to be trail easements on both sides of Hwy 17 in this stretch but they were never formalized by Caltrans. The original documents are upstairs at the County parks offices.– Action Item: it would be good to get easements formalized as part of the crossing project.

10. Santa Clara County Roads maintains a portion of Montevina Road, and a portion of Old Santa Cruz Highway and Alma Bridge Road from Highway 17 to the end.

11. May consider paving the trail on both sides of the connection – interest in use by road cyclists and a good way to tie into the transportation aspect of the project (for both commuters and potential funding opportunities).

12. Per Randy the prospective crossing would function as both a recreation and transportation facility. Per Julie the latter function will be important to working with VTA and Caltrans.

13. John noted that the Bear Creek Rd./Alma Bridge Rd. Overcrossing was designed to meet equestrian standards – smaller screen size to create a visual barrier; signs in place instructing users to lead horses. There is little current equestrian activity but in the future this could change – with connection to Bear Creek Redwoods OSP and the stables there. John noted the large turnout on Old Santa Cruz Highway north of the fire station is currently available for use as equestrian staging.

14. Julie asked if the model of a water district owning a property and another agency managing for recreation was working for SCC Parks? Per Don SCVWD benefits from trails in terms of public support. The County is looking at renegotiating the current Master Reservoir License agreement with SCVWD to be more of a partnership. SJWC has done some trail maintenance at the Lake Ranch property. This agreement (which was set up through the purchase) has been an example of a positive working relationship with SJW.

15. Don said County Parks would be willing to maintain wildlife fencing as long as an agreement is in place for County Parks to do work on SCVWD/SJWC lands. The actual extent and configuration of fencing will be recommended by the team's biological consultant – Dr. Tony Clevenger. Per Julie fencing could be done before the crossings, depending on timing and benefits.

16. Julie asked who from County Parks might attend a law enforcement focus group meeting. Don mentioned Flint Glinesons, Supervising Ranger for this District, and possibly Matt Anderson, Operations Manager.

17. John noted that SJWC owns a water line along the Los Gatos Creek Trail from the Main St. Bridge in Los Gatos up to the dam, and sometimes shuts the trail down for months when they are doing work. This would require signage notifying trail users in El Sereno and other connecting trails that the crossing was closed.

18. The connection east along Alma Bridge Road to the Ridge Trail at Priest Rock Trail was discussed. The Limekiln Quarry truck traffic is a significant constraint, and the Quarry has proposed 7-8 years ago that road bike access would be prohibited east of the boat launch. Providing a trail to get users out of the roadway would benefit the quarry, but would be very expensive. John has wondered about the feasibility of a pontoon bridge from the boat launch ramp to east of the rowing club – he cited and provided an example of a long pedestrian suspension bridge over a similar water body in San Diego area. An aerial trail crossing of Limekiln Road from St Joseph's Hill OSP was once considered, but is constrained by inholding parcels as well as steep unstable slopes.

The meeting concluded at approximately 9:50 and most of the group travelled to a follow-up meeting with Town of Los Gatos and the Ridge Trail.

Town of Los Gatos, Bay Area Ridge Trail Council, Santa Clara County Parks, April 19, 2016

11AM, Lexington Dam pullout, off Highway 17 via Alma Bridge Road, Los Gatos

Attendees:

Santa Clara County Parks Don Rocha, Natural Resource Manager, Interim Deputy Director John Falkowski, GIS Analyst Town of Los Gatos Bob Kass, Special Projects Manager Matt Morley, Director of Parks and Public Works	Bay Area Ridge Trail Council Bern Smith, Trail Director Midpeninsula Regional Open Space District (Midpen) Julie Andersen, Resource Specialist III Leslie Chan, Planner II Consultants: Randy Anderson, TrailPeople (consultant team leader and notes preparer)

Discussion Items:

1. Julie and Randy gave a brief review of background and status of the project – initial crossing concepts (Midpen and TrailPeople)

2. The group discussed relationship to Los Gatos Bicycle and Pedestrian Master Plan and Ridge Trail plans and interests:

3. Per Bob the Town is using volunteers to conduct trail counts for the Bike and Ped Master Plan. Their counts will be looking for increased levels of use rather than seeking an overall count or census. Bern said that the Ridge Trail could help provide volunteers for counts – he will coordinate that with Bob.

