PUBLIC REVIEW DRAFT

APPENDICES

SIR FRANCIS DRAKE BOULEVARD REHABILITATION PROJECT ENVIRONMENTAL IMPACT REPORT

STATE CLEARINGHOUSE NUMBER
2008112004

LSA

May 2010

PUBLIC REVIEW DRAFT

APPENDICES

SIR FRANCIS DRAKE BOULEVARD REHABILITATION PROJECT ENVIRONMENTAL IMPACT REPORT

SCH # 2008112004

Submitted to:

Marin County Department of Public Works
3501 Civic Center Drive
San Rafael, California 94903
Contact: Mr. Dave Bernardi
(415) 499-6530

Prepared by:

LSA Associates, Inc.
157 Park Place
Point Richmond, California 94801
(510) 236-6810

LSA Project No. BKF0902

May 2010

TABLE OF CONTENTS

This page intentionally left blank.

APPENDIX A

SUMMARY TABLE OF PUBLIC COMMENTS

This page intentionally left blank.

SUMMARY OF PUBLIC COMMENTS
Sir Francis Drake Rehabilitation Project
November 2008

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
			Federal Agencies, Other Nations						
1	11/24/2008	11/26/2008	National Park Service	Don L Neubacher	Superintendent	Pt. Reyes Stn	• Construction noise and vibration impacts to wildlife (fish) and trees. • Construction season. • Road safety during construction. • Pullouts should not pond or increase sediment to creek. • Evaluate impacts on wildlife species. / • Number of culverts and overwintering habitat for fish. • Lagunitas Creek already has impacted water quality. • Managing road runoff. • Management of fallen trees. • Slope instability.	NOISE WATER QUALITY FISH HABITAT RUNOFF TREES GEO	3.4.2 4.3.1 4.3.4 4.5.1 4.5.4 4.6.4 4.6.1, 4.6.4
2	11/23/2008	11/26/2008	Federated Indians of Graton Rancheria	Nick Tipon	Chairman	Rohnert Park	• Presence of sacred gathering sites and cultural resources. • Request meeting with lead agency.	CULTURAL	4.4.1
			State Agencies						
3	11/24/2008	11/25/2008	California RWQCB	Bruce Wolf	Exec Officer	Oakland	• Preferred alternative not clear. • Need link between road widening and safety. • Alternatives should include nonstructural methods. • Water quality and habitat impacts from paving, construction, widening, turnouts, culverts, tree removal, and bank stabilization. • Impacts to Lagunitas Creek for water quality, endangered species, riparian zone functions, stream productivity, macroinvertebrates, stream geomorphology, sediment discharge. • Impacts to tree roots. • Bank instability and upslope stability. • Bioswales. • Road drainage. • Ability for creek to meander. • Road pullouts and pollutant discharges. • Construction water quality impacts.	PROJ DES ALTERNATIVES WATER QUALITY CREEK SEDIMENT SLOPE STABILITY DRAINAGE RUNOFF WATER QUALITY	4.3.4 4.5.1 4.5.4 4.6.4
4	11/13/2008	11/17/2008	Caltrans	Lisa Carboni	Dist. Branch Chief	Oakland	• Impacts to traffic on State Route 1. • Need encroachment permit in State ROW.	TRAFFIC	4.8
5	11/20/2008	11/24/2008	Calif Dept of Toxic Substance Control	Homayune Atiqee	Project Manager	Berkeley	• Aerially deposited lead due to proximity to highway. • Contaminated soils should be adequately sampled. • Ability to assist with Voluntary Cleanup Program.	HAZARDOUS MATERIALS	4.7.1, 4.7.2, 4.7.4 4.7.4

SUMMARY OF PUBLIC COMMENTS
Sir Francis Drake Rehabilitation Project
November 2008

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
6	11/13/2008	11/17/2008	Calif Native American Heritage Comm.	Kay Sanchez	Program Analyst	Sacramento	• Contact appropriate regional archaeological Information Center for a record search. • If archaeological inventory required then prepare a professional report detailing findings and recommendations. • Contact Native American Heritage Commission for a sacred lands file check and a list of Native American contacts.	CULTURAL	4.4.1
			Regional Agencies						
	11/20/2008		Marin Transit	Amy Van Doren	Transit Planning Manager		• Significant impact to West Marin Stagecoach transit service. • Need to consider transit service. • Eastbound and westbound stops located in Camp Taylor. • Project blocks pullouts used by transit as "flag-stops". • Pullouts should accommodate transit vehicles. • Marin Transit needs info on construction delays to plan route changes.	TRAFFIC TRANSIT DELAYS	4.8 3.4.2
			Local Agencies						
7	5/8/2008	11/15/2008	Fairfax Town Council	Mary Ann Maggiore	Mayor Fairfax	Fairfax	• No cutting of old growth redwoods. • Protect stream from construction and runoff. • Preserve water quality for vegetation and wildlife. • Protect owl habitat. • Bicycle safety.	TREES WATER QUALITY WILDLIFE SAFETY	4.3.4 4.6.4
			Local Interest Groups						
8	11/5/2008	11/5/2008	Marin Horse Council	Sandy Greenblat		San Rafael	• Widen shoulders and pullouts to greatest extent possible with no variation in level of pavement to prevent "dropping off". • Signage necessary to prevent parking.	PAVEMENT SURFACE PARKING	3.4.1
9	11/21/2008	11/24/2008	Marin Conservation League	Nona Dennis	President	Mill Valley	• No additional sedimentation in Lagunitas Creek. • Risk of pollutants entering creek from construction. • Need ongoing maintenance plan for roadway to protect creek. • Cumulative impacts to Lagunitas Creek from project over time. • 43 pullouts to be paved with permeable asphalt: impacts vs. leaving in natural state and erosion at edge of pullouts. • Tree removal could cause sedimentation and erosion, and reduce shading of creek. • Location of replacement trees and disposal of trees to be removed. • Use actual traffic counts; traffic protections should extend 30 years	SEDIMENTATION WATER QUALITY ROAD MAINTENANCE EROSION TREES TRAFFIC ACCIDENTS	4.3.4 4.6.4 4.8 4.10

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							• Inform on current accidents and collisions and project with project including Option A. • Widening could affect traffic behavior, e.g. speed • Include alternative that directs bikes away from roadway and then evaluate potential impacts to old railroad right of way. • Noise during construction. • Need project performance monitoring during construction.	TRAFFIC NOISE	4.8.4 4.10.4
10	11/20/2008	11/25/2008	Marin County Bicycle Coalition	Andy Peri	Outreach Coord	Fairfax	• Evaluate safety issues related to variable shoulder width. • Evaluate shoulder widths ranging from 18 inches to 4 feet to minimize removal of trees. • Evaluate installing minimal width travel lanes (10.5 or less) to reduce tree impacts. • Evaluate increases in auto speed with widening of shoulders. • Evaluate how to create consistent riding surface in areas where permeable pavement may be used (turnouts). • Evaluate options for improvements to surface of roadway.	ROAD SAFETY TREES SPEED ROAD SURFACE	4.8.4 5.3 3.4.1
11	11/23/2008	11/26/2008	Sierra Club – Marin Branch	Gordon Bennett	Conservation Chair	Inverness	• Study new preferred alternative with 10 foot travel lanes, 1-foot paved shoulder and no tree removal. • Study whether paved shoulders increase safety. • Study whether 10 foot lanes, consistent with existing bridges, would be safer than 11 foot lanes. • Study claim that 11 foot lanes would reduce vehicle accidents compared to narrower lanes. • Analyze justification of reduced accidents given that existing accident rates is .00053% in past 5 years. • Calculate capacity of both 10 foot and 11 foot lanes on communities at both ends of project area. • Study impact of moving roadway further away from creek with 10 foot lanes rather than 11 foot lanes. • Clarify road configuration data; clearly define both existing and proposed linear lengths of road width, lane width and shoulder width. • Analyze impacts of eliminating unofficial pullouts on bicycle safety	ALTERNATIVES ROAD SAFETY ACCIDENTS TRAFFIC ROAD WIDTH PULLOUTS TREES MAINTENANCE TREES SHOULDERS	4.3.1 4.3.4 4.5.1 4.5.4 4.6.4 4.8 5.3 4.7.4

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							or environmental education. • Analyze data on tree by tree basis to remove significantly fewer trees. • Identify dedicated source of funds to keep road shoulders clear of debris. • Address immediate, long term and cumulative impact from proposed tree removals and develop metrics to rank each tree by its contribution to riparian function. • Consider whether Sudden Oak Death may change baseline of riparian function. • Round shoulder widths to half feet not whole feet for comparison. • Clarify impact of each tree proposed for removal on shoulder width. • Study whether adjacent roadway during its 30 year life may yet impact trees left standing through the construction phase. • Clarify methodology for counting trees acknowledging that redwoods often grow multiple trunks. • Areas further than 100 feet from creekbank should have wider shoulders, while areas closer to the creek should have a maximum of 1 foot to increase riparian functions. • Clarify inconsistencies between Table 2 (no trees removed), Table 3 (24 trees removed) and Table 4 list of trees proposed for removal. • Study providing habitat and/or fish friendly culverts on all tributaries to Lagunitas Creek. • Compare the estimated contribution to peak flows from the current road with cracks, and the estimated peak flow from the proposed project. • Study methods to make the discharge from ditch relief culverts as close to the sheet flow that would have occurred without the presence of the road. • Analyze how the project during construction and lifespan will reduce or prevent impacts to the watershed's habitats and wildlife. • Indicate the construction staging area and if it contains hazardous materials, the study which safety measures should be taken to protect wildlife and habitats.	TREES TREE COUNT CREEK SETBACKS TREES FISH HABITAT RUNOFF WILDLIFE HAZARDOUS MATERIALS SEDIMENT WETLANDS ROADWAY SLOPE REPAIR RETAINING WALLS RIGHT OF WAY	

SUMMARY OF PUBLIC COMMENTS
Sir Francis Drake Rehabilitation Project
November 2008

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							• Evaluate the ability of the narrower inboard bioswale ditch to continue to filter toxins from 30 years of roadway use given that it must be properly maintained. • Study where wetland acreage lost from the narrowing of inboard drainage ditches can be mitigated with the Lagunitas watershed. • Provide additional information to better determine the cause of cracks running down middle of roadway near marker 270+15. • If slope repair require, study impacts from bioremediation alternatives vs riprap as well as impacts from off-stream repair methods vs methods that require instream work. • Graphically represent all new retaining walls proposed including location, length, and materials. • Explain what impact lack of a recorded right of way may have on the project and whether a right of way agreement from the two parks should be negotiated as part of the Project.		
12	11/24/2008	11/25/2008	California Native Plant Society	Board of Directors	Marin Chapter	San Rafael	• Concerns with widening of SFD. • Old growth redwoods at least 800 years old with special status in California. • Damage to native plants associated with Coast Redwoods. • Only recorded population in Marin Co of Bishop's Cap, a locally rare plant at the southern limit of its range grows in spring along SFD. • Conduct surveys for special status species in accordance with protocols established by USFWS, DFG and CNPS.	TREES NATIVE PLANTS SPECIAL STATUS SPECIES	4.3.1 4.3.4
13	11/22/2008	11/26/2008	EAC of West Marin	Frederick Smith	Director		• Opportunity to restore natural function of Lagunitas Creek watershed. • Baseline conditions important in performing the analysis of potential impacts of the project. • Effect of crack and seat technique on root systems of trees. • Effect of noise or vibration on wildlife, including nesting birds. • Methods to control dust and debris to ensure that no sediments or toxins enter the creek. • Potential for toxins from pavement milling of rubberized	WATERSHED TREES NOISE SEDIMENTS TOXINS	4.3.1 4.3.4 4.6.4 3.4.1

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							asphalt concrete to leach or be washed into creek. • Increases in transport of toxins from autos from new road surface. • Analyze how changes in drainage patterns might degrade water quality, alter streamflows or injure riparian vegetation. • Analyze how riprap near streambed may affect streamflows, reduce areas of refuge, alter composition of streambed or course of creek, transfer creekbank susceptibility to erosion and sedimentation. • Analyze replacement of culverts may be used to enhance habitat of protected species. • Consider alternative in EIR that replaces all existing culverts that block fish passage. • Analyze effect of new paved pullouts on root systems of trees. • Analyze effects of grading associated with new pullouts or retiring of old pullouts. • Analyze effect of new paved pullouts designated as no parking zones. Where will people park? • Analyze effects of slope repair at Station 270+25 on streamflows, recue areas of refuge, alter composition of streambed or course of creek.	WATER QUALITY STREAMFLOW ENHANCE HABITAT ALTERNATIVES TREES SEDIMENT RUNOFF TRAFFIC SLOPE REPAIR	
14	11/24/2008	11/24/2008	Salmon Protection & Watershed Network	Paola Bouley	Program Director	Forest Knoll	• Potential for negative impacts on Biological Resources, Water Quality and Air Quality in Lagunitas Watershed. • Map should indicate specific ownership along roadway and adjacent rights of way. • What specific funds will be used for construction? Are there federal or State funds? Are funds secured? • Does project include work on federal lands? • Impacts to accessibility and rural character of West Marin? • Assess alternatives to proposed widening. • Use Cross Marin Trail for bike traffic rather than removing trees. • Vary widths to accommodate zero tree removals. • Implement behavioral changes to facilitate bike and pedestrian	WILDLIFE WATER QUALITY AIR QUALITY FUNDING FEDERAL LANDS RURAL CHARACTER ALTERNATIVES TREES BIKE SAFETY ALTERNATE ROUTES SPEED BIKE USE	4.3.1 4.3.4 4.4.4 4.6.4 4.6.1 4.10 4.12

SUMMARY OF PUBLIC COMMENTS
Sir Francis Drake Rehabilitation Project
November 2008

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							safety with signs indicating alternative trails. • Use alternative routes for heavy vehicles for road safety and that pose threat to Lagunitas Creek. • Evaluate safety impacts of widening and straightening the road e.g. likely to increase speed. • How many bicycles use the existing trail vs SFD? • Can life of roadway be extended beyond 30 years to reduce environmental impacts? • Option A, removing 24 trees, qualifies as destruction of designated critical habitat for endangered salmonids in Lagunitas Watershed. • Provide scientific assessment of anticipated impacts to individual stands of trees in designated critical habitat. • Address cumulative impact of loss of tree canopy in riparian zone as result of project including Sudden Oak Death Syndrome. • Document conclusion that existing turnouts contribute to erosion and sedimentation. • Document consequences of concentrating usage at fewer turnouts. • Indicate how project restores habitat in decommissioned areas instead of simply blocking off. • All culverts should be evaluated for connectivity issues of gravel and wood recruitment as well as fish passage and high flow refuge. • Project must maximize repair of current fish passage barriers as well as streams that would serve as high flow refugia. • Spawning tributaries are blocked by culverts that need to be retrofitted to accommodate fish passage. • Need to indicate which blue line and ephemeral streams occur along project area. • Indicate which major culverts are being proposed for fish passage repairs. • Indicate designs for fish passage structures. • Address impacts of climate change, a rise in sea level, and increases in severe weather events. • Culverts currently block several	TREES EROSION SEDIMENTATION HABITAT RESTORATION FISH PASSAGE BLUE LINE STREAMS FISH PASSAGE CLIMATE CHANGE REFUGE CULVERTS AND HABITAT TRIBUTARIES RESTORE HABITAT WILDLIFE HABITAT	3.4.1

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							ephemeral and intermittent tributaries that have potential to serve as refuge for salmonids during high-flows as well as provide habitat connectivity. • EIR must evaluate all culverts and assess what potential increase in habitat would occur both directly and indirectly. • DPW's Ross Taylor report does not evaluate high flow refuge along these reaches and is not adequate for this issue. • Indicate which ephemeral and intermittent tributaries exist along the proposed project site. • Assess refuge potential and connectivity of these streams for fish. • Indicate which repairs could be proposed to restore habitat value and hydrologic processes. • Project area is habitat for Spotted Owls – need to indicate presence and habitat use of this species in project area. • Indicate what steps DPW will take to avoid disturbance to the owls. • Project area is habitat for listed species, need comprehensive survey of existing resources. • Indicate how project would avoid impact to these species and habitats. • Armoring streambanks in Lagunitas Creek is inconsistent with established practices for streambank alternation in habitat for endangered coho salmon. • Indicate length of streambank proposed for stabilization. • Indicate how construction will conform to most recent available recommendations for restoration of coho habitat (DFG, 2005, NMFS 2009). • Polluted runoff from roadway will have negative impact on environment – exposure to non-point source pollutants such as copper is an emerging concern for threatened and endangered Pacific salmon that spawn in coastal watersheds. • Identify current load of existing pollutants and how project will increase or decrease loads. • Duration and timing of construction activity? • Indicate how project will impact	STABILIZATION FISH HABITAT ROAD RUNOFF CONSTRUCTION TIMING DIESEL EMISSION ROADWAY DISCHARGE RUNOFF SEALANTS MAINTENANCE AIR QUALITY CULTURAL RESOURCES	4.3.4 3.4.1 4.9.4 4.3.1 4.3.4 4.6.4 3.4.1

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							loads of diesel emission during construction and daily traffic to waterways. • Indicate what specific pollutant discharges are anticipated with milling, crushing and grinding of existing roadway. • Impacts from overlay of rubberized asphalt concrete made from recycled tires? • What type of sealants are proposed to use on roadway and what are impacts to aquatic resources. • What maintenance procedures are proposed to ensure that pollutants from regular traffic will be prevented from entering streams? • Indicate maintenance procedures proposed to ensure removal of debris and particulates from roadway and pervious surfaces. • Impacts to air quality from milling, crushing and grinding of existing roadway surface? • Impacts to air quality from particulate matter from diesel emission during construction and daily traffic. • Assess how project will avoid impacts to cultural resources.		4.7.4 4.9.4 4.4.4
15	11/23/2008	11/26/2008	SPAWN	Todd Steiner	Exec Director	Forest Knoll	•		
16	11/24/2008	11/29/2008	Marin Audubon Society	Barbara Salzman	Chair	Mill Valley	• Support alternative that does not remove trees. • Describe habitats that could be impacted by project including redwood forest and Lagunitas Creek. • Contact MMWD for information from study of creek. • Analyze each project component in terms of adverse impacts and habitat improvements or benefits. • Analyze adverse impacts to creek water quality and habitat from increased sedimentation and polluted runoff. • Document number of proposed pullouts and analyze impacts to habitat and potential pollutant runoff to Lagunitas Creek. • Show location of all trees that could be damaged by project and discuss measures to reduce potential loss of trees that remain. • Show location of new drainage culverts and discuss potential	TREES WILDLIFE HABITATS CREEK WATER QUALITY PULLOUTS AND RUNOFF TREES CULVERTS SLOPE REPAIR RETAINING WALLS	4.3.4 4.5.1 4.5.4 4.6.4

SUMMARY OF PUBLIC COMMENTS
Sir Francis Drake Rehabilitation Project
November 2008

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							impacts of replacement. • Concern with using riprap for slope repair vs other materials or methods to support and stabilize banks. • Impact of construction retaining walls. • Compare alternatives: number of trees to be removed, area of streambank to be covered with artificial surface, area covered by pullouts, area of impact to habitat. How would the loss of 24 redwoods be mitigated.	TREES	5.3 3.4.1
17	11/15/2008	11/22/2008	Marin Horse Council	Connie Berto		San Anselmo	• Support improving SFD for vehicles and lanes for bicycles. • Unpaved Railroad Grade should not be paved as alternate to providing bicycle lanes on SFD. • Concern for appropriate placement of vehicle turnouts on SFD in both directions with sufficient space for vehicle and horse trailer to pull off road.	ALTERNATIVES PULLOUTS	3.4.1
			Individuals						
18	11/22/2008	11/26/2008		Lisa Heisinger		Mill Valley	• Poor road conditions on SFD for bicyclists with high speed vehicles, no shoulders and blind curves.	ROAD SAFETY	3.3
19	11/21/2008	11/25/2000		Kenneth Howard		Mill Valley	• Against removal of redwoods to widen SFD given that there is alternate route for bicycles available.	TREES	4.3.4
20	11/21/2008	11/26/2008		Duffy & Ron Hurwin		Tiburon	• Allowing SFD to further deteriorate has negative impact. • Advocate paving at least 3 turnouts in either direction to allow safe passing for slower vehicles. • Support resurfacing existing roadway without removal of trees except where they impair safe sightlines and support drainage improvements to prevent erosion. • No support for paving Railroad Grade; paving this alternate route would decrease appeal for horseback riders and possibly increase speed of bicyclists.	ROAD SAFETY PULLOUTS ALTERNATIVES	5.1 3.4.1 5.3
21	11/22/2008			Susan Swan		San Geronimo	• Support SFD Rehab project and object to Option A. • Repair, drainage, culvert and turnout improvements needed. • Object to removing 24 trees for road widening; vehicles would speed and bicyclists would ride horizontal.	TREES CULVERTS TREES	4.3.4

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							• Route on north side of creek should be paved with permeable surface and designated for bikes. • Tree removal affect cool water, shade for fish – keeping trees would help fish. • Divert bicyclists to path away from motorists.	ALTERNATIVES TREES	
22	11/23/2008	11/26/2008		Jean Berensmeier		Lagunitas	• Rehab plan must protect park resources and improve fish habitat while improving road for vehicles. • She recommends new "preferred alternative": no tree removal with 10 foot car lanes and shoulder with of 1 foot to 4 feet for bikers in contrast to Option A. • Narrow width at east end appears to be safety factor in comparing accident figures since more accidents at wider west end. • Assess visual aesthetic and cultural impact of removing redwood trees. • Assess impact and provide information to mitigate and reduce to zero loss of tree canopy for water temperature, shade, wildlife, refuge, habitat, erosion. • Assess impacts and provide mitigation for removal of trees. • Assess impact of removing trees that do not provide significant canopy. • Provide information to explain how plan coordinates with Parks administration to remove sprouts at base of redwoods near road. • Assess option of making road 10 feet wide throughout the park. • Assess if narrowing road to 10 feet would allow realignment of road for less impact on creek. • Assess difference in impact of 11 foot vs 10 foot lane on riparian habitat, creek, fish and redwoods. • Assess safety issues when 11 foot roadway lanes converge with 10 foot wide bridge crossing lanes. Assess impact of disallowing use of Taylor Park Road for 3 axle vehicles. • Provide detail on retaining walls, appearance, location and composition. • Provide information that details how users will be accommodated during delays with road closures. • Provide information on how users will be notice of impending	FISH HABITAT ALTERNATIVES ACCIDENTS AESTHETICS CULTURAL TREES ROAD WIDTH RETAINING WALLS ROAD CLOSURES TOXINS SEDIMENT EROSION MAINTENANCE PULLOUTS HABITAT	4.3.4 4.4.4 4.6.4 1.4 1.5 3.4.1 3.4.2

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							project and expected delays. • Analyze short and long term impacts for any toxins released as a result of roadwork rehab. • Describe measures to control sediment and erosion. • Assess problems for long term maintenance issues of crack and seating method on safety of bicyclists. • Provide long term maintenance schedule that evaluates leaching problems. • Pullouts need to be of sufficient length to accommodate vehicles, trucks and trailers. • Assess impact of remaining pullouts on habitat and the fishery. • Assess impact including runoff from increasing length or width of pullouts. • Protect trees adjacent to pullouts. • Assess and mitigate impact of unauthorized trails from pullouts to creek. • Assess impact of long pullout on north side of SFD for impacts to steep banks, creek and salmonids. • Clarify if pullout would allow parking. • South side pullouts at west end: assess whether 4 clustered pullouts are needed. • Assess impacts of maintaining informal pullout/parking at Devil's Gulch. • Assess use of signs to mitigate speed, designate pullouts, parking and provide safety. • Assess whether proposed road materials, width, speed of traffic or materials will reduce noise. • Identify all culverts and assess benefit of improving all for fish refuge and passage. • Explain rationale for 3 large culverts being replaced for fish passage. • Prioritize culvert replacement based on tributaries that provide value for salmonid needs. • Time project and grants to run concurrently reducing impacts. • Evaluate cumulative impacts of improvement project to fish. • Evaluate impact to commuters and recreationists during construction.	RUNOFF TREES UNAUTHORIZED TRAILS PULLOUT SIGNS NOISE CULVERTS FUNDING FISH TRAFFIC DELAYS MAINTENANCE RIGHT OF WAY MONITORING PLAN SLIPPAGE ALTERNATIVES	3.4.1 4.3.4 3.4.1 4.6.4 4.10.4

SUMMARY OF PUBLIC COMMENTS
Sir Francis Drake Rehabilitation Project
November 2008

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							• Provide maintenance plan to ensure that road and creekside changes will be monitored and maintained; lack of maintenance has impacted area near Dead Man's Curve. • Assess issue of recorded right of way to prevent delays. • Need detailed monitoring plan for construction contractor. • Implement additional studies to assess cause of cracks and slippage. • Diversion of bicyclists to off-road alternative would require assessment of those impacts to hikers, equestrians and families.		3.4.1 3.4.1
23	11/8/2008	11/17/2008		Charles Gay		Pt. Reyes Stn	• Road surface needs improvement and support fewer but better turnouts without tree removal. • Bicyclists can use path that parallels road with signs to enforce speed limit.	ROAD SURFACE ALTERNATIVES	5.2 5.3
24	11/18/2008	11/21/2008		Sandy Greenblat		San Rafael	• Traffic study needs to incorporate numbers for equestrian truck and trailer traffic to Pt Reyes National Seashore (she provides estimates). • Cross Marin riding and hiking trail should not be included in study. • Support improving roadway surface and drainage only, leaving trees and controlling speed. • Provide signs to warn drivers against passing cyclists. • Improve roadway shoulders and turnouts. • Enforce speed limit on western half of study section. • Reduce maximum speed limit to 35 miles per hour.	TRAFFIC DRAINAGE TREES SAFETY SHOULDERS SPEED	4.8 5.2 5.3 3.4.1
25	11/14/2008	11/14/2008		Rebecca Atkinson		Berkeley	• Need more detailed discussion of goals and objectives in Project Description. • Question term of environmental resources in Project Description. • Goal should be added to improve resources such as fish habitat. • Is the goal purely rehab and safety or intent to increase capacity of roadway? Increasing capacity could impact visitation and recreation. • Will improvements result in higher travel speeds? • Project Description, construction timeframe and phasing should include possibility of delays • Include description and design of	PROJECT DESCRIPTION FISH HABITAT ROAD CAPACITY SPEED SCHEDULE FISH PASSAGE TREES FISH PASSAGE	4.3.4 3.2 3.4.1

SUMMARY OF PUBLIC COMMENTS
Sir Francis Drake Rehabilitation Project
November 2008

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							fish passage improvements for three locations. • Address impacts to tree roots even without tree removal. • Each alternative should include opportunities for fish passage improvements. • Project Description should address methods to deal with sediment and pollutants.	SEDIMENT	3.2 3.4.1
26	11/24/2008	11/24/2008		Peter Hoch		San Anselmo	• Road upgrade should include adequate width to allow vehicles and bicycles and may entail removal of trees. • APPEARS TO HAVE SECOND PAGE, BUT DON'T HAVE.	ROAD WIDTH	3.4.1
27	11/14/2008	11/14/2008		Carrie Sherriff		Mill Valley	• Support repaving roadway without removing trees.	TREES	5.3
28	11/15/2008	11/15/2008		Wendi Kallin		Forest Knoll	• Study alternative that has hard permeable surface on half of bike path from Shafter bridge to Redwood picnic grounds.	ALTERNATIVE	3.4.1
29	11/15/2008	11/15/2008		David Gault		Kentfield	• Oppose widening SFD which is safe and adequate for use. • Address safety issues with enforcement of existing laws.	ROAD SAFETY ENFORCEMENT	5.2 5.3
30		11/21/2008		Bob Freund			• Use old railroad right of way for bicyclists, using bridge with signs directing bicyclists and hikers onto Cross Marin trail. • Add pullouts and reduce speed limit.	ALTERNATIVES SIGNS SPEED	5.2 5.3 3.4.1
31	11/15/2008	11/21/2008		Hilary Winslow		Bolinas	• Limit work to allow redwoods to remain. • Repave road, but shoulders should remain unpaved.	TREES	4.3.4
32	11/17/2008	11/19/2008		Karen Nygren		Tiburon	• Clarify project priorities to improve speed and flow of traffic or maintain visual and aesthetic beauty through Sam Taylor. • If "fairness" is criteria, how would that be determined? • Impact of noise from crack and seat method to wildlife in quiet setting. • Construction in daytime or nighttime? • Impact to air quality from crack and seat and milling methods. • Impact of dust and debris filtering into culverts or creek. • Impact of crack and seat method to tree roots. • Number of truck loads required for construction and impacts to residents and nearby communities. • Alternatives to improving SFD other than crack and seat or milling method with less	AESTHETICS NOISE AIR QUALITY RUNOFF TREES TRUCK LOADS ALTERNATIVES CULVERTS ROADWAY	4.3.1 4.3.4 4.5.1 4.5.4 4.6.4 4.6.4, 4.7.4 3.4.2 4.9.4 5.2

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							destructive impacts. • Project Description replaces culverts that extend 10 or more feet beyond proposed edge of pavement; what about culverts that extend 1 to 10 feet beyond edge? • Difference between proposed edge of roadway and existing edge. • Impact of newly placed culverts on vegetation, trees. • Describe changes to runoff from realignment and new sloping to meet Caltrans and AASHTO roadway standards. • Impact to vegetation, trees and habitat from changing and redirecting runoff. • Clarify existing versus proposed pullouts. • Impact of paved pullouts to nearby trees and root system. • Impacts to trees from excavation for perforated pipe and areas to hold permeable backfill. • Amount of grading for revised pullouts. • Discuss safety for bicycles and pedestrians with blocked pullouts. • Will deleted pullouts be reseeded and restored with native vegetation. • Detail number, length and appearance of retaining walls along project route. • Discuss impact of cutting into slope for retaining walls. • Discuss impacts of major slope repair at approximate station 270 + 25 to vegetation, trees and creek. • Lower accident rate appears to be in narrower portion of roadway; would wider roadway prompt more accidents. • Discuss impacts of wider road with increased speed and flow prompting increased use of SFD. • Would increased speed and flow cause increase to road kill. • Would increased speed and flow impact safety of bicyclists. • Describe existing visual and scenic experience and future with proposed project. • Impacts of noise, traffic and visual to hikers and campers in State Park. • Visual impact of concrete	EDGES CULVERTS RUNOFF VEGETATION HABITAT PULLOUTS TREES GRADING BIKE SAFETY PULLOUTS RETAINING WALLS SLOPE REPAIR ACCIDENTS SPEED BIKE SAFETY VISUAL QUALITY NOISE TRAFFIC VISUAL QUALITY RETAINING WALLS KICKER WALL ROAD WIDTH SPEED OPTION A IMPACTS TREES VISUAL QUALITY WILDLIFE HABITAT	3.4.1 4.3.4 4.6.4 3.4.1 4.3.4 3.4.1 4.2.4 4.8.4 4.2.4

SUMMARY OF PUBLIC COMMENTS
Sir Francis Drake Rehabilitation Project
November 2008

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							retaining walls along roadway. • Define "kicker wall" and show locations. • Does project require 11 foot wide roadway? • Impact of additional retaining walls and cuts into toe of slope with Option A. • Discuss increase in speed and flow of traffic with Option A. • Discuss all impacts with Option A (noise, tree loss, grading). • Show location of all trees to be removed. • Document current and future horizontal clearances which require removal of redwood trees. • Are 24 trees recommended for removal considered to be protected or heritage trees by the County, or State Parks. • Visual and aesthetic impacts from removal of cluster of redwoods shown in Figure 9 and other 23 trees. • Describe wildlife habitat in redwood trees. • Diagram and describe kicker walls in Option A. • Restrictions on construction during bird or wildlife nesting season to not disturb natural setting. • Need to hire independent environmental specialist to monitor construction to insure protection of resources. • Location for stock piling building materials. • Long term monitoring of area used for stockpiling after it is hydro seeded. • Storage of fuel during construction e.g. fire hazards, danger to creek. • Traffic back-ups or delays during construction, emergency access.	CONSTRUCTION AND NESTING MONITORING STAGING FUEL STORAGE TRAFFIC DELAYS	3.4.1 4.5.4 4.8.4 3.4.1 4.2.4 4.3.1 4.3.4 4.7.4 4.8.4
33	12/15/2008	12/17/2008		Stan Weisenberg		Inverness	• Repave roadway without removing trees. • Improve dual pathway off road for bikers and hikers.	TREES ALTERNATIVES	5.2 5.3
	No Date			Ken Eichstaedt			• Use 10.5 to 11 feet widths for lanes to increase shoulders. • Provide minimum paved shoulder of 3 feet right of white line. • Increase shoulder widths where sight distance is limited. • Minimize design cross sections that will increase speed. • Use turn outs/pullouts if	ROAD WIDTH SHOULDERS SPEED PULLOUTS	3.4.1

SUMMARY OF PUBLIC COMMENTS
Sir Francis Drake Rehabilitation Project
November 2008

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							appropriate. • Provide better access west bound to Cross Marin Trail. • Narrow lane widths in straight sections but wider in turns.	TRAIL ACCESS NARROW WIDTHS	
	No Date			Amanda Eichstaedt			• Evaluate sight lines and speed while maintaining rural feel. • Certain areas will allow safe passing; tighter areas with lower speeds will require "shared" roadways. • No bike lanes; allow shoulder when possible • Improve access to Cross Marin Trail at Shafter end.	SIGHT LINES SPEED SHOULDERS TRAIL ACCESS	3.4.1
	No Date			Connie Berto			• Support proposal to renovate and rebuild SFD. • Oppose paving on parallel multi use trail, old Railroad Grade. • Support option with tree removal to improve safety.	IMPROVE SAFETY	3.4.1
		Hearing Date	**Oral/Written Comments at Public Scoping Meeting**						
34		11/15/2008	California Native Plant Society	Joe Kohn			• Concern for removal of old growth redwoods. • Need for sign at east end of Shafter Bridge to direct bicyclists to parallel trail. • Address Coho salmon and Endangered Species Act. • Only surviving population of Mytella oxalis, Bishop's Cap in one pullout along SFD.	TREES SIGNS FISH ENDANGERED SPECIES	4.3.4 4.3.1
35		11/15/2008	SPAWN	Chris Pincetich			• Critical habitat for endangered Coho Salmon, CA threatened steelhead, CA endangered freshwater shrimp. • Invertebrates depend on good stream bed conditions. • Roads are major source of pollution. • Need for ongoing maintenance with permeable surface. • Pesticides and heavy metals from cars impact migratory olfactory chemical synapses and neurological functions of fish. • Need to mitigate for long term chronic inputs of fine contaminants into creek and critical habitat.	FISH FRESHWATER SHRIMP INVERTEBRATES ROAD POLLUTION MAINTENANCE RUNOFF CONTAMINANTS	4.3.4 4.6.4
36		11/15/2008		Wendi Kallins		Forest Knoll	• Study alternative of placing permeable surface on bike path rather than widening road.	ALTERNATIVES	5.2 5.3
37		11/15/2008	Town of Fairfax	Maryanne Maggiore		Fairfax	• Fairfax Town Council concludes that project would impact human, wild animal and vegetative life in local environment. • Support option to repair road and	WILDLIFE VEGETATION TREES	4.3.4 4.6.4

SUMMARY OF PUBLIC COMMENTS
Sir Francis Drake Rehabilitation Project
November 2008

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							leave stream ban and vegetation intact. • No cutting of old growth redwoods. • Protect fish; stream is one of last remaining Coho Salmon runs. • Safeguard water. • Protect own habitat. • Safety of bike cyclists. • Against improvements that would increase speed on road.	FISH WATERQUALITY HABITAT BIKE SAFETY SPEED	
38		11/15/2008		Jean Berensmeier		Lagunitas	• Unacceptable to remove 24 trees for 11 ft lane for cars and 3 foot shoulder for bikes. • Proposed project with no tree removal, widen driving lanes, provide shoulder, recycle concrete base in place to eliminate truck trips and decrease noise. • 3 large culverts proposed as improved fish passage. • More accidents tend to be in wider portions of road. • Study option of road with 10 ft lanes throughout to slow traffic and allow shoulder for bikers. • Work closely with parks administration to maintain the removal of sprouts at base of redwoods. • Concrete recycled as road base should not include toxics or heavy metals. • Crack and sealing method would eliminate truck trips. • Need ongoing maintenance for safety of bikers. • Timing and length of implementation for project. • Number and location of existing and proposed pullouts. • Detail improvements to blocked pullouts e.g. planting, retaining walls. • Oppose alternative that would pave existing bike path.	TREES CULVERTS AS FISH PASSAGE SPEED ROAD WIDTH MAINTENANCE TOXINS IN ROAD BASE ELIMINATE TRUCK TRIPS MAINTENANCE PULLOUTS	3.4.1 4.3.4 3.4.1 1.4 1.5
39		11/15/2008		Sandy Greenblat			• Must include paved widening of shoulders, turnouts and pullouts; with no variation in level of paving. • Repeated "dropping off" and reentering roadway has created unstable areas. • Signage important to keep people from parking in pullouts. • Pullouts should be as long as possible for vehicles that are longer than 18 feet.	WIDEN SHOULDERS SURFACE VARIES SIGNS LONG PULLOUTS	3.4.1 3.3
40		11/15/2008		Ron Hurwin			• Many close calls and head on collisions with vehicles and bicyclists sharing the	ACCIDENTS PULLOUTS	3.3

SUMMARY OF PUBLIC COMMENTS
Sir Francis Drake Rehabilitation Project
November 2008

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							road. • Pullouts need to be long enough for truck and trailer to pull off the road. • Support widening of road even if some trees removed.		
41		11/15/2008		Duff Hurwin			• Support sharing road, but sometimes cyclists not in single file. • Need signage for bikes, paved trail from Irving Picnic Ground to Platform Bridge. • Horses have fallen on slick slurry sealed surface in Taylor State Park; do not support paving other pathways. • Turnouts need to be smoother and safer to get onto. • Bicyclists should use turnouts too to avoid backing up vehicles.	BIKE SAFETY SIGNS HORSE SAFETY ROAD SURFACE BIKE SAFETY	3.4.1
42		11/15/2008		Erica Heimberg		Woodacre	• Concerned about the character change with proposed options beyond just repaving. • Concerned about more bicyclists on roadway. • Concerned about increased car speed on the road. • Need to enhance use of bike path on other side of the creek.; bridge provides increased access to pathway. • Creek shelters last remaining population of Coho Salmon, aquatic species, birds and rare plants. • Does this project divert resources from addressing roads in Woodacre?	VISUAL QUALITY NUMBER OF BIKES SPEED ALTERNATIVES CREEK AS HABITAT FUNDING	4.3.1 4.3.4
43		11/15/2008		Connie Berto			• Road needs to be fixed and need good bike lanes on the road. • Are some trees identified for removal also diseased and possibly a hazard to users? • Railroad grade is not part of project and should not be paved. • Pullouts should be placed in both directions. • Trucks pulling horse trailers will use turnouts as long as there is not drop off, potholes or rocks.	NEED BIKE LANES TREES ALTERNATIVES PULLOUTS ROAD SAFETY	4.3.1 4.3.4
44		11/15/2008	Marin County Bicycle Coalition	Andi Peri			• Maximize safety through the corridor for all users; minimize impacts to environment: trees, soils, water quality, endangered species. • Safety of experienced and inexperienced riders weaving in and out of zero to four-foot shoulders; sharing with cars less	TREES WATER QUALITY ENDANGERED SPECIES SAFETY ROAD WIDTH	3.4 4.6.4

SUMMARY OF PUBLIC COMMENTS
Sir Francis Drake Rehabilitation Project
November 2008