4. Bern noted that both the S.F. Bay Trail and the Bay Area Ridge Trail are interested in highlighting connections between the two trails – such as the Los Gatos Creek Trail. This promotes the ability of residents to get to each, because most of the population lives in between.

5. Bob asked about timing for highway crossing public outreach. Per Julie it is anticipated in July or August and will include notice to Los Gatos constituents.

6. Matt noted that dog access is an interest of many Town residents, including access to El Sereno OSP. Per Julie St. Josephs Hill and portions of Sierra Azul OSP currently have on-leash dog access, and Midpen expects that any additional access would be on-leash only.

7. Ridge Trail design guidelines were discussed. Per Bern they are very general – a dirt surface is desired. In terms of a crossing, bigger and more light is better – for this reason a bridge would be preferred to a culvert. If a large culvert/undercrossing was provided, artificial light would not be necessary or appropriate.

8. Bob said there is interest within the Town in paving the Los Gatos Creek Trail. The idea will be considered in the Ped and Bike Master Plan. One consideration is that paving encourages people to go faster. Per John currently SCVWD does not fully compact the sharp base rock that is overlaid on the trail, which results in frequent bike tire punctures. Some compromise improved but not paved surface may be worth considering.

9. Per Julie ideally one or both crossings would be constructed by 2020 based on current schedule and if funding is secured.

10. Bern said that an overcrossing would capture the imagination more than a culvert. He noted that tons of people are biking out of Los Gatos and riding up Black Road, and that more than ½ of them are continuing on the John Nicholas Trail into Sanborn County Park and beyond using the Lake Ranch Trail. The Lexington area is on the cusp of being a full trail mecca, and Los Gatos is already a major trailhead for cycling and will be even more so.

11. Bob asked whether the trails to be developed in the area would be intensive like Pogonip Park in Santa Cruz County. Per Julie Mid pen provides low-intensity recreation, so not developing destination bike park facilities, but would facilitate low intensity off road bicycle trail use. Don noted that S.C. County is doing a feasibility study for a mountain bike park in Sanborn County Park. That would accommodate intensive recreation and the trail connections from Lexington would allow people to ride to the Park.

12. John noted that people are currently using Lake Ranch trail for road bike connections from Sanborn County Park down into Saratoga.

13. Randy asked about the preferred configuration and combination of trails for the Ridge Trail at the crossing – 8’ 10’ paved path with shoulders plus decomposed granite (D.G.) path plus dirt trail. Any need for fenced separation between users? Bern said that a paved trail and a separate dirt surface trail would be fine – there isn’t a need for fenced separation. Don said that the County doesn’t do separate D.G. trails – the 2’ D.G. or quarry fines shoulders work fine for people who want to run off pavement but not on a rough dirt trail.

The meeting concluded at approximately 12:10 PM.

Santa Clara Valley Transportation Agency and Caltrans Meeting, May 3, 2016

1:30 PM, VTA River Oaks Administrative Offices, 3331 North First Street, San Jose

Invitees:

VTA Gene Gonzalo, Capital Program Manager Eugene Maeda, Senior Transportation Planner Ann Calnan, Environmental Programs Manager Caltrans Dina El-Tawansy, Transportation Engineer Nancy Siepel, Mitigation and Wildlife Connectivity Specialist, District 5 (by phone)	Midpeninsula Regional Open Space District (Midpen) Allen Ishibashi, Senior Real Property Agent Julie Andersen, Resource Specialist III Leslie Chan, Planner II Kirk Lennington, Natural Resources Manager Consultants Randy Anderson, TrailPeople (consultant team leader and notes preparer)

Discussion Items:

Introduction and Project Overview

1. Following introductions, Kirk and Julie gave a brief overview of Midpeninsula Regional Open Space District (Midpen) and the relationship of the project to Midpen's Vision Plan and bond measure. Kirk noted that Midpen has funding for feasibility study, design and environmental, but not necessarily all the funding for construction. He noted that the wildlife and Ridge Trail crossing projects are priorities highlighted on Midpen's web site under Vision Plan. The current effort is to complete a parallel feasibility study and Project Study Report (PSR) by the end of the year.

2. Ann had worked previously with Midpen's consultant Pathways for Wildlife on other wildlife crossing projects, and attended a field meeting to look at the sites under study. Ann asked if some wildlife crossings are used by people. Julie replied that they are, although separation is preferable.