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							dangerous than unimproved shoulder with trees. • Suggest 18 inch continuous shoulder rather than 3 foot option to minimize impacts to trees; along with minimizing lane width. • Permeable pavement interface between asphalt and permeable pavement should not be within the shoulder. • Evaluate potential of increased speeds of cars from widening; compare 3 foot option to 18 inch option. • Using parallel pathway not complete answer; some bicyclists will only use road – CA Vehicle Code allows bicyclists to share the road – must be safe. • Need better signage.	PAVEMENT INTERFACE SPEED ALTERNATIVES SIGNS	
45		11/15/2008		Cela O'Connor			• Road needs resurfacing; accidents will increase with widening and straightening. • Parallel accessway is available for bicyclists. • County needs to improve maintenance of road. • Increase bus service, but don't widen road. • Just resurface road without increase in footprint keep permeable surfaces, no tree loss.	RESURFACING SPEEDS MAINTENANCE TRANSIT TREES	3.3 3.4.1 5.2 5.3
46		11/15/2008	North Coast Rivers Alliance	Frank Egger		Fairfax	• Address adverse impacts on state and federal parks, fish, growth and traffic inducing impacts on West Marin. • EIR must address no project alternative. • EIR should include an alternative with a load limit on that portion of Drake with redirection of commercial trucks through Nicasio to West Marin – just take them off the road. • Traffic increase in speed will increase adverse impacts to wildlife – should be measured. • EIR should address: ownership of right of way, the width of the right of way, the license of the agency contractor who surveyed the right of way, the boundary markers of the right of way should be staked. • Why is County spending Measure A money on roadway they do not own?	FISH TRAFFIC ALTERNATIVES SPEED RIGHT OF WAY FUNDING	4.3.4 4.8.4
47		11/15/2008		Karen Nygren		Tiburon	• Request 30 day minimum to review DEIR.	EIR REVIEW ALTERNATIVES	1.4 1.5

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							• Parallel bike path should be included as alternative – could enhance bicycle safety. • Suggest divided multi-use path for bicycles and pedestrians. • Measure A funds will be inadequate to fund entire project; will other source of funds (e.g. Caltrans) drive the design and configuration of the project?	ALTERNATIVES FUNDING	5.2 5.3
48		11/15/2008		Candace Hale			• Unacceptable to remove 24 Redwoods. • EIR should address intangible quality of our lives that is provided by undisturbed nature – cross White Hill into quieter, wilder place. • Wider road will be faster and noisier.	TREES RURAL CHARACTER SPEED/NOISE	3.4 4.3.4 4.2.1
49		11/15/2008		Chuck Ford		Lagunitas	• Separate bike path will trade off car/cyclist interface with pedestrian/cyclist interface – better to have permeable surface on trail. • Some trees could be cut, but not the redwoods near the entrance to Samuel P. Taylor Park. Taking trees out will remove pleasure from driving road. • Bad stretches for bicyclists are those where drivers go fast. • SFD is not pleasant, but cars go slower because roadway is bad. • Make illegal to ride bicycles on SFD between Shafter Bridge to Platform Bridge.	TREES BIKE SAFETY ROAD SAFETY ENFORCEMENT PROHIBIT BIKES	3.4 4.3.4
50		11/15/2008	Sierra Club- Marin Chapter	Gordon Bennett			• Option A removing 24 trees is too many – could the analysis begin with the trees and end up with the widths – rather than beginning with the required widths. • 18 inch bike path might be good and might result in many fewer trees being lost. • Suggest an option between preferred project and Option A. • Figure 10 shows 120 linear feet of riprap in the creek – seems like a lot. • Concern for toxics from road and from rubber asphalt. • Three culverts in the plan for fish passage and Stillwater Science identified high flow refuge as the limiting factor in this section of Lagunitas Creek – so what was criteria for the three culverts? Upstream breeding habitat should not be the criteria for fish	TREES ALTERNATIVES RIPRAP TOXINS CULVERTS FOR FISH PASSAGE MAINTENANCE	3.4 4.3.4 3.4.1

# of Letters Received	Letter Date	Date Received	Company	Commenter's Name	Title	City	Comments	EIR Topic	EIR Section
							passage culvert. • Regular maintenance of area defined for bikes will ensure that bicyclists do not use travel lanes.		
51		11/15/2008	SPAWN	Tod Steiner		Forest Knoll	• What is cumulative impact of additional loss of riparian habitat from widening the road? • Cumulative impact of the loss of trees that are proposed for removal – some have died of Sudden Oak Death Syndrome. • Road sweeping required for path in a forest that is used by bikes. Road seeping would prevent pollution on roads out of creeks. • Faster can mean more dangerous and also mean more pollution to water quality. • Impact of crushing current base on existing trees that are not to be removed. • Impacts of crushing trees on water quality. • Data to support premise that pull-offs cause significant erosion. • Impact of leaving road in place without improvements. • How many bikes use the road vs. use the parallel path?	RIPARIAN HABITAT TREE LOSS MAINTENANCE SPEED WATER QUALITY TREES EROSION ROAD VS TRAIL USAGE	4.3.4 6.4 3.4.1 5.1
52		11/15/2008		Ken Eichstaedt, PE			LAST TWO COMMENTS DO NOT APPEAR IN TRANSCRIPT		
53		11/15/2008		Amanda Eichstaedt					

APPENDIX B

NOTICE OF PREPARATION

This page intentionally left blank.

COUNTY OF MARIN
www.co.marin.ca.us/pw

DEPARTMENT OF PUBLIC WORKS

P. O. Box 4186, San Rafael, CA 94913-4186 • 415/499-6528 • FAX 415/499-3799 • TTY 415/499-3232

Farhad Mansourian, RCE
Director

ADMINISTRATION
499-6528

ACCOUNTING
499-6576 • FAX 507-2899

AIRPORT
451-A AIRPORT ROAD
NOVATO, CA 94945
897-1754 • FAX 897-1264

BUILDING MAINTENANCE
499-6576 • FAX 499-3250

CAPITAL PROJECTS
499-7877 • FAX 499-3724

COMMUNICATION MAINTENANCE
499-7313 • FAX 499-3738

DISABILITY ACCESS
499-6528 (VOICE)
499-3232 (TTY)

ENGINEERING & SURVEY
499-7877 • FAX 499-3724

FLOOD CONTROL DISTRICT
499-6528

COUNTY GARAGE
499-7380 • FAX 499-7190

LAND DEVELOPMENT
499-6549

PRINTING
499-6377 • FAX 499-6617

PURCHASING AGENT
499-6371

REAL ESTATE
499-6578 • FAX 446-7373

ROAD MAINTENANCE
499-7388 • FAX /499-3656

STORMWATER PROGRAM
499-6528

TRAFFIC ENGINEERING
499-6528

TRANSIT DISTRICT
499-6099 • FAX 499-6939

WASTE MANAGEMENT
499-6647 • FAX 446-7373

ALL AREA CODES ARE 415

NOTICE OF PREPARATION AND NOTICE OF PUBLIC SCOPING MEETING FOR THE SIR FRANCIS DRAKE BOULEVARD REHABILITATION PROJECT ENVIRONMENTAL IMPACT REPORT

The County of Marin will prepare a Draft Environmental Impact Report (EIR) for review and comment on the Sir Francis Drake Boulevard (SFDB) Rehabilitation project proposed by the County of Marin and the Transportation Authority of Marin. The EIR will evaluate the environmental impacts associated with the proposed SFDB rehabilitation improvements and an Option A to the proposed improvements, pursuant to the California Environmental Quality Act, (CEQA).

Project Location

SFDB is an east -west arterial roadway connecting US Highway 101 in the eastern end of Marin County, California with State Highway 1 at the west end of the County. The portion of SFDB proposed to be rehabilitated is along the western portion of the roadway between Shafter Bridge and Platform Bridge Road. This portion of SFDB traverses Samuel P. Taylor State Park and a portion of the Golden Gate National Recreation Area (GGNRA). SFDB has a horizontal curvilinear alignment and generally parallels Lagunitas Creek that flows west to Tomales Bay.

Background

The portion of SFDB to be rehabilitated was first constructed in 1929 as a two lane arterial roadway. Along a majority of the roadway there is no recorded right-of-way. Although SFDB bisects both State and Federal parks, the County of Marin has historically maintained the roadway. The existing roadway width is highly variable, the roadway is narrowest just west of Shafter Bridge and widest as it approaches Platform Bridge Road.

Project Description

The roadway rehabilitation project consists of pavement rehabilitation, drainage improvements, pullout improvements, and slope repair. Proposed pavement rehabilitation is divided into three segments. Segment 1 (Shafter Bridge to Station 100+00) will be rehabilitated using the crack and seat technique that reuses the existing concrete as a base for overlay of new asphalt concrete; Segments 2 and 3 (Station 100.00 to Platform Bridge Road) will be rehabilitated by milling the existing roadway surface and applying an overlay of rubberized concrete. All existing culverts comprised of corrugated metal or plastic will be removed and replaced. Three culverts, identified as fish passages, will be improved consistent with recommended fish habitat enhancements. Regularly spaced pullouts will be provided and paved with permeable asphalt. The pullouts will be signed as no-parking zones. The existing unstable slope at Station 270+25 will be repaired. In addition, the proposed project includes improvements to the alignment and width of SFDB. Small retaining walls, less than 3 feet in height, may be constructed to provide added shoulder width. All proposed project improvements are designed to protect all existing trees. Thus no tree loss is anticipated.

Option A would provide additional shoulder areas and a more uniform paved roadway width. The added shoulder and more uniform roadway are proposed where existing topography will allow for the additional improvements. It is estimated that up to 24 existing trees, adjacent to the roadway, would need to be removed under Option A.

It is the intent of the Notice of Preparation and Scoping Meeting to solicit input from members of the public, organizations, and government agencies on the scope of environmental issues to be addressed in the EIR for the Proposed Project and Option 'A'. Public comments on the scope of the issues to be evaluated in the EIR are encouraged.

Pursuant to state and local guidelines implementing the California Environmental Quality Act (CEQA), please be advised that the Marin County Department of Public Works (DPW) will be the lead agency for the project. Marin County DPW has determined that a full scope EIR is required for the proposed project. Therefore pursuant to CEQA Guidelines Section 15060(c) an Initial Study has not been prepared. The potential environmental effects, to the extent known, are described below:

1) Land Use & Planning	6) Transportation/Circulation	11) Public Services
2) Geophysical	7) Biological Resources	12) Utilities & Service Systems
3) Hydrology	8) Energy & Natural Resources	13) Aesthetics/Visual Resources
4) Water Quality	9) Hazards	14) Cultural Resources
5) Air Quality	10) Noise	15) Social & Economic Effects Related to Physical Impacts

To ensure that the EIR for the Proposed Project is thorough and adequate, and meets the needs of all agencies reviewing it, Marin County DPW is soliciting comments on specific issues to be included in the environmental review. Public comments on the scope of issues to be evaluated in the EIR are also encouraged. A more detailed project description is on file with the office of the Marin County Department of Public Works, 3501 Civic Center Drive, Room 404, San Rafael, CA 94903, and are available for public review between the hours of 8:00 a.m. to 4:00 p.m., Monday through Friday, or the document can be accessed online at http://www.co.marin.ca.us/depts/pw/main/engineering.cfm

So that the EIR will address any additional issues that may be of concern to the public for this proposed project, the County will also conduct the public scoping meeting on **Saturday, November 15, 2008, from 10:00 Am to Noon at the Woodacre Improvement Club, 1 Garden Way, Woodacre, California 94973** Public Agencies, Community Groups and interested members of the public are invited to attend this meeting and present oral or written comments they may have on this proposed project EIR.

If you wish to comment during the 30-day NOP review period that begins on October 27, 2008, or if you cannot attend the scoping meeting we will accept written comments about the scope of the environmental report until the close of the NOP comment period at **4:00 pm on Monday, November 24, 2008**. Commentors are advised to mail written comments postmarked on or before November 24, 2008 to the attention of Dave Bernardi at 3501 Civic Center Drive, Room 404, San Rafael, CA 94903 **Comments by FAX or E-mail may not be able to be confirmed as officially received and accepted before the end of the comment period deadline.** Comment letters should clearly identify and include in the subject heading Comments on the Sir Francis Drake Boulevard Rehabilitation Project Notice of Preparation in order to distinguish these comments from any other comments. If you have any questions, or want additional information concerning the scoping meeting, please contact David M. Bernardi, Senior Civil Engineer, DPW, at 415-499-7864. Please direct questions about the project, the project application and design, or processing to the application to David M. Bernardi, Senior Civil Engineer, DPW, 415-499-7864.

David M Bernardi

David M. Bernardi
Senior Civil Engineer

The Woodacre Improvement Club is accessible to persons with disabilities. If you require American Sign Language interpreters, assistive listening devices, or other accommodations to participate in this meeting, you may request them by calling (415) 473-4381 (voice/TTY) or 711 for the California Relay Service or e-mailing disabilityaccess@co.marin.ca.us at least **four working days** in advance of the event.

Copies of documents are available in accessible formats upon written request.

APPENDIX C

COMMENTS RECEIVED IN RESPONSE TO THE NOTICE OF PREPARATION

This page intentionally left blank.

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

RECEIVED
NOV 26 2008
MARIN COUNTY PUBLIC WORKS

IN REPLY REFER TO:

L7621

November 24, 2008

Mr. Dave Bernardi
3501 Civic Center Drive, Room 404
San Rafael, CA 94903

Comments on the Sir Francis Drake Boulevard Rehabilitation Project Notice of Preparation

Dear Mr. Bernardi:

The National Park Service has reviewed the information prepared as background for the EIR scoping of the Sir Francis Drake Boulevard Rehabilitation Project. In addition, staff attended the Public Scoping Meeting held on November 15, at the Woodacre Improvement Club. The project area is within the legislative boundaries of Golden Gate National Recreation Area. The western end of the project area (Stations 5+80 to 91+00) is within the managed lands of Point Reyes National Seashore. Based on the information presented in the public review documents as well as the Public Scoping Meeting, the National Park Service prefers the proposed project alternative, and has concerns regarding the project proposed as Option A.

We have summarized our comments as an attachment to the letter. The comments address the following topics:

- ➢ Proposed Project Approach
    - o Evaluate Impacts of Crack and Seat Technique
    - o Proposed Project Timeline
    - o Road Uses and Road Safety
    - o Pullouts
- ➢ Sensitive Resources
    - o Evaluate Impacts on Wildlife Resources
    - o Culvert Replacement in Context of Riparian and Floodplain Habitat
    - o Water Quality Protection
    - o Managing Road Runoff
    - o Management of Fallen Trees Along Road Corridor
    - o Slope Stabilization
- ➢ Option A – NOTE - All previous comments are applicable
    - o Tree Removal

PROPOSED PROJECT

Evaluate Impacts of Crack and Seat Technique

The project states that the cement sections along the road corridor will be broken in-place and then paved over using a crack and seat technique. The process of cracking the cement is not described, and there are a number of potential impacts of this practice that should be considered:

1. noise impacts to wildlife
2. impacts of cracking on existing road infrastructure
3. impacts of cracking on established root structure of trees adjacent to the road
4. impacts of cracking on streambanks – will this result in greater areas of instability
5. Impacts of cracking on aquatic species and aquatic habitat – NMFS has considered sound impacts and shock wave to salmonids associated with pile driving. The project should analyze potential for soundwaves to travel through soil and into the water column, thereby affecting aquatic habitat.

The project should evaluate removal of cement blocks from the site and establishment of new road base using other established design considerations.

Proposed Project Timeline

Because of the sensitive resources, the construction window for this project should be August 15 to October 15. Any earlier would potentially affect the bird nesting season, and any later would push into the wet seasons, resulting in increased risk of road construction runoff to the creek.

Road Uses and Road Safety

A number of public comments were made regarding the safety of all modes of transportation along the road. Under any scenario, the lanes will be narrow, and the shoulders will be minimal. The accumulated debris along the edge of the road further narrows the road, and makes alternative transit modes more dangerous to use.

- ➢ The NPS recommends that speed limits along the project area be maintained at their current levels. Additional signage should be provided to maintain lower speeds.

There are redundant bicycle paths running parallel to Sir Francis Drake. While many bicyclists may prefer to use the main road, many others do not know about alternative routes.

- ➢ The project should include added signage indicating the presence of an alternative bicycle route that could encourage some portion of the bicycle community to use the alternative route.

Point Reyes National Seashore has more than two million visitors per year, many of which use this important transportation corridor. Heaviest vehicle use occurs during the weekends, when bicycle use is also the heaviest.

- The County should evaluate the potential of limiting vehicle size on this section of Sir Francis Drake, routing larger vehicles over Nicasio Road to Point Reyes Station during weekends and holidays.

The project describes the installation of bioswales to capture sediment and road pollutants on site rather than passing them through to the creek. As described in more detail under *Managing Road Runoff*, without extensive regular maintenance, the bioswale facilities could become a road safety hazard in the winter with increased ponding of water along the road.

- The Project Description and Environmental Analysis should include a detailed maintenance plan to ensure the effectiveness of the proposed project.
    - The plan should include maintenance practices and frequency to ensure road shoulders are clear and available for bicycle use, vegetation does not encroach on road shoulders, bioswales drain road runoff and filter sediment and pollutants effectively, and pullouts do not pond water.

A more aggressive maintenance strategy for this section of Sir Francis Drake is necessary to ensure that all objectives of the proposed project can be achieved.

Pullouts

The project includes an effort to formalize and improve pullouts along this section of road. Pullouts are important for road safety, and the proposed permeable paving would make these pullouts more useable than the current conditions. The pullouts should be situated in locations that are stable, and should not concentrate and discharge water across the road or on to unstable channel slopes. Our review of existing pullouts show that these are often full of puddles, may be a source of fine sediment to the creek, and in some areas ponding of water may increase slope instability.

SIGNIFICANCE OF SENSITIVE RESOURCES WITHIN PROJECT REACH

The project is proposed for a five-mile section of Sir Francis Drake Boulevard that runs parallel to Lagunitas Creek, one of the most critical watersheds for the protection of Central California Coast coho salmon. Lagunitas Creek supports the largest population of the CCCESU coho salmon (Moyle et. al. 2008), and is also representative of the southernmost stable population of these federal and state endangered species. In addition to coho salmon, federally threatened steelhead trout and Chinook salmon, as well as federally threatened California red-legged frog are known to occur in this area of the Lagunitas Creek watershed. In addition, the project reach supports the federally endangered California freshwater shrimp, which is documented to occur in only 11 watersheds in the world, including this section of Lagunitas Creek.

In 2000, the San Francisco Bay region listed the Lagunitas Creek watershed as water quality limited by pathogens, nutrients, and sediment. The RWQCB has recently completed a TMDL development process for pathogens in the watershed and will be initiating the sediment TMDL process in the next year. This project will likely result in short-term sediment impacts, but may be designed to reduce long-term sediment loading to the Creek.

As noted throughout the project planning process and at the public scoping meeting, the project is located within a highly sensitive resource area. A number of sensitive resources should be evaluated as part of the project.

Evaluate Impacts on Wildlife Resources

The project should evaluate impacts of all activities, as well as long-term operation and maintenance of the road corridor on a number of federal and state protected species. Wildlife resources to be analyzed for impacts include:

- Coho salmon,
- Chinook salmon,
- Steelhead
- California freshwater shrimp
- Northern Spotted Owl
- Nesting riparian birds
- California red-legged frog

Culvert Replacement in the Context of Riparian and Floodplain habitat

Much of the road is located adjacent to the active floodplain of Lagunitas Creek which has been documented to provide important overwintering habitat for coho salmon, Chinook salmon, as well as California freshwater shrimp. Many of the intermittent and ephemeral channels that are not considered important for summer rearing likely provide important overwintering habitat. There is now a strong emphasis from National Marine Fisheries Service and others to evaluate and improve access and availability on floodplain habitat for salmonids.

The project proposes to replace a total of 63 culverts located within the project area. There are no specifications as to the culverts that will be replaced, but the NPS recommends the following considerations:

- Culverts providing fish passage
    - The project states that three culverts will be replaced to accommodate fish passage. As we understand, these include Cheda Creek, Devils Gulch, and the small drainage at MP 16.85 previously studied by PWA and SPAWN. The NPS agrees with these sites for fish passage, but reiterates that some additional analysis of culverts connecting upslope drainages be conducted to make these areas accessible during extreme flow events.
- Culverts that connect upslope drainages to Lagunitas Creek should be considered as potential off-channel, high flow refuge habitat.
    - Evaluate channel profile from Lagunitas Creek through the road to determine appropriate invert elevation.
    - Culvert size should provide passage of all planned flow events, but under flood scenarios, would there be access through the culvert to floodplains on the upslope side of the road.
- Culverts that drain road ditches
    - Evaluate potential of consolidating road ditch drainages to areas where discharge may be more actively managed.

- Road swales and ditches should not drain to culverts where upstream channels have established bed and banks.

The County should work with local fish biologists, CDFG and NMFS to identify how culvert improvement may address habitat limitations at higher flows.

Water Quality Protection

The San Francisco Regional Water Quality Control Board has listed Lagunitas Creek on the Clean Water Act 303(d) list as impacted by pathogens, sediment, and nutrients. The road is cut through the existing hillslopes and its presence affects the flow pathways resulting in increased erosion along the roadcut. The project proposes installation of bioswales along the inboard ditch to help intercept this sediment. While this is well intentioned, the functionality of the bioswales may be limited by the actual sediment and debris load (see *Managing Road Runoff*, below).

The County should evaluate areas where the roadcut has changed the channel profile, thereby inducing erosion upstream. In many cases, treatment or stabilization of these areas could reduce sediment loading to the road corridor.

Managing Road Runoff

The annual rainfall at the Kent Reservoir is more than 60". This section of Lagunitas Creek and Sir Francis Drake is subject to similar annual rainfall, which results in extensive runoff from the upslope areas, as well as accumulation of debris from the densely forested corridor. There are numerous areas where upslope surface flows enter the road drainage network, resulting in a very high volume of runoff. In many of these discharge areas, water sheets across the road during storm events. There are a number of areas where the County has conducted upslope stabilization to prevent sliding onto the road, and other areas where surface drainage regularly floods the road. These areas should be documented and analyzed to see if additional stabilization practices are necessary. This may also mean adding culverts to improve road drainage in some areas.

Figure 8 presents proposed bioretention swale (bioswale) sections for the inboard ditch portions of the road. There are multiple potential problems with this proposal. As noted above, the volume of water, accumulated from the road and upslope areas commonly overwhelms existing open drainage channels. The installation of a permeable bioswale will likely be overwhelmed under many storm scenarios. Furthermore, the delivery of sediment to the bioswale will quickly fill in the interstitial spaces requiring either regular maintenance or failure in a short period of time. During most storms, the road is quickly covered with debris off the redwood and fir trees. In addition to the sediment loading, the accumulation of needles and other debris from the forest canopy would quickly overwhelm a bioswale facility. The proposed swale section in Figure 8 shows the swale would be installed at grade with the paved surface. Again, if the bioswale is not functioning at its optimal rate, then there is potential to pond water along the road.

An alternative to the bioswale approach is to evaluate the road drainage network and identify areas where accumulated water could be discharged to a bioretention area below the road. A second alternative is simply the creation of drainage ditches that are sized to accommodate expected flows. In this case, the road drainage network should not drain to creek crossings. There are many areas where vegetation is established and is very effective at detaining sediment.

Management of fallen trees along road corridor
The EIR should identify standard practices for managing trees that fall along the road corridor. These trees are part of the riparian corridor and provide important aquatic and terrestrial habitat. A description of standard management practices should be included for this section of Sir Francis Drake.

Slope Stabilization
The project has identified one location where a landslide scarp is along the edge of the road. NPS staff have noted additional slopes immediately adjacent to the road where slope failure to the creek has occurred. As an example, along the pullout between MP 20.03 and 20.13, there is a one foot scarp along the edge of the pullout and the entire slope below (to the edge of the creek) shows signs of previous slope instability. As indicated, there are likely additional areas of instability along the road corridor that should be documented and evaluated as part of the project.

Figure 10 shows a typical approach to stabilize the toe of an unstable slope. The approach of installing extensive rip rap into the Lagunitas Creek channel is incompatible with the sensitive habitats and resources documented above. Any slope stabilization designs should incorporate treatments that include habitat enhancements, such as woody debris installation or other techniques.

OPTION A

At the scoping meeting, the County presented the preferred project, and spent minimal time on Option A, with one presentation slide, and a statement that Option A would include removal of trees.

Based on our review of the limited information provided, Option A would include many of the same activities as the proposed project, including replacement of road culverts, slope stabilization, etc. For these topics, our comments on the proposed project would remain consistent.

Option A would widen the road corridor to allow a minimum of 2 foot shoulders along both sides of the road. This would require removal of 24 Redwood trees along the road corridor.

Tree Removal
Any tree removed as part of the project should be installed as a woody debris structure at project (intentional removal) or contractor (unintentional removal) cost. The Marin Municipal Water District has a well-established woody debris placement program, and these trees should be integrated into their program.

In closing, the National Park Service supports a project that will result in improvement to the safety and road conditions along the Sir Francis Drake Corridor, while minimizing changes to the footprint of the road and riparian corridor of Lagunitas Creek. The protection of threatened and endangered aquatic species and their habitats within Lagunitas Creek should take precedent over road expansion. Should you have questions related to these comments please contact the park hydrologist, Brannon Ketcham at 415-464-5192.

With the proposed project, the County has identified the unique nature and importance of the Lagunitas Creek system, and the proposed project is intended to protect the integrity of this system. We encourage the County to maintain this approach as it moves forward with the planning process.

Sincerely,

Don L. Neubacher
Superintendent

FEDERATED INDIANS OF GRATON RANCHERIA

Sacred Sites Protection Committee
6400 Redwood Drive, Suite 300
Rohnert Park, CA 94928
707- 566-2288

RECEIVED
NOV 26 2008
MARIN COUNTY PUBLIC WORKS

November 23, 2008

David Bernardi
County of Marin Civic Center
3501 Civic Center Drive, Room 404
San Rafael, CA 94903

RE: Sir Francis Drake Blvd. Rehabilitation Project

Dear Mr. Bernardi

Thank you for the information regarding the Sir Francis Drake Blvd. Rehabilitation Project. The Federated Indians of Graton Rancheria (FIGR), a federally recognized Tribe and sovereign government has the following official comments regarding cultural resources on or near the project site.

FIGR members have knowledge of the presence of sacred, gathering sites and cultural resources in or in close proximity of this project and request a meeting with the lead agency to discuss our concerns. We would like to begin the government to government consultation process soon. Please contact the Tribe at the numbers below to schedule a meeting.

We also request contact information for the all agencies granting permits for this project.

If you have any questions, please contact me at the numbers below.

Sincerely,

Nick Tipon
Chairman: Sacred Sites Protection Committee

707 478-1737
ntipon@comcast.net

California Regional Water Quality Control Board
San Francisco Bay Region

Linda S. Adams
Secretary for
Environmental Protection

1515 Clay Street, Suite 1400, Oakland, California 94612
(510) 622-2300 • Fax (510) 622-2460
http://www.waterboards.ca.gov/sanfranciscobay

Arnold Schwarzenegger
Governor

RECEIVED
NOV 25 2008
MARIN COUNTY PUBLIC WORKS

November 24, 2008
Site No. 02-21-C0730
CIWQS Place No. 729744

David Bernardi
Marin County Community Development Agency
3501 Civic Center Drive, Room 308
San Rafael, CA 94903

SUBJECT: Sir Francis Drake Boulevard Rehabilitation Project Notice of Preparation

Dear Mr. Bernardi:

We have received and reviewed the Notice of Preparation (NOP) and Notice of Scoping Session, and reviewed the project description details found on the Marin County Department of Public Works website for an Environmental Impact Report (EIR) for the Sir Francis Drake Boulevard Rehabilitation Project. We have the following comments on these documents.

The detail provided was not substantial enough for us to determine all potential environmental impacts that must be considered in the EIR. However, we do have several specific concerns based on the data provided.

Project Alternatives:
We had difficulty in determining what is the preferred alternative – "proposed roadway improvements" or "proposed roadway improvements – Option A". We are particularly concerned that Option A, with its proposed removal of 24 trees (23 relatively large diameter redwoods) may have such significant environmental impacts. Further, the project goals are not clearly connected to a definition of the problems and the proposed alternatives. For instance, bicycle and pedestrian safety are not discussed, and it is not clear which aspects of the project address vehicle, bicycle or pedestrian safety. The link between road widening and traffic safety is not demonstrated. Additionally, the alternatives considered do not appear to include other options, including paving the existing road without any widening, providing road widening or other accident-prevention measures in high- accident areas only (while leaving the rest of the road at current widths), and using non-structural methods rather than road widening for improving traffic and pedestrian safety, e.g., flashing signals at Shafter Bridge, warning signs at Big Bend, speed limit alterations and improved enforcement of limits, and improvements to the cross-Marin trail to facilitate bicycle, pedestrian, and equestrian use as an alternative to the roadway. In addition to considering non-structural alternatives, it is essential to consider

structural alternatives with less impact, e.g., alternate road paving and bank stabilization methods.

Water Quality, Creek Geomorphology, and Habitat Issues:
The EIR must address water quality and habitat impacts to Lagunitas Creek from paving, construction, road widening or alignment changes (including turnouts), culvert replacement, tree removal, and creek and upslope bank stabilization and must propose mitigation for any impacts. On all issues, the EIR should clearly discuss impacts to Lagunitas Creek, including direct and indirect impacts on the following: water quality (temperature, dissolved oxygen, eutrophication, pollutant discharge); endangered species and their habitat; riparian zone functions; stream productivity; macroinvertebrates; large woody debris recruitment; stream geomorphic function, including sediment discharge and transport; and other relevant parameters. For example:

- Tree and vegetation removal: Serious impacts from tree and vegetation removal including impacts on all functions of the riparian zone and Lagunitas Creek must be analyzed, e.g., loss of shade, loss of instream cover, increased pollutant delivery from road and bank runoff, decreased bank stability, etc. Tree and vegetation removal may also lead to bank instabilities and therefore lead to more erosion and loss of habitat. Lagunitas Creek is listed as impaired for excess nutrients, and any reduction in shade will exacerbate this situation, and may degrade water quality through eutrophication. Further, during the summer Lagunitas Creek has violations of the temperature standard for salmonids as stated in State Water Board Order 95-17.
- Bank slope repair: The project identifies bank slope repair at location 270+25. Based on conversations with the County, this stabilization is proposed along a 500-foot stretch of Lagunitas Creek that has a well-developed and intact riparian zone. The bank instability does not appear to be caused by high flood flows, as was indicated in the NOP, and therefore the proposed solution of toe rock appears unnecessary and may not resolve the problem. The need for this stabilization must be more clearly analyzed and alternative methods, including biotechnical bank stabilization, proposed before any hardscape is incorporated. The impacts of any bank stabilization on the riparian zone, aquatic species and their habitat, and stream geomorphic function must be addressed.
- Culvert replacement: The NOP indicates that three culverts have been identified by the County for fish passage improvements. These improvements need to particularly take into account juvenile fish passage for winter refuge. The recent limiting factors analysis done by Stillwater Sciences for the Marin Resource Conservation District for salmonids on Lagunitas Creek identified winter refuge as a major limiting factor for population recovery. We are aware that the County fish passage assessment did not include an assessment of all potential fish-bearing streams. Therefore, all other culverts on potential fish-bearing streams should be analyzed and considered for improving juvenile fish passage, specifically for winter refuge, and should be sized to promote low velocity salmonid refuge at the confluence with Lagunitas Creek. This will require evaluating stage discharges of Lagunitas Creek and the tributaries. Additionally, all culverts should be evaluated for restoring natural watershed processes, including sediment and large woody debris transport.

Construction and Design Issues:

- Impacts to Tree Roots: The proposed road construction methods, particularly the "crack and seat" from station 100+00 to Shafter Bridge, may negatively affect shallow redwood tree roots and therefore tree vigor and survival. These impacts must be carefully analyzed and avoided.
- Bank instability: All aspects of construction and project design must be evaluated for their potential to cause creek or upslope bank instability or exacerbate current instabilities (as noted above). We are concerned that road widening and/or construction methods may lead to upslope and stream bank instabilities that have not been identified in the provided documents. In many places the road is very close to the top of the streambank, and any construction method involving application of large or point forces may cause lateral instabilities in the bank.
- Upslope stability: The project may potentially increase upslope sediment discharges due to destabilized slopes resulting from the road widening or construction methods or altered drainage patterns. The NOP mentions the use of retaining walls for upslope stability and improving road drainage. The ability of these walls to function both in the short and long-term must be fully analyzed to ensure there is no increased sediment discharge or aggravated drainage problems.
- Bioswales: The project proposes to use inboard ditch bioswales to reduce pollutant discharges to the creek. The ability of these to function effectively with upslope soil sloughing and necessary maintenance must be evaluated.
- Road drainage: Drainage improvements are necessary to reduce erosion impacts from culvert discharges and flooding. Improved inboard ditch drainage, culvert replacements, riprap, and spreaders are discussed in the NOP. Additional measures to dissipate concentrated flow or reduce erosion, such as road outsloping, should also be considered.
- Creek meandering: The project design needs to take into account the natural tendency of Lagunitas Creek to meander. The design must be evaluated to determine if it will result in the roadway being too close to the creek to allow this natural meandering, without requiring current or future hardscape protection measures to maintain road integrity.
- Road pullouts: It is not clear from the NOP where and how many pullouts will be retained or created and how many will be paved. The proposed paving and perforated pipe may not be the best management measure for reducing pollutant discharges, and other measures should be evaluated, including gravel surfaces and converting concentrated flow to sheet flow.
- Construction water quality impacts: A project of this scale, constructed so close to Lagunitas Creek, has very significant potential impacts to discharge pollutants during the construction phase. These impacts must be carefully analyzed and all necessary BMPs implemented during construction.
- Construction materials: Short and long-term water quality impacts from using rubberized asphalt concrete made out of recycle tires must be thoroughly evaluated.

Thank you for the opportunity to comment on the NOP and for the site tour by your and County staff. If you have any questions on these comments, please contact Leslie Ferguson at (510)

622-2344, or via e-mail at lferguson@waterboards.ca.gov or Dale Hopkins at (510) 622-2362 or via email at dhopkins@waterboards.ca.gov.

Sincerely,

Wil Bruhns for

Bruce H. Wolfe
Executive Officer

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
111 GRAND AVENUE
P. O. BOX 23660
OAKLAND, CA 94623-0660
PHONE (510) 622-5491
FAX (510) 286-5559
TTY 711

Flex your power!
Be energy efficient!

RECEIVED

NOV 17 2008

[illegible] WORKS

November 13, 2008

MRN001174
MRN-1-26.51
SCH # 2008112004

Mr. David Bernardi
Marin County Department of Public Works
P.O. Box 4186
San Rafael, CA 94913-4186

Dear Mr. Bernardi:

Sir Francis Drake Boulevard Rehabilitation Project – Notice of Preparation (NOP)

Thank you for including the California Department of Transportation (Department) in the environmental review process for the project referenced above. The Department is primarily concerned with impacts of the proposed project on State highway facilities. Please make sure that the environmental document evaluates impacts to traffic on State Route 1 and provide us with a Traffic Control Plan, once available.

Encroachment Permit

Any work or traffic control that encroaches onto the State right-of-way (ROW) requires an encroachment permit that is issued by the Department. See the following website link for more information: http://www.dot.ca.gov/hq/traffops/developserv/permits/ . To apply, a completed encroachment permit application, environmental documentation, and five (5) sets of plans clearly indicating State ROW must be submitted to the address listed below:

Julie Hsu, Office of Permits
CA Department of Transportation, District 4
P.O. Box 23660
Oakland, CA 94623-0660

Should you require further information or have any questions regarding this letter, please call or email Ina Gerhard of my staff at (510) 286-5737 or ina_gerhard@dot.ca.gov .

Sincerely,

Lisa Carboni

LISA CARBONI
District Branch Chief
Local Development - Intergovernmental Review

c: State Clearinghouse

"Caltrans improves mobility across California"

Department of Toxic Substances Control

Maureen F. Gorsen, Director
700 Heinz Avenue
Berkeley, California 94710-2721

Linda S. Adams
Secretary for
Environmental Protection

Arnold Schwarzenegger
Governor

November 20, 2008

RECEIVED
NOV 24 2008
MARIN COUNTY PUBLIC WORKS

Mr. David Bernardi, Senior Civil Engineer
Marin County Department of Public Works
3501 Civic Center Drive, Room 404
San Rafael, California 94903

Dear Mr. Bernardi:

Thank you for the opportunity to comment on the Notice of Preparation (NOP) for the *Sir Francis Drake Boulevard Rehabilitation Project draft Environmental Impact Report (EIR)* (SCH #2008112004). As you may be aware, the California Department of Toxic Substances Control (DTSC) oversees the cleanup of sites where hazardous substances have been released and regulates hazardous waste pursuant to the California Health and Safety Code, Division 20, Chapters 6.5 and 6.8. As a potential Responsible Agency, DTSC is submitting comments to ensure that the California Environmental Quality Act (CEQA) documentation prepared for this project adequately addresses any management of hazardous wastes and remediation of hazardous substance releases that may be necessary.

The proposed project involves the rehabilitation of a portion of Sir Francis Drake Boulevard in Marin County in order to enhance the safety and operation of the road. Aerially-deposited lead may be present in soils that are handled during the project because of the proximity of soils to the highway. Therefore, any potentially contaminated soils that will be encountered during this project should be adequately sampled as soon as possible so that any necessary, special handling procedures for these soils can be identified in the draft EIR.

DTSC can assist your agency in overseeing characterization and cleanup activities through our Voluntary Cleanup Program. A fact sheet describing this program is enclosed. We are aware that projects such as this one are typically on a compressed schedule, and in an effort to use the available review time efficiently, we request that DTSC be included in any meetings where issues relevant to our statutory authority are discussed.

Please contact me at (510) 540-3838 if you have any questions or would like to schedule a meeting. Thank you in advance for your cooperation in this matter.

Sincerely,

Homayune Atiqee, Project Manager
Brownfields and Environmental Restoration Program
Berkeley Office

Enclosures

cc: w/o enclosures

Governors Office of Planning and Research
State Clearinghouse
P.O. Box 3044
Sacramento, California 95812-3044

Guenther Moskat
CEQA Tracking Center
Department of Toxic Substances Control
P.O. Box 806
Sacramento, California 95812-0806

California Environmental Protection Agency
Department of Toxic Substances Control

The Voluntary Cleanup Program

The California Environmental Protection Agency's Department of Toxic Substances Control (DTSC) has introduced a streamlined program to protect human health, cleanup the environment and get property back to productive use. Corporations, real estate developers, local and state agencies entering into Voluntary Cleanup Program agreements will be able to restore properties quickly and efficiently, rather than having their projects compete for DTSC's limited resources with other low-priority hazardous waste sites. This fact sheet describes how the Voluntary Cleanup Program works.

Prior to initiation of the Voluntary Cleanup Program, project proponents had few options for DTSC involvement in cleaning up low-risk sites. DTSC's statutory mandate is to identify, prioritize, manage and cleanup sites where a release of hazardous substances has occurred. For years, the mandate meant that, if the site presented grave threat to public health or the environment, then it was listed on the State Superfund list and the parties responsible conducted the cleanup under an enforcement order, or DTSC used state funds to do so. Because of staff resource limitations, DTSC was unable to provide oversight at sites which posed lesser risk or had lower priority.

DTSC long ago recognized that no one's interests are served by leaving sites contaminated and unusable. The Voluntary Cleanup Program allows motivated parties who are able to fund the cleanup -- and DTSC's oversight -- to move ahead at their own speed to investigate and remediate their sites. DTSC has found that working cooperatively with willing and able project proponents is a more efficient and cost-effective approach to site investigation and cleanup. There are four steps to this process:

/ Eligibility and Application
/ Negotiating the Agreement
/ Site Activities
/ Certification and Property Restoration

The rest of this fact sheet describes those steps and gives DTSC contacts.