3. Julie described directional fencing concepts, and the Laurel Curve wildlife crossing. She mentioned the objective of this project to develop an effective operation and maintenance plan, including addressing potential homeless encampments.

4. Randy gave a brief Powerpoint presentation of the alternative crossing locations: undercrossing at Ravine Culvert (only potential for wildlife), undercrossing at Trout Creek Culvert (good for wildlife, potentially could include Ridge Trail), overcrossing near the water

treatment plant (preferred by Ridge Trail but also could be used by wildlife), or undercrossing between Montevina Road and Alma Bridge Road (fall-back for Ridge Trail and potentially some use for wildlife). Lexington Culvert is not seen as a viable alternative for either purpose, though both people and small wildlife currently use. Kirk said that per Chris Wilmer of the UCSC Puma Project, the area north of the dam is well documented as the appropriate location for a crossing.

Planning Process and Funding

5. Ann asked about public and stakeholder input. Kirk described that both are included in the current process; partner buy-in is particularly important, since Midpen does not own the land.

6. Per Julie potentially the wildlife and trail projects could be pulled apart if needed and be on separate processes and schedules. If that were to occur, Leslie would take the trail project and Julie would take the wildlife project.

7. The Caltrans process was discussed. Dina described the I-Team as a customized customer service group from Caltrans that works part of the time out of VTA based on County funding to expedite County projects. She is the regional manager for capital projects. Nancy would be able to provide expertise in wildlife crossings that Dina doesn't have.

8. Generally the crossing(s) would be like any other project by others in the Caltrans ROW. A feasibility study is typically the first step, and combining this with a Project Study Report (PSR) in a PSR/PDS document saves a step. This serves as a document to allow Caltrans to program the project, help with definition of the study area, selection of alternatives, and identification of fatal flaws. For the purposes of this project, it would be considered the Planning Initiation Document or PID.

9. The step after this would be PA/ED – Project Approval and Environmental Documentation, which would be followed by PS&E – Plans, Specifications and Estimate for bidding, and finally construction.

10. Per Ann, VTA's role is to set priorities. A formal agreement with VTA isn't needed. Her original involvement was to help get people connected. It would be good for Randy to contact VTA's Bicycle and Pedestrian Coordinator, Lauren Ledbetter to fill her in on the project.

11. Dina asked about the size of the study area and relationship to the County line. Kirk described it as a little over a mile long and several miles north of the Santa Cruz County line.

12. Julie noted that the feasibility study objective is to narrow down the alternatives, and take only the preferred alternatives through the full environmental process.

13. Per Dina the next step is to send a letter to Caltrans proposing to initiate the project. Julie said that Midpen has already drafted such a letter and expects to get it to Caltrans next week. Midpen has also obtained the cooperative agreement for the Liberty Canyon wildlife crossing project in LA, and will reference it in developing one for this project. Per Dina the coop agreement will initially just cover the PSR/PDS phase.

14. Eugene asked if there is a project budget. Kirk responded that the Laurel Curve wildlife crossing budget is being used as a placeholder – which is $5.7 million (estimated construction costs only). In any case the project is expected to be over $3 million for each crossing. Per Nancy the total cost estimate for the Laurel Curve project with PSR, PAED, PS&E phases is over $12 million, but expect to get down to at least $8 million by the time the review process is completed.

15. Julie asked who would oversee construction. Midpen is comfortable managing through the environmental process, but not with construction oversight on a state highway. Per Dina Caltrans could implement, or could just have oversight (over a contractor hired to implement construction).

16. Ann asked how communication would work – would there be monthly meetings? Julie replied that this would be determined through the cooperative agreement. Dina said the designated Caltrans contact would probably be an assigned Planner/Project Manager.

17. Julie asked about potential challenges to continuing the project. Dina said that in other cases this mainly has had to do with funding and changing community priorities. Ann described that it is very important that the proponent listen and respond to Caltrans direction.

18. Kirk would like help identifying and pursuing potential funding sources. Ann said VTA has some funding experts in-house who could help.

<u>Ownership and Maintenance</u>

19. Julie noted that there is a question re. long-term ownership and maintenance. In the case of the Laurel Curve project Caltrans has accepted responsibility. Nancy described the project as either a bridge or a jack and bore culvert. It is a Caltrans District 5 project, and has a Caltrans-prepared PID. Depending on the actual cost there may be other funding sources.