October 2002

The Voluntary Cleanup Program

Step 1: Eligibility and Application

Most sites are eligible. The main exclusions are if the site is listed as a Federal or State Superfund site, is a military facility, or if it falls outside of DTSC's jurisdiction, as in the case where a site contains only leaking underground fuel tanks. Another possible limitation is if another agency currently has oversight, e.g., a county (for underground storage tanks). The current oversight agency must consent to transfer the cleanup responsibilities to DTSC before the proponent can enter into a Voluntary Cleanup Program agreement. Additionally, DTSC can enter into an agreement to work on a specified element of a cleanup (risk assessment or public participation, for example), if the primary oversight agency gives its consent. The standard application is attached to this fact sheet.

If neither of these exclusions apply, the proponent submits an application to DTSC, providing details about site conditions, proposed land use and potential community concerns. No fee is required to apply for the Voluntary Cleanup Program.

Step 2: Negotiating the Agreement

Once DTSC accepts the application, the proponent meets with experienced DTSC professionals to negotiate the agreement. The agreement can range from services for an initial site assessment, to oversight and certification of a full site cleanup, based on the proponent's financial and scheduling objectives.

The Voluntary Cleanup Program agreement specifies the estimated DTSC costs, scheduling for the project, and DTSC services to be provided. Because every project must meet the same legal and technical cleanup requirements as do State Superfund sites, and because DTSC staff provide oversight, the proponent is assured that the project will be completed in an environmentally sound manner.

In the agreement, DTSC retains its authority to take enforcement action if, during the investigation or cleanup, it determines that the site presents a serious health threat, and proper and timely action is not otherwise being taken. The agreement also allows the project proponent to terminate the Voluntary Cleanup Program agreement with 30 days written notice if they are not satisfied that it is meeting their needs.

Step 3: Site Activities

Prior to beginning any work, the proponent must have: signed the Voluntary Cleanup Program agreement; made the advance payment; and committed to paying all project costs, including those associated with DTSC's oversight. The project manager will track the project to make sure that DTSC is on schedule and within budget. DTSC will bill its costs quarterly so that large, unexpected balances will not occur.

Once the proponent and DTSC have entered into a Voluntary Cleanup Program agreement, initial site assessment, site investigation or cleanup activities may begin. The proponent will find that DTSC's staff includes experts in every vital area. The assigned project manager is either a highly-qualified Hazardous Substances Scientist or Hazardous Substances Engineer. That project manager has the support of well-trained DTSC toxicologists, geologists, industrial hygienists and specialists in public involvement.

The project manager may call on any of these specialists to join the team, providing guidance, review, comment and, as necessary, approval of individual documents and other work products. That team will also coordinate with other agencies, as appropriate, and will offer assistance in complying with other laws, such as the Resource Conservation and Recovery Act.

Step 4: Certification and Property Restoration

When remediation is complete, DTSC will issue either a site certification of completion or a "No Further Action" letter, depending on the project circumstances. This means "The Site" is now property that is ready for productive economic use.

To learn more about the Voluntary Cleanup Program, contact the DTSC representative in the Regional office nearest you:

Southern California
Tedd Yargeau
1011 North Grandview Avenue
Glendale, California 91201
(818) 551-2864

Central California
Tim Miles
8800 Cal Center Drive
Sacramento, CA 95826-3200
(916) 255-3710

North Coast California
Lynn Nakashima Janet Naito
700 Heinz Avenue, Suite 200
Berkeley, California 94710-2737
(510) 540-3839 (510) 540-3833

Central California -
Fresno Satellite
Tom Kovac
1515 Tollhouse Road
Clovis, California 93612
(209) 297-3939

(Revised 10/18/02)

STATE OF CALIFORNIA **Arnold Schwarzenegger, *Governor***

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
(916) 657-5390 - Fax

RECEIVED
NOV 17 2008
MARIN COUNTY PUBLIC WORKS

November 13, 2008

David Bernardi
Marin County Community Development Agency
3501 Civic Center Drive, Room 308
San Rafael, CA 94903

RE: SCH#2008112004 Sir Francis Drake Boulevard Rehabilitation Project; Marin County.

Dear Mr. Bernardi:

The Native American Heritage Commission (NAHC) has reviewed the Notice of Preparation (NOP) referenced above. The California Environmental Quality Act (CEQA) states that any project that causes a substantial adverse change in the significance of an historical resource, which includes archeological resources, is a significant effect requiring the preparation of an EIR (CEQA Guidelines 15064(b)). To comply with this provision the lead agency is required to assess whether the project will have an adverse impact on historical resources within the area of project effect (APE), and if so to mitigate that effect. To adequately assess and mitigate project-related impacts to archaeological resources, the NAHC recommends the following actions:

- ✓ Contact the appropriate regional archaeological Information Center for a record search. The record search will determine:
  - If a part or all of the area of project effect (APE) has been previously surveyed for cultural resources.
  - If any known cultural resources have already been recorded on or adjacent to the APE.
  - If the probability is low, moderate, or high that cultural resources are located in the APE.
  - If a survey is required to determine whether previously unrecorded cultural resources are present.
- ✓ If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
  - The final report containing site forms, site significance, and mitigation measurers should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for pubic disclosure.
  - The final written report should be submitted within 3 months after work has been completed to the appropriate regional archaeological Information Center.
- ✓ Contact the Native American Heritage Commission for:
  - A Sacred Lands File Check. **USGS 7.5 minute quadrangle name, township, range and section required.**
  - A list of appropriate Native American contacts for consultation concerning the project site and to assist in the mitigation measures. **Native American Contacts List attached.**
- ✓ Lack of surface evidence of archeological resources does not preclude their subsurface existence.
  - Lead agencies should include in their mitigation plan provisions for the identification and evaluation of accidentally discovered archeological resources, per California Environmental Quality Act (CEQA) §15064.5(f). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American, with knowledge in cultural resources, should monitor all ground-disturbing activities.
  - Lead agencies should include in their mitigation plan provisions for the disposition of recovered artifacts, in consultation with culturally affiliated Native Americans.
  - Lead agencies should include provisions for discovery of Native American human remains in their mitigation plan. Health and Safety Code §7050.5, CEQA §15064.5(e), and Public Resources Code §5097.98 mandates the process to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery.

Sincerely,
Katy Sanchez
Katy Sanchez
Program Analyst

CC: State Clearinghouse

Native American Contact
Marin County
November 12, 2008

The Federated Indians of Graton Rancheria
Gene Buvelot
6400 Redwood Drive, Ste 300 Coast Miwok
Rohnert Park , CA 94928 Southern Pomo
coastmiwok@aol.com
(415) 883-9215 Home

The Federated Indians of Graton Rancheria
Frank Ross
440 Apt. N Alameda del Prado Coast Miwok
Novato , CA 94949 Southern Pomo
miwokone@yahoo.com
(415) 269-6075

Ya-Ka-Ama
6215 Eastside Road Pomo
Forestville , CA 95436 Coast Miwok
(707) 887-1541 Wappo

The Federated Indians of Graton Rancheria
Greg Sarris, Chairperson
6400 Redwood Drive, Ste 300 Coast Miwok
Rohnert Park , CA 94928 Southern Pomo
coastmiwok@aol.com
707-566-2288
707-566-2291 - fax

Kathleen Smith
1778 Sunnyvale Avenue Pomo
Walnut Creek , CA 94596 Coast Miwok
925) 938-6323

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed SCH# 2008112004 Sir Francis Drake Boulevard Rehabilitation Project; Marin County.

marin transit

750 lindaro st, #200
san rafael, ca 94901

ph: 415.226.0855
fax: 415.226.0856
marintransit.org

November 20, 2008

Ernest Klock
Senior Civil Engineer
Marin County Public Works Department
3501 Civic Center Drive, Room #304
San Rafael, CA 94903

Re: Sir Francis Drake Boulevard Rehabilitation Project NOP Review Period Comments

Dear Mr. Klock:

Marin County Transit District (Marin Transit) staff have reviewed the County's Notice of Preparation (NOP) for the Sir Francis Drake Boulevard Rehabilitation project. The project proposes the repaving of a 5.2 mile long segment of Sir Francis Drake Boulevard between the Shafter Bridge and Platform Bridge Road and would result in the elimination of several existing pull-outs on Sir Francis Drake Boulevard.

As proposed, this project will **significantly impact** the West Marin Stagecoach (Stagecoach) transit service provided by Marin Transit on the roadway segment included in this project. Marin Transit would like to meet with Marin County Public Works to look for opportunities to minimize these impacts and ensure that the rehabilitation project includes accommodating transit services.

Marin Transit staff has compiled the following comments that pertain to the items included in the NOP.

1. Project needs to consider transit service in Plans: Marin Transit currently operates the Stagecoach on Sir Francis Drake Boulevard in the proposed study area. The Stagecoach Route 68 provides service between San Rafael and Inverness via Sir Francis Drake Boulevard; with a bus stop at the campgrounds in Samuel P. Taylor Park, at mile marker 17.10. Eastbound service to San Rafael is provided between 6:30 AM and 6:11 PM, and westbound service to Inverness is provided between 8:05 AM and 7:53 PM. The official schedule and route map

are attached.

2. Official Stagecoach Stop is Located within the Project: The eastbound and westbound stops are located at "Camp Taylor". This project needs to recognize and plan for these stops. This project is an opportunity for the County of Marin to improve these stops. In particular, the westbound stop (Figure 1) should be widened or relocated (perhaps to Madrone Group Camp) to prevent the transit vehicle from blocking traffic while it waits for passengers.

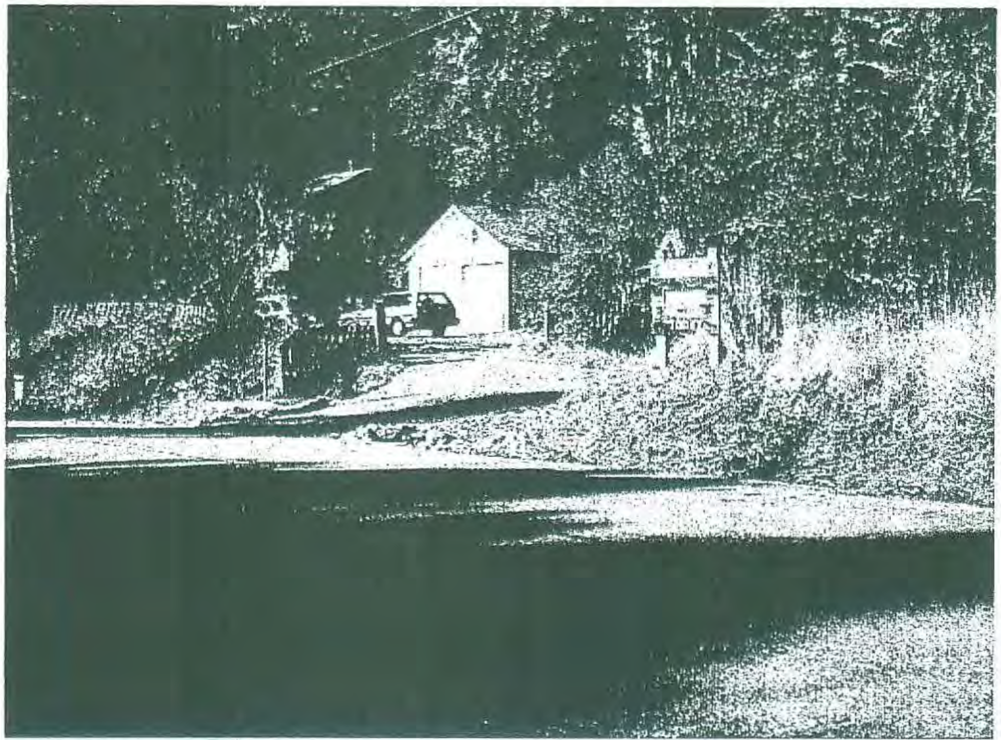


Figure 1: Westbound Sam Taylor Stage Stop

3. Project proposes to block pull-outs that the Stagecoach uses as flag stops and to allow vehicles to pass: Marin Transit requests to be included in discussions related to determining which pull-outs will remain and which will be blocked at the completion of this project.

   As shown in the official Stagecoach schedule, the Stagecoach service operates as a "fixed-route" service with designated bus stops and a set schedule. However the Stagecoach also provides "flag-stop" service, which means that buses will stop at locations between two marked stops, provided there is a safe, hazard-free location for the bus to pull over. There are at least six regularly used flag-stop locations within the project limits that are proposed to be blocked as part of this project:
   - mile marker 15.25 (Shafter Pedestrian Bridge)

- mile marker 15.32 (past the Samuel P. Taylor park sign)
- mile marker 18.05-18.12 (Devils Gulch camping/hiking area)
- mile marker 18.44 (Salmon Crossing Bridge)
- mile marker 18.76 (Salmon Crossing Bridge)
- mile maker 16.7 (Ranger Station near the Overhead and Irving Bridges)

Where possible, the Stagecoach uses existing pull-outs on Sir Francis Drake Boulevard to pick-up/drop-off passengers at flag-stops, as well as to allow faster moving vehicles to pass. There are several locations where Stagecoach vehicles currently pull-over for this purpose, including mile markers 18.76, 19.21, 19.34, 19.64, 20.03, and 20.28; all of which are proposed to be blocked as part of this project. See attached operator notes.

4. Pull-outs needs to be designed to accommodate Transit Vehicles: Remaining pull-outs on Sir Francis Drake Boulevard should be designed to accommodate the Stagecoach vehicles, which are between 22 feet and 32 feet in length.

5. Marin Transit needs detailed information regarding construction delays to plan a route deviation and/or notify passengers: As described in Section 3.09 of the NOP, construction on Sir Francis Drake Boulevard will result in the closure of one lane of traffic in either direction for a period of six months, during Stage 4 through Stage 7 of the construction process. This will significantly impact the Stagecoach service and ability to maintain the published schedule. Marin Transit requests that information pertaining to the construction schedule and construction delays be provided during the planning stages as well as on an on-going basis during the course of this project.

Based on the above mentioned transit service-related comments, we request that Marin County Public Works and TAM coordinate with Marin Transit staff regarding the rehabilitation project on Sir Francis Drake Boulevard. As the local public transit provider, Marin Transit is interested in ensuring high quality transit service within Marin County.

Please contact Lauren Gradia, Senior Transportation Planner at (415) 226-0861 or via email at LGradia@co.marin.ca.us to discuss these comments and set up time for a meeting. Thank you in advance for your cooperation.

Sincerely,

Amy Van Doren

Amy Van Doren
Transit Planning Manager

attachments

T:\04 MCTD Programs\04.02 Rural Transit\04.02.03 Correspondence\2008\SFD Rehabilitation\112108 Marin Transit Comment Letter.doc

Notes: From Operator
Sir Francis Drake Blvd. Rehabilitation Project.

(1) The stops that are currently operating in the segment of Sir Francis Drake that will be being reconstructed are ~~Lagunitas, and~~ Samuel P. Taylor. We also make a regular flag stop in Sam Taylor Park besides the scheduled one. It is located Eastbound at the Salmon Crossing Pedestrian Bridge nearest to mile marker # 18.76.

(2) As far as the pull out improvement project. Listed below are the pull outs currently being used that are large enough to accommodate the size of vehicles on route.

Mile Marker	**Direction**	**Explanation of site**
14.45	Eastbound	Lagunitas stop (needs pavement extended to allow more room for passengers to stand and wait for bus.
15.25	Eastbound	(mile marker is w/b) Shafter pedestrian bridge flag stop
15.32	Eastbound	flag stop at bridge just past Existing Sam Taylor sign
15.45	Westbound	(mile marker is E/B) Large pullout
15.97	Eastbound	large enough pullout to use
16.21	Eastbound	Large pullout
16.81	Westbound	Parking area pullout
17.10	Westbound	Sam Taylor stop (See attached for relocation site)
17.64	Eastbound	Large pullout can't use currently tree branches to low
17.44	Westbound	Madrone Group Camp (Sam Taylor relocation site)
18.05-18.12	E/B W/B	Devils Gulch camping and hiking flag stop area
18.44	Eastbound	At Salmon Crossing Bridge Frequent flag stop
18.44	Westbound	Large pullout
18.76	Eastbound	(mile marker is W/B) Pullout for traffic passing
18.91	Westbound	Long enough needs repair

Continued from previous page.

Mile Marker	Direction	Explanation of site
19.21	Eastbound	(mile marker is W/B) Pullout for traffic passing
19.34	Eastbound	(mile marker is W/B) Pullout for traffic passing
19.64	Eastbound	(mile marker is W/B) Pullout for traffic passing
20.03	Eastbound	(mile marker is W/B) Pullout for traffic passing
20.28	Eastbound	(mile marker is W/B) Pullout for traffic passing

(3) I would like to propose a relocation of the Westbound Samuel P Taylor stop. I have taken pictures of the current stop location as well as the proposed stop relocation. It is the Madrone Group Camp which is located 0.30 miles from the current westbound stop. But has ample space for the bus to pull off of the Highway. It is a reservation only camping area. It is located at mile marker 17.44.

(4) I am not quite sure how much this rehabilitation project is going to affect the operation of the service we currently provide. I know for a fact that it will inflict unknown delays on every leg of the current schedule that road work is being performed. It will affect the times heading each direction. Not allowing the bus to stay on schedule. From past experience with road/ tree work in this same area we were experiencing no less than 20 minute delays each direction throughout the entire day. This is going to be a much more involved project lasting through peak recreational use time. So the disruption in service is unknown.

May, 2008

Draft letter to Supervisor Kinsey, Chair
~~Marin Transportation Authority~~
Transportation Authority of Marin

Dear Supervisor Kinsey:

The Fairfax Town Council has reviewed the project outline for the Sir Francis Drake Boulevard Rehabilitation and though it is still early in the process, we feel it is not too early to voice our concerns. As this project could severely impact the human, wild animal and vegetative life in our environment, and, as it will utilize Measure A funds to which we all contribute, we would like to voice our preference.

After reviewing the options stated in the publicly presented report of Project Manager David Bernardi, we feel that Option One, which repairs the road and seeks to leave as much of the stream bank and vegetation intact, is the best option.

In any case we feel that it is important to articulate what we value and would support in any option ultimately offered:

No Cutting of Old Growth Redwoods: At least one of the proposed options and all of the public discussions have made mention of the destruction of at least 19 if not many more old growth redwoods, some upwards of 1000 years old. We do not support the destruction of any of these magnificent trees.

Protection of Fish: As this stream is one of the last remaining Coho Salmon runs, it is vitally important that the stream be protected from construction and roadway run-off.

Safe-Guarding of Water: It is vital that the purity of water be preserved to serve all animal and vegetative life as well as the stream's fish.

Protection of Owl Habitat: This area is flush with birds, and is a sheltering home for some of the area's last remaining owls. We seek to protect them as well.

Safety of Bicyclists: On a county-wide level, we are all currently in the process of expanding bicycle mobility to replace motor vehicle traffic wherever we can. In every case, and especially in this project, we seek to make bicycle friendly passageways that are safe for all bicycle riders.

We understand an Environmental Impact Report is the next stage of consideration on this project. But we feel it is best and most useful to readily express areas and preferences that are most important to us. We seek to guide the project early toward a positive focus -- protective of nature and of humankind. We urge you to support our requests and honor our considerations.

Sincerely,

CC Farhad Mansourian
CC Steinhauser
all members of TAM.

Mary Ann Maggiore
Mayor of Fairfax

AGENDA ITEM # 6

MARIN COUNTY DEPARTMENT OF PUBLIC WORKS

PUBLIC SCOPING SESSION

ENVIRONMENTAL IMPACT REPORT FOR SIR FRANCIS DRAKE BOULEVARD REHABILITATION PROJECT

WRITTEN COMMENT FORM

November 15, 2008

Name/Affiliation: Sandy Greenblat
105 Bay Way
San Rafael CA 94901 MARIN HORSE COUNCIL

Address:

City: Zip Code: Telephone: 415/459-1335

Please provide comments and concerns regarding the environmental effects of the proposed project or the environmental process below.