20. Julie noted that Caltrans has also accepted responsibility for maintenance of the Liberty Canyon wildlife overcrossing, except for vegetation management. Midpen is interested in whether Caltrans District 4 would be willing to take over the Highway 17 crossing(s) given Midpen does not own and operate highway structures Dina said that they will be working on

the maintenance question early in the process, as there is a statewide budget shortfall on maintenance funding and it is a major issue. The final disposition would be worked out in a Maintenance Agreement.

21. Eugene noted that on other projects the proponent has funded the first few years of maintenance to give Caltrans a chance to line up resources. Gene noted that there is typically a 3 year landscape maintenance agreement, which is followed by a walk-through and checklist before the transition to Caltrans maintenance.

22. Ann said that the study should consider maintenance. Randy replied that it will; including a proactive conceptual plan for operation and maintenance, as well as consideration of how well the alternatives would perform respectively, if the maintenance should lapse. He noted that potentially Midpen or other partners could play a role in portions of the maintenance and oversight (vegetation/fencing etc.).

23. Dina said that this is a good question to bring up at the Safe on 17 group meeting. Collisions with wildlife is also a vehicle safety issue. Julie said that Midpen Public Affairs is working on the public interest side of the issue, including potential concern about the presence of mountain lions.

24. Dina noted that it is important to consider access for maintenance crews in the design. She said that other projects on Highway 17 have ended up requiring full time biological monitoring, including for red legged frogs and birds, and that this was very expensive. Julie will be working with environmental constraints and stakeholders to see what mitigation opportunities exist.

<u>Next Steps</u>

25. The next steps for VTA, per Ann, are to keep them informed. She noted that VTA is putting a sales tax measure on the November ballot. One element of the measure addresses advance biological mitigation and enhancement, which could include addressing wildlife connectivity associated with specific projects.

The meeting concluded at approximately 3 PM.

Santa Clara Valley Water District and County Roads Meeting, May 2, 2016

1 PM, SCVWD Admin Office - 5750 Almaden Expressway, San Jose

Attendees:

Santa Clara Valley Water District Sue Tippets, Community Projects Review Unit Manager Santa Clara County Roads and Airports David Boyd, Land Development Engineering Division Roberto Salinas, County Traffic Engineer	Midpeninsula Regional Open Space District (Midpen) Allen Ishibashi, Sr. Real Property Agent Julie Andersen, Resource Specialist III Leslie Chan, Planner II Jane Mark, Planning Manager Consultants Randy Anderson, TrailPeople (consultant team leader and notes preparer)

Discussion Items:

1. Following introductions, Julie and Randy provided a brief review of background and status of the project and initial crossing concepts.

2. Fencing: Julie asked what is needed in terms of fencing – there could be wildlife fencing that would exclude people but allow wildlife passage. Julie asked about fencing that SCVWD needs for security. Sue indicated that it was just for areas around the spillway and outlet structure– she knows of no additional area that need to be fenced.

3. San Jose Water Company (SJWC) Facilities: Sue noted that the Los Gatos Creek Trail is all on Caltrans ROW except across the dam. SCVWD has the ROW lines in GIS [which are shown on the Study maps], but ultimately the boundaries must be surveyed. SCVWD has an agreement with Caltrans to operate in their ROW, but not an easement, *per se*. The status of an easement or other agreement for the SJWC water line along the Los Gatos Creek Trail would need to be clarified through SJWC.

4. SJWC is rebuilding their treatment plant – this project includes the soil stockpile north of the treatment plant. They are converting to a reverse osmosis system. The SJWC facilities opposite on the west side of Highway 17 are likely clarifiers and sedimentation ponds, per Sue. There are water lines that cross under 17 to connect to the treatment plant. This plant provides water to Los Gatos and other areas, but not necessarily to nearby residences, such as on Montevina Road.

5. Relationship to SCVWD: The potential crossing alternatives do not present any significant difficulties for SCVWD, according to Sue. Per Sue the staging area south of the treatment plant where soil is currently stockpiled has been used in the past by SCVWD and SJWC – likely to be needed again. Sue believes the Lexington Culvert is not a good location for a potential primary improved trail undercrossing as its utility would be compromised by its function as an overflow connection between the two arms of the reservoir. It could be considered for use as a secondary or informal trail crossing, and SCVWD has no objection to its use as a wildlife crossing. SCVWD is not responsible for the public use of the culvert because it is a Caltrans facility.