Please see attached

Sandy Greenblat

Please use backside of page for additional comments, if needed. This comment form may be handed in at the scoping session to County Staff or mailed to the attention of Dave Bernardi, by Thursday November 24, 2008, at the Marin County Department of Public Works, 3501 Civic Center Drive, Room 404, San Rafael, CA 94903.

RECEIVED
NOV 05 2008
MARIN COUNTY PUBLIC WORKS

MARIN COUNTY DEPARTMENT OF PUBLIC WORKS

PUBLIC SCOPING SESSION

ENVIRONMENTAL IMPACT REPORT FOR SIR FRANCIS DRAKE BOULEVARD REHABILITATION PROJECT

WRITTEN COMMENT FORM

November 15, 2008

Name/Affiliation: SANDY GREENBLAT - MARIN HORSE COUNCIL

Address: 105 BAY WAY

City: SAN RAFAEL Zip Code: 94901 Telephone: 415/459-1335

COMMENTS ON THE SIR FRANCIS DRAKE BOULEVARD REHABILITATION PROJECT NOTICE OF PREPARATION

Roadway Shoulders, Turn Outs and Pull Outs:

The Environmental Impact Report and the resulting final grading and paving plan must include the widening of all shoulders, turn outs and pull outs to the greatest extent allowable under physical limitations.

These areas, designed to provide room for vehicles to pull away from the roadway and allow other vehicles to pass, must include pavement levels that are as wide as possible when viewed away from (to the right of) the usable right edge of the traffic lane. There must be no variation in the level of the pavement.

Present conditions include drop-offs from 1" to as much as 4" when leaving the roadway to allow passing. This creates a very dangerous situation. It results in a lack of constant tire contact with the surface and continuously breaks up the edge of the pavement. The result is the constant creation and recreation of unstable areas many vehicles chose not to utilize. Repeated 'dropping off' the roadway and reentering the roadway by essentially climbing back onto the road surface is damaging to vehicles. Many drivers simply will not tolerate the risk of damage to their vehicles.

Retaining a constant pavement level will allow cars, trucks, trucks with trailers, semi-trucks with trailers and other vehicles to properly and safely leave the roadway to allow passing. It will provide a safe method to re-enter without incident or damage. Failure to provide such a safe surface area will defeat the very purpose of the turn outs, pull outs, and shoulders.

Signage as indicated in your study is absolutely necessary to prevent parking.

Please use backside of page for additional comments, if needed. This comment form may be handed in at the scoping session to County Staff or mailed to the attention of Dave Bernardi, by Thursday November 24, 2008, at the Marin County Department of Public Works, 3501 Civic Center Drive, Room 404, San Rafael, CA 94903.

Marin Conservation League

1623A Fifth Avenue • San Rafael, CA 94901
(415) 485-6257 • Fax (415) 485-6259
e-mail: mcl@marinconservationleague.org • website: www.marinconservationleague.org

RECEIVED
NOV 24 2008
MARIN COUNTY PUBLIC WORKS

November 21, 2008

David M. Bernardi
Senior Civil Engineer
Department of Public Works
County of Marin
3501 Civic Center Drive, Room 404
San Rafael, CA 94903

Re: Sir Francis Drake Boulevard Rehabilitation Project – DEIR Scoping Comments

Dear Mr. Bernardi,

We take this opportunity to provide you with the Marin Conservation League's comments regarding the scoping of the Environmental Impact Report (EIR) to be prepared for the Sir Francis Drake Boulevard Rehabilitation Project now under consideration by the County of Marin. While the project is a main connecting route between east and west Marin, it runs alongside endangered Coho salmon habitat in Lagunitas Creek, and also passes through Samuel P. Taylor State Park. We believe that the natural resources at risk must receive priority in this case, and offer our comments on the preparation of a thorough and exhaustive EIR with this in mind.

Impacts on Lagunitas Creek:

Sedimentation Risk: There should be zero tolerance design and construction of the project to ensure that no additional sedimentation occurs in Lagunitas Creek. Necessary mitigations should include but not be limited to the inclusion of catchment basins, dust control measures, and other best management practices. EIR should assess whether or not the proposed design accomplishes this objective and, if not, describe in detail what is necessary to be done in order to achieve this goal.

Road Runoff Pollutant Risk: We are concerned over the potential risk of additional pollutants reaching the creek from construction activities as well as from the proposed use of Rubberized Asphalt Concrete Overlay. The EIR must analyze the potential impacts of the proposed construction methods and materials in this regard and indicate what methods and materials would fully mitigate against the risk of additional pollutants reaching Lagunitas Creek.

Marin County's Environmental Guardian
A nonprofit corporation founded in 1934 to preserve, protect and enhance the natural assets of Marin County.

Ongoing Maintenance Plans: Once the project is completed there must be a clear and comprehensive Maintenance Plan to ensure that the roadway continues to perform as planned and the creek continues to receive the necessary protections embedded in the project design. Therefore, the EIR should outline the contents of a Maintenance Plan.

Cumulative Impacts: The EIR should investigate and describe in detail the potential cumulative impacts from the project on Lagunitas Creek over time. This would include the risks noted above as well as those deriving from increased auto and bike traffic in the future. The EIR should determine whether or not unacceptable threshold risks to the endangered Coho salmon would occur as a result of the project and its future operation.

Roadway Pullouts: Forty-three roadway pullouts are shown in the project description. Five are designated to remain, and thirty-eight will be blocked from access, yet it appears that all will be paved with permeable asphalt. The five remaining pullouts are all next to the creek and will presumably be sized to accommodate trucks and vehicles pulling trailers. The EIR should analyze the impacts of using permeable asphalt for the blocked pullouts vis-a-vis leaving them in a natural state. The EIR should also analyze the potential for erosion at the edge of all the pullouts and propose appropriate mitigations to correct erosion risk.

Tree Removal under Option A: The removal of 24 trees along the roadway may expose the creek to additional sedimentation and erosion risks. Tree removal may also reduce the shading of the creek, which could adversely affect water temperatures. The EIR must address these risks and indicate what mitigations, if any, can be employed to reduce them to insignificance. Also, if trees are to be removed, what replacement trees will be provided, and where will they be planted. Disposal of trees removed should be addressed in the EIR along with preferred mitigation measures to recycle them for productive use.

Public Safety and Traffic Impacts:

Traffic Levels: Page 4 of the Project description states that the total average daily traffic (ADT) in the fall of 2007 was 5,031 vehicles yet the tables show much lower numbers. Which is correct? And if there is no discrepancy, an explanation is necessary. The EIR must use actual traffic counts with a sufficient sampling size over different time periods during the year to provide an ADT baseline for comparison to future estimated traffic once the project is completed. Traffic projections should extend out for the 30-year estimated project life for all types of users with estimates of peak use and levels of service obtained.

Traffic Safety: The EIR should inform the public on what the present accident and collision experience is on this 5.2 mile section of roadway, and what the expected accident and collision rate may be in the future based upon projected traffic levels and speeds from the improvements made with the proposed project and under Option A.

As we understand it, the proposed project does not contemplate a widening or realignment of the existing roadway. Option A, however, plans for both widening and some realignment of the roadway. The proposed project does not have a dedicated continuous bike path whereas Option A would do so. The two alternatives will promote different and potentially conflicting traffic behavior by autos as well as bicyclists. The EIR should assess these outcomes and propose appropriate mitigations. The two alternatives may also have different impacts with respect to travel speeds by both autos and bicyclists, which also require analysis in the EIR.

In this connection, it has been proposed that the EIR incorporate another alternative that would remove bicyclists entirely from the roadway and transfer them to the old railroad right-of-way from the Ink Wells Bridge, through Samuel P. Taylor Park and on to Platform Bridge Road. The Marin Conservation League does not support this proposal. It raises other potential safety concerns associated with placing high speed road bikes in close proximity with pedestrian and equestrian users of the existing pathway on the old railroad right of way and in the park itself. However, if this additional alternative should be added to the content of the EIR, these potential conflicts and risks must be assessed and mitigated appropriately with effective speed control devices and barriers. It may also require a widening and re-surfacing of the pathway in various sections in order to accommodate multi use, which, in turn, will need effective mitigations. Impacts on wildlife in the park with increased bike use of the pathway would also have to be assessed and mitigated.

<u>Other Issues:</u>

Noise: The EIR must include information on the noise generated by the project construction and future traffic levels, and provide for appropriate and effective mitigations to protect native species in the project corridor, especially during nesting and spawning seasons.

Project Performance Monitoring: While the Contractor is responsible for protection of environmental resources during construction, it is important that the County have a detailed monitoring plan for the Contractor's performance in this regard. The EIR should spell out in great detail how this must be accomplished in order to ensure full compliance with all the necessary mitigations.

Thank you for this opportunity to comment on the scoping for this project EIR. We look forward to reviewing the Draft EIR in due course

Sincerely yours,

Nona Dennis

Nona Dennis
President

MCBC
MARIN COUNTY
BICYCLE COALITION
www.marinbike.org

P.O. Box 1115
Fairfax, CA 94978
voice (415) 456-3469
fax (415) 456-9344
www.marinbike.org

November 20, 2008

RECEIVED
NOV 25 2008
MARIN COUNTY PUBLIC WORKS

Mr. Dave Bernardi
Marin County Department of Public Works
3501 Civic Center Drive- Room 404
San Rafael, CA 94903

Re: Sir Francis Drake Boulevard Rehabilitation Project- Scoping Comments

Dear Mr. Bernardi:

The Marin County Bicycle Coalition is pleased to submit comments regarding the scoping process for the Samuel P. Taylor State Park/Sir Francis Drake Boulevard Rehabilitation Project Environmental Impact Report. The Marin County Bicycle Coalition wishes to maximize safety through this corridor for bicyclists and all other users, while minimizing impacts to the ecological environment including trees, soils, water quality, aquatic and terrestrial species, etc.

As you may be aware, since 1999, there have been four bicyclists killed in West Marin – making West Marin the most dangerous place to bicycle in all of Marin County. This stretch of roadway has many hazards that the Project seeks to remedy; we believe improvements can be made while minimizing ecological damage to the ecosystem.

Below please find a list of areas that the MCBC requests be considered in the preparation of the EIR.

- One specific concern we have regarding safety is the prospect of both experienced and inexperienced riders weaving in and out of travel lanes (onto and off of shoulder areas) if there are not continuous shoulders. The 0-4 foot-wide shoulder option creates this potential hazard for all bicyclists – weaving into travel lanes is a documented cause of crashes between bicyclists and motorists. Please evaluate the safety issues related to variable shoulder width and how to maximize safety while preserving the environment.
- While evaluating a continuous shoulder through the park (as part of the 3 foot continuous shoulder alternative), we request that the safety and environmental impacts of a continuous 18-inch wide shoulder be reviewed (including the number of trees that would be cut). As was indicated at the November 15 public meeting, an evaluation of which trees lie within the current shoulder area and their distances from the roadway centerline would be very helpful for such an evaluation. Please evaluate creating shoulder widths that range from a minimum of 18 inches to 4 feet (where feasible) to minimize the removal of trees.

- Narrower automobile lanes provide traffic calming and have been shown through some studies to provide safer conditions for drivers, pedestrians and bicyclists. Please evaluate the installation of minimal-width automobile travel lanes (10.5 feet or less); this could further reduce the tree impacts while providing a wider shoulder and improving safety.

- Please evaluate how potential increases in automobile speed with the widening of shoulders might impact the safety of other road users. This review should include suggestions for how any increased hazards could be mitigated through narrower automobile lanes, signage, or other traffic calming measures, etc.

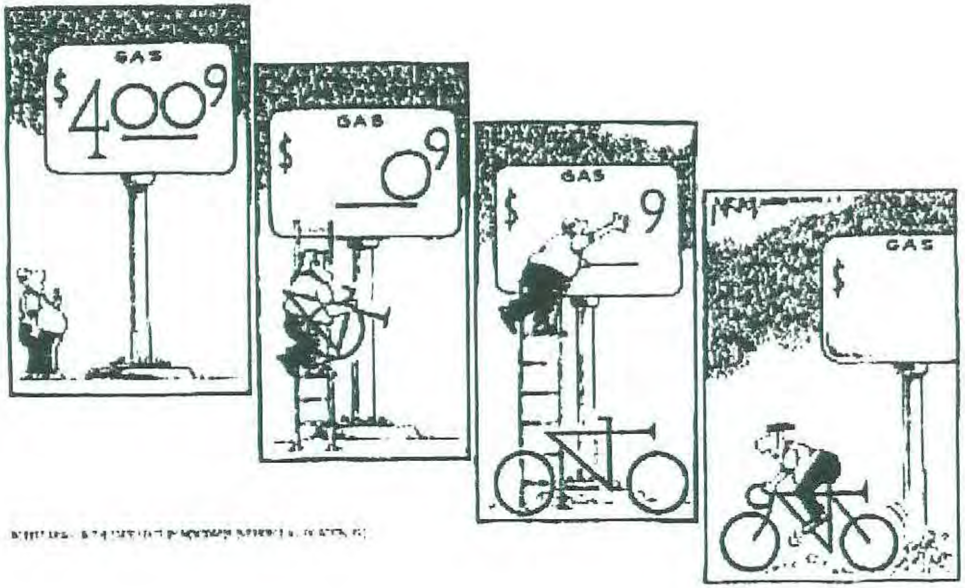
- To maximize cyclists' safety, road shoulders must be consistently smooth. We recommend that any permeable pavement on turnouts do not occur within the shoulder zone where bicyclists will be riding; this change of surface could potentially result in a hazard for bicyclists. Please evaluate how to create a consistent riding surface for bicyclists in areas where permeable pavement may be used (in turnouts, etc.).

- A smooth roadway surface is a fundamental safety benefit for bicycle riders; we want to make sure that the project is constructed in a way that will have long-term benefits and will not require re-paving in fewer than 20+ years. Please evaluate various options for improvements to the surface of the roadway.

We appreciate the opportunity to comment on this project, and look forward to working with the County and other stakeholders to protect the safety of all corridor users while ensuring minimum impacts to the ecological environment.

Sincerely,

Andy Peri, Advocacy Outreach Coordinator
Marin County Bicycle Coalition


GAS
$4009
GAS
$
09
GAS
$
9
GAS
$

[illegible]

SIERRA CLUB
FOUNDED 1892

Gordon Bennett
40 Sunnyside Dr, Inverness CA 9493
415-663-1881 gbatmuirb@aol.com

RECEIVED
NOV 26 2008
MARIN COUNTY PUBLIC WORKS

November 23, 2008

Marin County Department of Public Works (DPW)
Attn: Dave Bernardi, Senior Civil Engineer
3501 Civic Center Drive, Room 404 San Rafael, CA 94903

Re: Comments on the Sir Francis Drake Boulevard Rehabilitation Project (SFDB Project) Notice of Preparation

Dear Mr. Bernardi:

The Sierra Club, on behalf of its 7000 Marin County members, is please to offer the following scoping comments on SFDB Project, which we continue to believe has the potential to provide benefits to habitat, bicycles, and vehicle safety.

1) We urge that the Environmental Impact Report (EIR) study a new "preferred" alternative with standardized 10-foot travel lanes, minimum 1-foot paved shoulders and no tree removal. The new 10-foot lane alternative would have the same inner edge and same minimum 1-foot paved shoulder as the current 11-foot no-tree removed alternative, thus maximizing roadway distance from the creekbank. We suggest this new 10-foot lane alternative would provide vehicle safety benefits over the current lanes that vary in width from 9 to 12 feet

2) The EIR should study whether paved shoulders increase safety by providing additional road surface for emergencies. For example, it may be that actual accident rates for 10-foot lanes with 1-foot paved shoulders in the Project area may be more similar to published accident rates for 11-foot lanes with soft shoulders elsewhere. Likewise, actual accident rates for 11-foot lanes with 1-foot paved shoulders in the Project area may be more similar to published accident rates for 12-foot lanes with soft shoulders elsewhere.

3) The EIR should study whether 10-foot lanes, which would be consistent with existing bridges within the Project area (e.g. Irving, whose indicated 10-foot-lanes are not proposed to be changed), would be safer than 11-foot lanes, which would have to be narrowed at all bridges and thus could represent a safety hazard.

4) The EIR should study the claim that 11-foot lanes will reduce vehicle accidents compared to narrower lanes in the Project area. Some data shows that 10-foot lanes are equally safe (see attachments 1 and 2). While wider lanes may well reduce accidents for the average rural road, we do not believe this accident data is applicable to the Project. Accidents in the Project area are focused in two places: ~40% at the west end where the lanes are widest, but where the broader curve radius encourages higher speeds and ~30% at Project marker 110+50 (Big Bend) where the road curve has a very narrow radius. Thus we believe a stronger argument can be made that curve radius, not lane width, is the primary accident factor in the Project area. If so, then, 11-foot lanes that encourage higher speed yet require tighter curves in the construction footprint may increase accidents compared to 10-foot lanes that reduce speed and can be constructed with broader curves in the same footprint, including existing bridges.

5) The EIR should analyze the justification of reduced accidents given that the average daily trip count of 2057 with 20 accidents (no fatalities) in 5 years represents what we believe to be an insignificant accident rate of 0.00053%.

6) The EIR should calculate the capacity of both 10-foot lanes and 11-foot lanes compared the current 9-foot lanes and study the impact of any capacity increase on communities at both ends of the Project area (e.g. Fairfax and West Marin).

7) The EIR should study the environmental impact moving the roadway further away from the creek throughout this environmentally constrained area. For example the EIR should examine whether and to what extent 10-foot lanes, as compared to 11-foot lanes, will reduce roadkill while adding 1.26 acres (2 feet x 5.2 miles) of riparian function including: temperature reduction, increased dissolved oxygen, more leaf and insect fall, better bank stability, more effective pollutant removal, and more woody debris. Using 10-foot lanes vs 11-foot lanes simply means 1.26 more acres of habitat and 1.26 less acres of pavement.

8) The EIR should generally clarify road configuration data. For example, existing lane widths appear to be determined by the 17-18+ foot concrete slabs (i.e. they average ~9 feet), except in a few areas where additional asphalt has been placed and the centerline moved, but Figure 2 of the October 17th Project Overview is unclear. The first 4 cross sections provide a total road width (ie road surface whether base-supported or not from 26' to 33'?), but the last two do not. The 4th, 5th, and 6th cross sections sketch the concrete extending to "EP" (edge of pavement), but this is well past the graphics that mark "edge of concrete." Lane widths (ie base- supported road surface?) are not identified in the 4th or 5th cross sections. Shoulder widths (ie currently unsupported asphalt lain outside the concrete?) are not identified in the 2nd 3rd, 4th, and 5th cross sections. The 4th cross section indicates two sections (9'-15' and 5'-14' in width) whose combined width is inconsistent with the overall 17-18' width indicated (i.e. at the right lane maximum width of 14' paired with the left lane minimum width of 9' results in a width greater than the 18' maximum overall width; likewise for the left lane maximum and the right lane minimum). The EIR should clearly define and describe both the existing and proposed linear lengths of "road width," "lane width" and "shoulder width" within the Project area.

9) The EIR should analyze whether the elimination of many current unofficial pullouts may impact bike/pedestrian safety or environmental education (fish viewing) opportunities and if so, then whether impacts can be mitigated. The EIR should also analyze if the smaller number of new pullouts may induce more concentrated use by vehicles thus increasing weight on adjacent tree roots as well as increasing pollutant run off. The EIR should identify the dedicated source of funds to maintain the required porosity of the pullout's permeable pavement as well as any maintenance required to keep the pollutants in check.

10) We urge that the EIR analyze the data on a tree-by-tree basis to create a CEQA required second "build" alternative that would remove significantly fewer trees. The current "reasonable range" of alternatives includes Option A, which proposes to remove 24 trees in order to provide shoulders 3 feet or wider along ~98% of the Project. Many of these trees are heritage redwoods over 3-feet in diameter and one appears to be an old growth redwood over 6 feet in diameter. All of these trees contribute to the "Yosemite" experience that draws people to the Parks and to West Marin. The preliminary study has already indicated that 11-foot lanes with minimum 1-foot shoulders can be created throughout the Project area without removing any trees. Thus Option A proposes to remove these 24 trees simply to increase shoulder width from minimum of 1-foot to a minimum of 3-feet, which we regard as unacceptable and unreasonable to include in the range of "reasonable" alternatives.