6. Relationship to County Roads: David is working with SJWC to permit improvements to their frontage along Alma Bridge Road through County Roads and Airports. This will improve sight distance, provide a wider driveway, and wider shoulders [would be desirable to get copy of these plans]. There are apparently truck deliveries to the plant 2x per week. Roberto said that trail access and potential crossing of Alma Bridge Road would be preferable north of this curved segment from a traffic standpoint.

7. Jane described an effort by County Parks a few years ago to study improvement of the shoulders along Alma Bridge Road, which met stiff resistance from Limekiln Canyon Quarry. Per David, County Roads and Airports would not have a problem with the shoulder improvement project, though there is concern about crossing sight distance. Per Sue, if a trail connection was needed along the section near the treatment plant it potentially could be located down the slope toward the reservoir – the necessary removal of eucalyptus trees would require a permit from County Roads, but might be considered a plus by Santa Clara County Fire Safe Council.

8. The potential undercrossing between Montevina Road and Alma Bridge Road may include a portion of County road ROW on the west.

9. Julie asked who is responsible for maintaining the Alma Bridge Road/Bear Creek Road overcrossing. David and Roberto indicated that is maintained by Caltrans.

10. Roberto noted that the County normally doesn't allow uncontrolled crossing, although there is one at Coyote Reservoir. Currently there is no formal crossing at the County Parks parking area at the boat launch ramp opposite the Jones Trail.

11. Sue thinks that developing an improved trail along Alma Bridge Road and an improved crossing is a good idea because of the level of trail and truck traffic on the east side of 17and because of existing trail use connecting to points near the Bear Creek Road overcrossing .

12. Approval requirements and timing: County Roads and Airports would typically do a first round review at the 35% stage of design – takes about 3 weeks. Their overall review time for an encroachment permit application is about 6 week, per David. The highway crossings aren't on SCVWD property; a letter could be provided that confirmed no SCVWD permit was required for these. Improvements along Alma Bridge Road and near the spillway would be on SCVWD property and would require an encroachment permit, with a similar process and timeline to County Roads.

13. The overall schedule for the crossing feasibility study was discussed. Per Julie by this summer the initial feasibility study would be completed; by December should have selected the preferred alternative and moved into more detailed analysis. Construction is anticipated by 2020.

14. Sue's impression is that SJWC is pretty agreeable to allowing trails on their property where the use does not jeopardize their facility. She noted that the feasibility of the Trout Creek connection for the Ridge Trail is a key part of the decision.

15. Roberto said that County Roads and Airports would want to see alternatives. There was a prior proposal for a temporary improved crossing of Alma Bridge Road as part of plans for raising the height of the dam about 7 years ago. Per Randy these plans may have useful CAD information for existing conditions in the vicinity of the dam. Sue will see what is available.

16. Julie noted that the SCVWD agreement with County Parks may be a model for an operating agreement for the crossing(s). Sue said that the agreement expires in September and that SCVWD has sent a draft to County Parks. Note: the agreement between Parks and SCVWD addresses recreational uses of District property. The arrangement with Caltrans will be an encroachment permit. Caltrans will determine the form of permit or agreement so the agreement between SCVWD and Parks has little relevance even as a "model".

The meeting concluded at approximately 2:10 PM

San Jose Water Company Meeting, May 6, 2016

2:30 PM, San Jose Water Company Engineering Building, 1265 S. Bascom Ave., San Jose

Attendees:

SJWC Andy Gere, P.E. , President and Chief Operating Officer Curt Rayer, Vice President of Operations John Tang, Vice President - Government Relations & Corporate Communications	Midpeninsula Regional Open Space District (Midpen) Allen Ishibashi, Senior Real Property Agent Julie Andersen, Resource Specialist III Leslie Chan, Planner II Jane Mark, Planning Manager Kirk Lennington, Natural Resources Manager Consultants Randy Anderson, TrailPeople (consultant team leader and notes preparer)

Discussion Items:

1. Julie and Randy briefly reviewed the background and status of the project and the two project components: safe wildlife passage and a multi use recreational (Bay Area Ridge Trail) trail crossing of Hwy 17 within the study area. The area north of the dam is well documented by successful and unsuccessful mt. lion crossings as the appropriate location for a wildlife crossing. Randy gave a Powerpoint highlighting the initial study. The four initial crossing concepts include: 1) undercrossing at Ravine Culvert (only potential for wildlife), 2) undercrossing at Trout Creek Culvert (good for wildlife, potentially could include Ridge Trail), 3) overcrossing near the water treatment plant (preferred by Ridge Trail but also could be used by wildlife), or 4) undercrossing between Montevina Road and Alma Bridge Road (fall-back for Ridge Trail and potentially some use for wildlife). Lexington Culvert is viewed as the "no project" option. Although it is currently used by some recreationists and small mammals, it is located too far south to mitigate large mammal crossing needs and it is not seen as a viable alternative for recreational users due to its primary intended use as a flood control structure.

The relationship of the crossing study to SJWC facilities and operations was discussed:

2. Andy noted that there have been a lot of problems with homeless encampments on the east side of Los Gatos Creek. The upper property where soil is currently being stockpiled from the SJWC treatment plant improvement project is leased from SCVWD for use as a staging area.

3. The treatment plant improvement project includes modification of vehicle access to/from the plant to allow safer access for SJWC trucks. Improving the access onto Highway 17 as originally desired by SJWC was difficult due to meeting Caltrans standards. Randy indicated that the study team would like to get a copy of the access improvement plans as part of the background for the feasibility study.

4. Andy asked if the Lexington Culvert has the potential to become a dedicated recreational trail. Per Julie this is not desirable to SCVWD due to the flood control nature of the structure – though it may be a fallback option.

5. Per Andy SJWC owns property along Trout Creek; there is a 10' water intake line located in the creek bottom west of Highway 17. This line connects under 17 (possibly sloe to the proposed Trout Creek undercrossing) and runs south to the treatment plant. Per Curt SJWC has maps that show the alignment of this and other lines. Per Andy the primary issue at Trout Creek has been illegal dumping. Julie mentioned that any directional fencing installed could help to alleviate dumping issues at that and potentially other locations.

6. Kirk expressed interest in understanding the best way to work with SJWC on this study. Julie described the study schedule and stages.

7. Andy said that the Town of Log Gatos has an easement from SJWC for the Los Gatos Creek Trail. SJWC can pull property maps that show jurisdictions. Randy expressed the desirability of having more accurate boundary and facility information than the current GIS data – especially if it could be obtained in CAD, or at least digital form.

8. Kirk asked if there was value to SJWC from having the Montevina Rd. – Alma Bridge Rd. undercrossing if it could be make accessible for service vehicles. Per Andy there would be operational benefits as this would bypass a long, circuitous route between the SWC facilities on the east and west sides of Highway 17. Randy noted that the trail and connections through the Ridge Trail crossing are envisioned to include a paved path that would ideally be ADA compliant.

9. The potential Ridge Trail route from Trout Creek Canyon or from Montevina Rd. to an overcrossing near the treatment plant would pass near to the SJWC facilities on the west. Andy said that these facilities are currently fenced and the while the clarification ponds are being reconstructed the footprint is not being enlarged.

10. The operation and maintenance requirements of the crossing(s) were discussed. Per Andy SJWC patrols up and down the creek (below the dam) periodically to try to manage the homeless encampments. Their representative could be invited to the anticipated law

enforcement/management meeting to be organized by Midpen. He noted that SCVWD had organized a homeless task force and that this may be a group to coordinate with.

11. Julie asked going forward how data requests from the consultant team should be made to SJWC. Andy indicated that Randy should start with Curt who can connect him to the right information/people.

The meeting concluded at approximately 3:30 PM.

Andy then escorted Randy to the construction staging area for the water treatment plant improvement project, where Randy was able to photograph and assess the potential overcrossing east landing site.