11) The EIR should identify the dedicated source of funds to sweep road shoulders clear of debris, which is particularly important when highly sensitive environmental constraints result in narrowed shoulders. We note that shoulders in the adjacent road section through Lagunitas that is similarly highly constrained are not swept. We regard the removal of trees to increase shoulder width that is subsequently rendered unusable through lack of sweeping as unacceptable and unreasonable to include in the range of "reasonable" alternatives.

12) The EIR should address the immediate, long term and cumulative impact from proposed tree removals and develop metrics that can rank each individual tree proposed for removal by its contribution to riparian functions. Using diameter as the only tree metric seems far too crude to be useful given that two trees of the same diameter may differ greatly in their contribution to riparian functions. The EIR should consider whether the onset of Sudden Oak Death may change the baseline of riparian function so that trees deemed insignificant in impact before SOD could then become much more significant.

13) The EIR should round shoulder widths to half-feet. Shoulder widths in the October 17th Project Overview are rounded to whole feet, which disguises the fact that the widest "1-foot" shoulder (1.49 feet) is 3 times the width of the narrowest "1-foot" shoulder (0.5 foot), a meaningful difference for bicycle use.

14) The EIR should clarify the impact of each tree proposed for removal on shoulder width. For example, Figure 12 shows 7 trees to be removed at roughly marker 160+00, which is consistent with Table 4 which shows 7 trees removed at marker 159+15. Comparing Table 2 (no trees removed) with Table 3 (24 trees removed), it appears that the removal of these 7 trees allows the shoulder width to increase in this area from 3-feet to 4 feet, which we consider an insignificant benefit relative to tree loss. The EIR data should be able to address questions such as: what shoulder width would result if the only trees removed were those that contributed insignificantly to riparian function; would any trees need to be removed to increase the minimum shoulder width to 1½ feet? A tree ranking lowest in providing riparian function yet greatest in providing shoulder width may still be worth saving, but it would be useful to have easily understandable data.

15) The EIR should study whether the adjacent roadway during its 30-year life may yet impact trees left standing through the Project's construction phase. For example, the current cracked pavement unintentionally creates a permeable surface that conveys nourishment to the roots of trees adjacent to the road surface. Will a new impervious road deplete the root systems of the adjacent trees so that they slowly die? Will lack of maintenance turn the pullout's proposed pervious pavement to impervious?

16) The EIR should review how the Project counts trees to be removed. Our understanding is that individual redwood trees often grow multiple trunks. If so, then removing one, but not all, of the multiple trunks may be more similar to pruning the tree than removing the tree completely. For example, the Project's Option A proposes to remove 7 <u>different</u> redwood trees all at location 159+15, *five of which have the same tree tag number (1121). Are these actually* genetically different trees, or are some of them simply sprouts from a more mature tree? If some of these are sprouts, then is the proposal to remove the entire tree or only selected sprouts?

17) The EIR should provide data describing how far away from the creekbank the proposed paved shoulders are. In areas further than 100-feet from the creekbank, shoulders can be wider, but in areas closer to the creek, we urge that shoulders be a maximum of 1.0 foot wide in order to increase riparian functions.

18) The EIR should clarify inconsistencies between Table 2 (no trees removed), Table 3 (24-trees removed) and Table 4's list of trees proposed for removal. For example, Table 2 shows the 6700 feet from marker 213+00 to 280+00 as comprised of 4900 feet of 2-foot shoulders and 1800 feet of 1-foot shoulders. Table 3 shows this same 6700-foot stretch comprised of 5800 feet of 4-foot shoulders, 700 feet of 3-foot shoulders, and 200 feet of 2-foot shoulders. However, Table 4 shows no tree proposed for removal in this 6700-foot section, so it is unclear why the shoulders widen in Table 3. Likewise, Table 2 shows shoulders ranging from 3 to 4-feet from marker 5+80 to 135+00, while Table 3 indicates shoulders in this same area uniformly at 4 feet, yet Table 4 shows no tree removal that would plausibly result in this change.

Start

19) The EIR should study providing habitat and/or fish-friendly culverts on all tributaries to Lagunitas Creek including ephemeral creeks. Stillwater Science's Limiting Factors Study has recently revealed that high-flow refugia is the current limiting factor by an order of magnitude for endangered salmonid populations, thus the presence or absence of potential breeding habitat upstream in the tributaries should no longer determine whether fish-friendly culverts should be provided. Although some tributaries may not appear to have the physical structure needed for high-flow refugia, they can be flooded by high mainstem flows and provide refuge for small fish nevertheless. Tributary culverts should also be designed to facilitate use by lampreys as well as salmon. Even if a fish-friendly culvert is deemed unnecessary, larger and appropriately designed tributary culverts still contribute to ecosystem connectivity and watershed processes, including delivery of nutrients and woody debris. Larger tributary culverts also insure lower long-term maintenance costs. Culverts provided for tributaries should be kept separate from ditch relief bioswale culverts.

20) The EIR should compare the estimated contribution to peak flows from the current road (including its cracks, which provide inadvertent permeability) and the estimated peak flow from the proposed Project. Peak flows due to the Project may be inadvertently increased by former ponding areas now planned to be drained as well as by the proposed narrower inboard ditch with its smaller cross sectional capacity. Similarly, new culverts with higher headwalls may increase hydraulic head and also inadvertently contribute to peaks flows.

21) The EIR should study methods of making the discharge from ditch relief culverts as close to the sheet flow that would have occurred without the presence of the road, so that the road approaches hydrological invisibility. Decreasing unnaturally high flows to background-level flows is not only crucial to endangered coho (Oncorhynchus kisutch) and endangered steelhead (Oncorhynchus mykiss) in Lagunitas Creek adjacent to the SFDB Project, but may also be important to the California freshwater shrimp (Syncaris pacifica), another endangered species whose adjacent populations have been decreasing.

22) The EIR should analyze how the Project, during its construction as well as for its entire 30-year life, will reduce or prevent impacts to the watershed's habitats and wildlife. During construction, for example, noise could impact nesting birds and/or toxins could be released from equipment (e.g. a fuel spill) or from construction materials (e.g. from the rubberized asphalt) or from constructions methods (e.g. dust and debris from the "crack and seat" process). The EIR should indicate the construction staging area and if it contains hazardous materials, then should study which safety measures should be taken to insure that the Park, its wildlife and habitats are fully protected. The EIR should evaluate the ability of the narrower inboard bioswale ditch to continue to filter toxins from 30 years of ordinary roadway use given that it must be properly maintained and protected from upslope sloughing. The EIR should identify the dedicated source of funds for this required ongoing bioswale maintenance.

23) The EIR should study where wetland acreage lost from the narrowing of inboard drainage ditches can be mitigated within the Lagunitas watershed at a site nearest to the Project that most benefits endangered species in the watershed.

24) The EIR should provide additional information to better determine the cause of the cracks running down the middle of the roadway near marker 270+15. Immediately after the November 15 scoping meeting, the Sierra Club walked that section of roadway and we agree that an inappropriate culvert discharge point may be contributing to slope instability thus causing the road cracks. However, we question the suggested contribution of high flow erosion due to the creek turning at marker 270+15 because we observed similar middle-of-the-road cracks where the creek runs straight for about 150 feet prior to the curve. Presumably erosion due to high flows would have less intensity in the straight stretch compared to the curved stretch, yet the mid-road cracks appeared the same.

25) Should slope repair be required at this site, the EIR should study impacts from bioremediation alternatives vs riprap as well as impacts from off-stream repair methods vs methods that require instream work. The October 17th Project Overview Figure 10 does not indicate the length proposed for riprapping but we understand that an estimated 500 linear feet may be proposed, which we consider a significant negative impact to the creek as well as to the ambiance of the park. It should be noted that the previously suggested 10-foot lanes with 1-foot shoulders would provide additional working area compared to 11-foot lanes and may make solutions other than riprap and other than instream work possible.

26) The EIR should graphically represent all new retaining walls proposed, including their location, length, and materials. The EIR should demonstrate both the new walls impact on upslope stability (important for the function of the bioswale), as well as mitigate their visual impact on park ambiance.

27) The EIR should explain what impact lack of a recorded right-of-way may have on the Project and whether a right-of-way agreement from the two parks should be negotiated as part of the Project, given that page 4 of the Notice of Preparation states, *"Along a majority of the roadway there is no recorded right-of-way. Although SFDB bisects both State and Federal parks, the County of Marin has historically maintained the roadway."*

Thank you for the opportunity to provide scoping comments,

Gordon Bennett, Sierra Club Marin Group Conservation Chair

Accommodating Bike Lanes in Constrained Rights-of-Way

http://www.strans.org/travel_lanes_doc.doc
http://www.sprinkleconsulting.com/PDFs/The%20Influence%20of%20Lane%20Widths%20on%20Safety%20and%20Capacity.pdf
http://safety.fhwa.dot.gov/geometric/mitigationstrategies/chapter3/3_lanewidth.htm

Members of the Association of Pedestrian & Bicycle Professionals (APBP) were asked whether 10-foot travel lanes are used in their communities in order to accommodate bike lanes on urban collector and arterial streets. This is a summary of the responses received to date. The contact listed below each summary is the person who sent the response, not necessarily the contact for that project or city.

QUESTION:
Are 10' travel lanes permitted on collectors, on arterials?
If yes, under what conditions?
Is there a traffic volume, heavy vehicle volume or speed threshold?
If 10' lanes are used, is it typically due to right-of-way constraints or because 10' lanes were considered more desirable?
Are there projects in your area where existing 11 to 12 foot lanes were reduced to 10'?
If yes, were there any impacts (increase or decrease in collisions, changes in speed or capacity, etc)?

RESPONSES:
Arlington, VA
- have been installing bike lanes on streets when they are repaved
- have a number of streets with 10' lanes & bike lanes
- have 10' lanes on arterial streets (no thresholds when determining to allow 10' lanes)
- 10' lanes & bike lanes function fine and have not had operational issues or complaints
- Charles Denney, AICP, Bicycle & Pedestrian Program Manager
  Arlington County Department of Environmental Services, Division of Transportation
  2100 Clarendon Blvd., Suite 900, Arlington, VA 2220, cdenney@arlingtonva.us, 703-228-3633

Cincinnati, OH
- 10' lanes are permitted on collectors/arterials 'all the time'
- new installations are generally where space is tight – historical areas, CBD
- all new installations are 35 mph and under
- projects where lanes were restriped to 10': restriped five segments to get bikeways – consultant recommended as low as 9', state DOT refused but allowed 10' lanes (no significant problems)
- Jim Coppock, City of Cincinnati, Department of Transportation and Engineering,Transportation Design Section
  801 Plum St, Room 435 City Hall, Cincinnati, OH 45202-1969, Jim.Coppock@cincinnati-oh.gov 513-352-5305

Colorado Springs, CO
- Have restriped five 12' lanes to: 1) five 10' lanes plus bike lanes or 2) three 10' lanes w/ wide outside travel lanes
- Wide curb lane configuration preferred on designated truck route or with poor access management
- Currently converting a 60' wide street to four 10' lanes w/ a 9' TWLTL and 5', and 6' bike lanes, ADT 18,000 (future 25,000), good access mgmt, non-truck route, posted speed 40 mph
- Kristin Bennett, AICP, Bicycle, Pedestrian and Neighborhood Traffic Programs Manager,City of Colorado Springs, Kristin.bennett@adelphia.net

Charlotte, NC
- Draft Urban Street Design Guidelines specifies 10' lanes under "constrained conditions" on some urban arterials/thoroughfares
- The city does have many 10' (and even 9' lanes) on urban arterials
- John Cook, AICP, The Lawrence Group, Town Planners & Architects, 108 S. Main St., Suite B. P.O. Box 1836, Davidson, NC 28036, jc@thelawrencegroup.com, 704-896-1696

Eugene, OR
- Collector street w/ 6,000-8,000 ADT, w/ busses & bike lanes, 36' wide, parking on one side, 9-10' travel lanes. Speed is 30 m.p.h. (residential)
- 14,000 vehicles per day, speed is 20 m.p.h. 5' bike lane, 7' parking lane, 3 10' travel lanes (one way)
- Minor arterial w/ 13,000 vehicles per day – 9 _' travel lanes
- Arterial and Collector Street Plan – http://www.eugeneor.gov/portal/server.pt/gateway/PTARGS_0_2_13315_0_0_18/41-76.pdf
- Rob Innerfeld, AICP, Senior Transportation Planner, City of Eugene, Public Works – Engineering
  858 Pearl St., Eugene, OR 97401, Rob.inerfeld@ci.eugene.or.us, 541-682-5343

Houston, TX (Houston Bikeways Program – 1996)
- Re-striped four lane blvd's. From two 12' wide travel lanes in each direction to two 10' travel lanes plus 4' wide bike lanes in each direction
- Some 30 miles of the arterial streets in Houston restriped. Traffic volumes range from 15,000 to over 30,000 vpd, posted speeds of 30 to 40 m.p.h. (typically 35 m.p.h.)
- Bill Hlavacek, City Traffic Engineer, City of Houston Traffic Div., Houston, TX, William.hlavacek@cityofhouston.net, 713-837-7244

Lawrenceville, NJ

- NJ Department of Transportation considers 11' to be appropriate lane width on urban arterials, but allows 10' where needed because of right-of-way or development constraints.
- NJDOT has allowed a number of 10' lanes on lower speed roadways
- Charles Carmalt, Trans Planner, 74 Birchwood Knoll, Lawrenceville, NJ 08648, 609-538-1442,ccarmalt@comcast.net

Los Angeles, CA

- Many cities use 10' travel lanes in the LA area Santa Monica, Burbank, West Hollywood, Huntington Beach"
- Ryan Snyder Associates, LLC, 431 S. Burnside Ave. #10c, Los Angeles, CA 90036-5349, 323-571-2910, ryan@rsa.cc

Portland, OR

- 10' lanes (in conjunction w/ bike lanes and otherwise) are very common
- standards found at: http://www.portlandonline.com/transportation/index.cfm?c=36900 click on "Bicycle Master Plan", and see pgs. 94 & 95
- Jeff Smith, Jeff.Smith@pdxtrans.org

Rochester, NY

- 10' travel lanes common in upstate New York
- several heavily traveled arterials (20,000-40,000), with frequent bus traffic, and truck that were routinely traveling on 40' face-to-face roadways marked w/ four lanes
- Contact same as Colorado Springs, CO

San Jose, CA

- Recently completed San Fernando Bike Lane project
- Included sections of roadway w/ 10' travel lanes, 6' bike lanes, and 7' parallel parking
- 10' lanes occurred primarily at approaches to signalized intersections where space was limited
- Corridor has bus line, no complaints from transit agency
- Posted speed is 30 m.p.h.
- John Brazil, Bike/Ped Program, City of San Jose, 200 East Santa Clara St., 8th Floor. San Jose, Ca 95113-1905
  408-975-3206 John.Brazil@sanjoseca.gov

Scottsdale, AZ

- 10' travel lanes permitted on arterials & collectors
- thresholds are case by case, prefer less that 40 m.p.h., typically due to ROW constraints
- several lane reduction projects – typically short distances at intersections for minor collectors, major collectors and minor arterials
  Reed Kempton, Transportation Planner, City of Scottsdale, 7447 E. Indian School Rd., Scottsdale, AZ 85251
  480-312-7630, rkempton@scottsdaleaz.gov

Somerville, MA

- City of Somerville Bicycle Committee has developed travel lane and bike lane width guidelines based on traffic speeds, land use, roadway grade (uphill or downhill), bus and truck traffic.
- Preferred and minimum widths for travel, parking lanes and bike lanes are established with increases and decreases of _ to 1' depending on conditions above.
- Guide is available by contacting swinslow@ci.somerville.ma.us

Tucson, AZ

- Speedway Blvd.: 6-lane divided roadway w/ commercial development on both sides. Speed limit is 35 mph and the ADT is 35 to 40,000 vpd. Lanes were restriped to 10' with a 4 foot bike lane Michael Hendrix, mhendrix@kittelson.com
- Configuration above is 4/10/11/11 (half section). 5/10/10/11 may have worked better. Buses tend not to veer away from edge line. Matthew Zoll, Matt.zoll@dot.pima.gov
- Two-lane residential collector, low speed, restriped 11' lanes to 10' lanes to widen bike lane to 5'
- policy: "Standard Guidance for the Installation of a Bike Route with Striped Shoulder on an Existing City of Tucson Arterial or Collector Street"
- Allows 10' travel lane "with a posted speed limit no greater that 40 mph and travel lanes with no opposing traffic in an adjacent lane"
- Turn lane widths may be 10' and even 9' with TE approval
- 4' bike lanes, including gutter pan, allowed where cross-section limited, with consideration to speed limit, presence of gutter pan, connectivity
- Bike lane to right of Right-Turn-Lane: preferred width 5', constrained widths permits 4', very constrained widths permits 3'
- If cross-section too constrained, 14' wide curb used
- Richard E. Corbett, M.S., AICP, Regional Bicycle Program Manager, Pima Association of Governments
  Transportation Department, 177 N Church Ave., Suite 405, Tucson AZ 86701-1127, 520-792-1093, rcorbett@pagnet.org

Vancouver, Canada

- 10' permitted on collectors and arterials

- minimum 10.5' – 10.8' on designated truck or bus routes
- All arterials have a 31 mph speed limit
- 10' generally used due to ROW constraints - pedestrian space & urban design elements take precedence over wider traffic lanes
- Have reduced lane widths to install bike lanes
- Haven't studied the effects of narrower lanes
- Peter Stary, Bicycle Program Coordinator, City of Vancouver Engineering Services, 453 West 12th Avenue
  Vancouver, BC V5Y 1V4, 604-871-6437, peter.stary@vancouver.ca

The following responses were posted to a similar question posed and summarized by Ben Gomberg in 1998. They are available on the "Bike Plan Source" webpage at www.bikeplan.com/narrow.htm

Cambridge, MA

- Preferred dimensions are 11' travel, 5-6' bike and 8' parking.
- 5' bike lanes minimum adjacent to parking
- 4' min adjacent to curb
- 7' min parking lane

Philadelphia, PA

- 44' wide streets in Philadelphia are being stripped w/ 7' parking lanes, 5' bike lanes, and 10' travel lanes
- the 10' travel lane have appeared to calm traffic somewhat
- pedestrian that is crossing the street has only 20' of moving traffic to contend w/

Portland, OR

- With 44' cross-section would stripe 10' travel, 4.5' bike lane and 7.5 parking lane
- Configuration works well on streets 25-35 mph.
- Curvy streets add .5' to each travel lane
- Streets with low parking usage reduce to 7' parking lane
- Do not consider designs "sub-standard"

San Francisco

- Provide 7-8' min for parking and 5' min bike lane next to parking
- Suggest 8' parking and 14' wide curb if constrained

Toronto, Canada

- on a 46' wide street distribution is: 6.6' parking, 5.9' bike lane, 10.5' traffic lane
- seems to work w/ minimal impact on capacity for streets with up to approx. 18,000 average daily traffic volume
- one street has 5.9' parking, 5.4' bike lane, 10' traffic lanes (four traffic lanes at this width w/ frequent bus service and 30,000 adt)

Publications

AASHTO's *Guide for Development of Bicycle Facilities* (1999)
A *Guide for Achieving Flexibility in Highway Design* (2004b)
TRB Report 330, Effective Utilization of Street Width on Urban Arterials (1990)
Draft ITE/CNU Context Sensitive Design For Urban Arterials Book – http://ite.org/bookstore/RP036.pdf

From ITE Guide Page 118:

"Street width is necessary to support desirable design elements in appropriate contexts such as on-street parking, landscaped medians and bicycle lanes. Excessively wide streets, however, create barriers for pedestrians and encourage higher vehicular speeds. Wide streets can act as barriers, reducing the level of pedestrian interchange that supports economic and community activity. Wide streets discourage crossings for transit connections. The overall width of the street affects the building height to width ratio, a vertical spatial definition that is an important visual design component of urban thoroughfares. Lane width is only one component of the overall width of the street, but is often cited as the design element that most adversely affects pedestrian crossings. In fact, many factors affect pedestrian crossing safety and exposure, including the number of lanes, presence of pedestrian refuges, curb extensions, walking speed and number of conflicting movements at intersections.