Law Enforcement Meeting, Thursday July 14, 2016

10 AM – 11 AM
Santa Clara County Parks Main Office- Annex Building 298 Garden Hill Drive, Los Gatos, CA 95032

Attendees:

California Department of Fish and Wildlife: Travis Jarrett and Terris Kasteen Santa Clara County Parks: Flint Glines and Annie Thompson Santa Clara County Sheriffs Department: Jeff McCoy Monte Sereno/Los Gatos Police Department: Clint Tada California Highway Patrol: Scot Loetscher San Jose Water Company: Jim Wollbrinck	<u>Midpeninsula Regional Open Space District (Midpen)</u> Tom Lausten, Area Superintendent Julie Anderson, Resource Specialist III Leslie Chan, Planner II Allen Ishibashi, Senior Real Property Agent Leslie Chan, Planner II Damon Adlao Capital Project Manager. Meredith Manning., Senior Planner <u>Consultants</u> Randy Anderson, TrailPeople (consultant team leader and notes preparer) – by phone

Meeting Objectives:

- Identify potential benefits and issues associated with the crossings (i.e. traffic safety, homeless occupation)
- Discuss management and maintenance responsibilities anticipated for the crossings
- Understand respective responsibilities and geographic coverage areas
- Get input about the alternatives from a law enforcement/patrol/protection standpoint – respective pros and cons – how can they be made most successful?

Discussion Items:

21. Brief review of background and status of the project – initial crossing concepts (Julie)
Synopsis: To date the Highway 17 Crossing Study has reviewed 5 alternative locations and tentatively identified a preferred wildlife undercrossing at Trout Creek, and a preferred trail undercrossing between Montevina Road and Alma Bridge Road (the latter would be passable to patrol vehicles). There would also be wildlife exclusion and directional fencing associated with the new crossings and potentially with existing culverts in the Study Area (i.e. Lexington Culvert).

22. Review the alternatives, focused on tentative preferred alternatives; discuss operation, maintenance and emergency response needs, and respective agency roles and responsibilities.

a. There are utilities at the Montevina-Alma Bridge undercrossing location that may be a constraint.

b. Would wildlife cameras be useful to law enforcement? Potentially, yes.

c. The Santa Clara County Board of Supevisors has passed an ordinance that requires permits for all surveillance cameras – takes effect in 3 months.

d. Ravine culvert location may be very tempting for people to enter since it is so close to and visible from the L.G. Creek Trail.

e. SJWC has an intake line on the west side of Hwy 17 at Trout Creek

f. Protected bat species may be encouraged to occupy the undercrossing – would this be a deterrent? Protected species signs may be a deterrent, and disturbance of the bats, for example, could be penalized under F&G code, but a percentage of people will enter regardless.

g. Entry would not be a violation of the Fish and Game code. Having a Midpen easement over the crossing with a designation as a closed area could impose ordinances that could be enforced.

h. There is not enough access to services at the prospective crossing sites to support homeless encampments, which depend on access to places to scavenge. Having direct access to water is a major draw.

i. The Trout Creek location could potentially be a draw for homeless because of consistent water flow. Ravine culvert has no regular water. SJWC regularly patrols the area and has fencing and sensing equipment. Because of the flat area with access along Hwy 17 dumping has been a problem.

j. The wildlife crossing, as well as the trail crossing and larger existing culverts, will have relatively continuous wildlife exclusion fencing along the highway. This fencing is included as an allowance in the cost estimates for the crossing alternatives.

k. This fencing might deter dumping at Trout Creek, but access for truck and trailers to pull off highway would need to be maintained.

l. Access at the Trout Creek might encourage marijuana growers and people who want to explore to enter. A Midpen easement might help if it doesn't interfere with operations or encourage public access.

m. Does the CHP have an opinion of the benefit of reduction of collisions between vehicles and wildlife? (Have found that Caltrans roadkill records do not include all animals killed, and collision data does not identify if wildlife collision was a cause). Per Scot Loetscher:

- Collisions with animals are seldom reported – people think they will get in trouble.
- With no shoulders, no center divide, heavy traffic and high speed Hwy 17 is a challenging route. The CHP tries to keep traffic speed down to maintain safety.
- Pedestrians and bicyclists on the highway has not been an issue. In the past 2 ½ year there has not been a serious collision involving them.

n. Are seismic/geologic constraints taken into account in the crossing alternatives? Yes – the San Andreas Fault is nearby, but any of the alternatives would be constructed per current Caltrans highway design standards, which would account for this. The bigger variable is unstable slopes which could slide and block the crossing. The Ravine Culvert location has the greatest potential for this.

o. What about ADA access? The trail crossing is intended to be meet ADA access standards and is intended to accommodate the full range of non-motorized users, as well as through passage for patrol and maintenance vehicles. The undercrossing is anticipated to be lighted – possibly with solar fixtures. The wildlife crossing will have access for patrol and maintenance vehicles, but will not be ADA accessible.

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