General Principles and Considerations

General principles and considerations in the selection of lane widths include:

• Base the overall width of the street and the traveled way on the accumulated width of the desired design elements (for example, parking, bicycle lanes, travel lanes and median). Prioritize design elements that constitute an ideal cross section and eliminate lower priority elements when designing in constrained rights-of-way. Reducing lane width is one means of fitting the design into the available right-of-way.

- A minimum lane width of 10 ft. may be used for travel lanes on low speed urban collector streets. A 10-ft. wide turn lane may be considered on arterial streets in constrained rights-of-way. Consider design speeds of 35 mph or less (operating speeds of 25 to 30 mph) for application of 10-ft. lanes. Check local fire codes for restrictions on lane widths.
- Where adjacent lanes are unequal in width, the outside lane should be the wider lane to accommodate large vehicles and bicyclists (only where bicycle lanes are not practical).
- While it may be advantageous to use minimum dimensions under certain circumstances, avoid combining minimum dimensions on adjacent elements to reduce street width where it could affect the safety of users. For example, avoid combining minimum width travel lanes adjacent to a minimum width parking/bicycle lane, a situation that reduces the separation between vehicles and bicyclists.
- On the lower-speed urban thoroughfares addressed in this report (35 mph or less operating speed), a range of lane widths from 10 to 12 ft. on arterials and 10 to 11 ft. on collectors is appropriate (excluding gutter pan). Lanes that are 11-ft. wide are appropriate under most circumstances addressed in this report. Arterial and collector roadways with design speeds of 30 mph (5 mph over the operating speed) are appropriate for applying the lower end of the ranges (10 ft.) (Figure 9.4). The conventional 12-ft. wide travel lane is appropriate for high speed (40 mph or higher) facilities (see Chapter 11 on Thoroughfares in Vehicle Mobility Priority Areas).
- Streets with high volumes of trucks or buses require wider travel lanes, particularly the curb lane. Modern buses can be 10.5-ft. wide from mirror to mirror and require a minimum 11-ft. wide lane on roadways with 30 to 35 mph design speeds. Wider curb lanes, between 13 to 15 ft. for short distances, should only be used to help buses negotiate bus stops and help trucks and buses negotiate right turns without encroaching into adjacent or opposing travel lanes.
- When wider curb lanes are required, consider balancing the total width of the traveled way by narrowing turn lanes or medians to maintain a reasonable pedestrian crossing width.
- Consider wider lanes along horizontal curves to accommodate vehicle off-tracking, based on a selected design vehicle. The AASHTO Green Book provides guidance on widening for vehicle off-tracking.
- Turn lanes that are 10- to 11-ft. wide are appropriate in urban areas. Use the guidance in Chapter 7 regarding the design vehicle to select an appropriate turn lane width
- Wider travel lanes only marginally increase traffic capacity. According to the *Highway Capacity Manual* (2002), an 11-ft. wide lane reduces the saturation flow rate by 3 percent when compared to a 12-ft. lane, while a 10-ft. wide lane reduces the saturation flow rate by about 7 percent. Consider other means of capacity enhancement such as access management or signal synchronization before using wider lanes.
- If a network evaluation determines that sufficient capacity exists to accommodate corridor- or area-wide traffic demands, consider reducing the number of travel lanes to accommodate the desired design elements in constrained right-of-way. On streets with very high turning movements, replacing through lanes (where turns are occurring from the inside through lane) with a turning lane can significantly improve traffic capacity.
- Consider converting two parallel streets into a pair of one-way streets (couplet) to increase capacity before widening thoroughfares. While the subject of debate and controversy, one-way couplets have appropriate applications under the right circumstances. Strive to keep the number of lanes in each direction to three or less. This measure requires a comprehensive study of the ramifications for pedestrian and bicycle safety, transit and vehicle operations, economic issues, etc.

Recommended Practice

Select lane widths between 10 and 12 ft. based on the following four key considerations:

- Design speed—lanes 10-ft. wide may be considered on collector and arterial streets with design speeds of 30 mph or less. Use the wider end of the range (11 to 12 ft.) at design speeds of 35 to 40 mph.
- Design vehicle—vehicles such as transit buses or large tractor-trailers require wider lanes, particular in combination with higher design speeds if they frequently use the thoroughfare. Consider wider lanes only if appropriate for the frequency of the design vehicle.
- Right-of-way—balance the provision of the required design elements of the thoroughfare with the available right-of-way. This balance can mean reducing the width of all elements or eliminating lower priority elements.
- Width of adjacent bicycle and parking lanes—the width of adjacent bicycle and parking lanes influences the selection of lane width. If the adjacent bicycle or parking lane is narrower than recommended in this report, first consider widening the bicycle lane. If a design vehicle or design speed justify, provide a wider travel lane to provide better separation between lanes (Figure 9.5). The recommended range of lane widths for arterials (10 to 12 ft.) and for collectors (10 to 11 ft.) is consistent with AASHTO guidelines. An 11 ft. lane is used extensively on all classifications of major urban thoroughfares. AASHTO highlights benefits of narrower travel lanes on lower-speed urban streets, including a reduction in pedestrian crossing distance, ability to provide more lanes in constrained rights-of-way and economy of construction. The recommended travel lane widths are also consistent with design guidelines in AASHTO's *Guide for Development of Bicycle Facilities* (1999) and the recommendations in *A Guide for Achieving Flexibility in Highway Design* (2004b).

Research on the relationship between lane width and traffic crashes found no statistically significant relationship between lane width and crash rate on arterial streets (TRB 1986)."

The Influence of Lane Widths on Safety and Capacity: A Summary of the Latest Findings

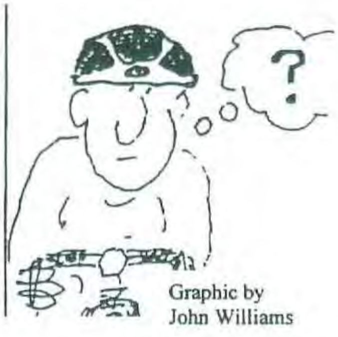
Theodore Petritsch, P.E. PTOE
Director of Transportation Services
Sprinkle Consulting

Problem –

The competition for space within a roadway right-of-way is fierce. It isn't just sidewalks and bike lanes battling "motor vehicle lanes" for the space. Drainage and utilities are also vying for their share of the right-of-way. And money for additional right-of-way is hard to come by. Also, adjacent property owners are not usually "friendly sellers" of land for roadway projects. Often times, something gets squeezed out – usually, it is the bicycle and/or the pedestrian facilities.

Background -

When faced with having bike lanes, and possibly sidewalks, eliminated from a roadway project, advocates for bike and ped facilities may ask, "Can't we narrow the travel lanes to less than twelve feet?" Very likely, the engineers will list apparently good reasons for not wanting to reduce the travel lane widths: twelve foot lanes are the AASHTO standard; reducing lane widths reduces safety; narrowing lane widths reduces the roadway capacity. Surely, given these well known facts, no one would seriously suggest narrowing lanes.



Graphic by John Williams

But what if these well known *facts* aren't true? What if we could narrow the lanes on a roadway without adversely impacting the operations of the roadway? These questions have been asked and, in large part, answered. The following is *The Truth about Lane Widths.*

Solution -

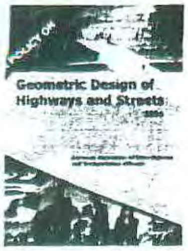
What is "the Standard"? The AASHTO *Green Book*[1] is a guide. On the first page of its Foreword it states, "The intent of this policy is to provide guidance…" Many states, however, have adopted the values in AASHTO as "standards." However, when considering using its specified values for design criteria, one must keep in mind two other statements from the *Green Book's* Foreword,

> *"Minimum values are either given or implied by the lower value in a given range of values. The larger values …will normally be used where the social, economic, and environmental impacts are not critical."*

With these fundamentals in mind, let's review the actual lane width guidance for urban arterial streets.

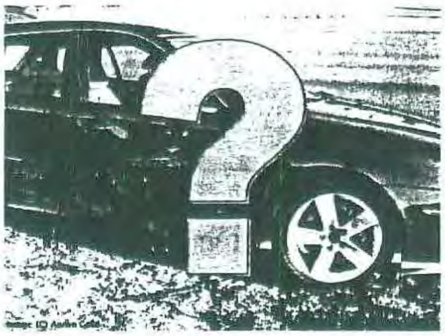
---

[1] AASHTO. *Geometric Design of Highways and Streets*, pg. xliii, AASHTO, Washington, D.C., 2004.



According to the AASHTO *Green Book*, for rural and urban arterials, lane widths may vary from 10 to 12 feet. It goes on to say that 12-foot lanes should be used where practical on higher speed, free flowing, principal arterials. However, under interrupted-flow (roads with signals) conditions operating at low speeds (45 mph or less) narrower lane widths are normally quite adequate and have some advantages.[2]

Given the above statements from AASHTO, 10-foot lanes should be considered the minimum standard.



But what about Safety? Safety is another oft cited reason for maintaining 12-foot lane widths. However, much research has been performed evaluating the crash impacts of narrowing lanes. This research found little to no support for the safety argument (with respect to urban roadways). Some of this research is summarized below:

NCHRP 330 *Effective Utilization of Street Width on Urban Arterials*,[3] in its implementation guidelines states,

> *"Narrower lane widths (less than 11 ft) can be used effectively in urban arterial street improvement projects where the additional space can be used to relieve traffic congestion or address specific accident patterns"*

It goes on to note that,

> *"all projects evaluated during the study that consisted exclusively of lane widths of 10 feet or more resulted in accident rates that were either reduced or unchanged."*

And recommends,

> *"Where streets cannot be widened, highway agencies should give strong consideration to the use of 10-ft lanes where they are necessary as part of a geometric improvement to improve traffic operations or alleviate specific accident patterns."*

Most recently, the Midwest Research Center[4] reported,

> *"A safety evaluation of lane widths for arterial roadway segments found no indication, except in limited cases, that the use of narrower lanes increases crash frequencies. The lane width effects in the analyses conducted were generally either not statistically significant or indicated that narrower lanes were associated with* ***lower*** *rather than higher crash frequencies. There were limited exceptions to this general finding." [emphasis added]*

---

[2] AASHTO. *Geometric Design of Highways and Streets,* pg. 473, AASHTO, Washington, D.C., 2004.

[3] NCHRP Report 330 Effective Utilization of Street Width on Urban Arterials, Transportation Research Board, Washington, D.C., 1990.

[4] Ingred B. Potts, Harwood, D., Richard, K., *Relationship of Lane Width to Safety for Urban and Suburban Arterials,* Transportation Research Board, 2007 Annual Meeting.

And went on to say,

> *The research found three situations in which the observed lane width effect was inconsistent—increasing crash frequency with decreasing lane width in one state and the opposite effect in another state. These three situations are:*
>
> - *lane widths of 3.0 m (10 ft) or less on four-lane undivided arterials.*
> - *lane widths of 2.7 m (9 ft) or less on four-lane divided arterials.*
> - *lane width of 3.0 m (10 ft) or less on approaches to four-leg STOP-controlled arterial intersections.*
>
> *Because of the inconsistent findings mentioned above, it should not be inferred that the use of narrower lanes must be avoided in these situations. Rather, it is recommended that narrower lane widths be used cautiously in these situations unless local experience indicates otherwise.*

Based upon the above cited research, it appears that narrowing lanes to less than the "standard" 12-ft width does not usually degrade safety.

Yes, but there's still the capacity issue. The *Highway Capacity Manual*[5] (*HCM*) is the primary document used by planners and engineers to determine the capacity of roadways and intersections. In Chapter 16, pages 16-10 and 16-11, the *HCM* describes those factors which impact the capacity of signalized intersections – including an adjustment factor based upon lane widths. Essentially, the *HCM* shows that the saturation flow rate (capacity) of a lane at a signalized intersection is reduced by 3.33 percent for each foot of lane width less than 12 feet. Consequently, according to the *HCM*, the capacity of a 10-foot lane is only 93 percent of the capacity of a 12-foot lane.

However, in 2007 a literature search was performed as part of the Florida Department of Transportation *Conserve By Bike Program Study.*[6] This literature search was to evaluate findings of recent research from across the United on impacts to urban street capacity resulting States from lane narrowings. The findings are

> *"The measured saturation flow rates are similar for lane widths between 10 feet and 12 feet. For lane widths below 10 feet, there is a measurable decrease in saturation flow rate.* ***Thus, so long as all other geometric and traffic signalization conditions remain constant, there is no measurable decrease in urban street capacity when through lane widths are narrowed from 12 feet to 10 feet".***[7] *[emphasis added]*

Capacity, therefore, is not degraded until lane widths are reduced to less than 10 feet.

---

[5] Transportation Research Board, *Highway Capacity Manual*, Transportation Research Board, National Research Council, Washington, D.C., 2000.

[6] Sprinkle Consulting, Conserve By Bike Program Study Final Report, FDOT, Tallahassee, FL, 2007.

[7] John Zegeer, P.E., (past Chair, TRB Jighway Capacity and Quality of Service Committee) in a memo to Sprinkle Consulting Engineers, March 22, 2007.

Result –

In general safety and capacity are not adversely impacted by reducing lanes widths to as little as 10 feet. If we refer back to the AASHTO *Green Book's* Foreword and ask, "Are there critical social, environmental and economic reasons that would justify using less than 12-foot lanes?" The answer, in urban areas, is often "yes." Accommodating pedestrians and bicyclists is a critical social issue: it makes our downtowns more livable, transit more viable, and provides for the mobility of those who cannot – or chose not – to drive. Accommodating more users in less space also addresses critical environmental issues: narrower lanes means less pavement (asphalt or concrete), less runoff, and less land consumed. Narrower (than 12-foot) lane widths reduce costs, a critical issue in times of shrinking budgets: smaller right-of-way costs, reduced costs for utility easements, reduced construction costs, reduced environmental mitigation costs. In addition to these obvious considerations, by reducing lane widths and better providing for the mobility of all transportation system users, we can reduce our dependency on fossil fuels and reduce motor vehicle emissions. Furthermore, increased walking and bicycling resulting from the provision of facilities will promote active lifestyles, help combat the growing obesity epidemic, and contribute to healthier more active communities. Realizing and taking advantage of the Truth about Lane Widths provides benefits for everyone.

1st Avenue North at 49th Street in St. Petersburg, FL

Photo Credit:
Michael Frederick, Manager
Neighborhood Transportation
and & Parking

Who to contact for more information -

Theodore A. Petritsch, P.E., PTOE
Senior Transportation Engineer
Sprinkle Consulting, Inc.
18115 US Hwy 41 N, Suite 600, Lutz, FL, 33549
813.949.7449
tap@sprinkleconsulting.com

California Native Plant Society

November 24, 2008

To: Dave Bernardi
Marin County Dept of Public Works
3501 Civic Center Dr, Room 404
San Rafael, CA 94903

From: Board of Directors, Marin Chapter
California Native Plant Society
166 Alpine Street
San Rafael, CA 94901

Re: Sir Francis Drake Boulevard Rehabilitation Project

The Marin chapter of the California Native Plant Society has great concerns about the proposed plans to widen Sir Francis Drake Blvd from Shafter Bridge to Platform Bridge. We fear that almost any version of the proposed project will adversely affect or destroy special stands of native vegetation in the forest.

Some of the Coast Redwood trees (*Sequoia sempervirens*) proposed for removal are "old growth Redwoods," a dwindling group of majestic trees that are at least 800 years old. Redwood trees have a special iconic status in California and we can neither understand nor condone cutting down some of the last remaining old growth Redwoods in Marin, particularly for the purpose of adding a bicycle lane to Sir Francis Drake Blvd, when one of the loveliest and most beautiful and safe bicycle paths already exists approximately 100 feet away, parallel to Sir Francis Drake on the other side of Lagunitas Creek.

Additionally, we have fears for damage to the many native plants associated with Coast Redwoods along the Sir Francis Drake corridor, including Red Ribbons (*Clarkia concinna*), Snow Queen (*Synthyris reniformis*), Streamside Violet (*Viola glabella*), Coltsfoot (*Petasites frigidus)*, and the rare California Bottlebrush Grass (*Elymus californicus*), among others. These roadside plants are some of the most lovely and most diverse in all of Marin County, and we feel they should be preserved, not destroyed.

In addition, the only recorded population in Marin County of Bishop's Cap (*Mitella ovalis*), a locally-rare plant that is at the southern limit of its range in coastal California, grows in a spring in a road-cut along Sir Francis Drake Blvd, and we are concerned that the proposed road widening project will harm or extirpate this plant.

Surveys for special-status species should be conducted in accordance with protocols established by the US Fish & Wildlife Service, California Department of Fish & Game, and CNPS, i.e., appropriately-timed surveys must be conducted for all potentially-occurring rare plants and a complete list of plants observed during these surveys must be provided. The surveys must be conducted by a person(s) familiar with the flora of Marin County and/or with the knowledge of using Marin Flora (Howell et al. 2008).

We hope to see the above concerns addressed in the Draft Environmental Impact Report, and to see alternatives proposed that will not be destructive to Marin's native vegetation.

Dedicated to the preservation of California native flora

RECEIVED
NOV 26 2008
MARIN COUNTY PUBLIC WORKS

eac

The Environmental Action Committee *of* West Marin

November 22, 2008

David Bernardi
Senior Civil Engineer
Marin County Department of Public Works
3501 Civic Center Drive, Room 404
San Rafael, CA 94903

Re: Scoping Session for the Sir Francis Drake Rehabilitation Project

Dear Mr. Bernardi:

Thank you for the opportunity to comment on the scope of the EIR for this important project. The Environmental Action Committee of West Marin views the rehabilitation of this roadway as a unique opportunity to restore some of the natural function of the Lagunitas Creek watershed.

As a general comment, we urge you to choose with great care the baseline conditions that will be used in performing the analysis of the potential impacts of this project. The existing roadway actively impedes the natural function of the watershed. The project description document acknowledges as much, and details improvements that can be made to the existing conditions of the box culverts and the various unpaved pullouts. We strongly urge you to use that approach in analyzing all aspects of this project. For example, the replacement of the existing culverts offers the opportunity to analyze whether any of them, with an improved design, might provide passage to intermittent or ephemeral creeks that could act as refuge for over-wintering salmonids during high flow events. In short, we urge you to use as a baseline a watershed with no road through it.

Our specific comments on the scope of the EIR are detailed below.

Pavement Rehabilitation

The EIR should examine:

- The effect of the crack and seat technique on the root systems of trees and other vegetation;
- The effects of its attendant groundborne noise or vibration on resident wildlife species, including nesting birds;

- The methods for controlling dust and debris, in order to ensure that no sediments or toxins produced by the work enter the creek.

- The potential for toxins, from the pavement milling process or from the application of rubberized asphalt concrete to leach or be washed into the groundwater or creek;
- Potential increases in the transport of toxins from automobiles (oil, fuel, brake-lining dust, etc.) from the new road surface.

Drainage Improvements

The EIR should analyze:

- How any changes in the drainage patterns might degrade water quality in Lagunitas creek; alter streamflows to the detriment of protected species; or have an injurious effect on riparian vegetation;
- How the placement of riprap on or near the streambed might affect streamflows; reduce areas of refuge for protected species during periods of high creek flows; alter the composition of the streambed, or the course of the creek to the detriment of protected species; transfer creekbank susceptibility to erosion and sedimentation from one area to another;
- As noted in our general comment, how the replacement of culverts might be used to enhance the habitat of protected species.
- Please consider an alternative in the EIR that replaces *all existing* culverts that block fish passage with appropriate alternatives.

Roadway Pullouts

The EIR should analyze:

- The effect of new paved pullouts on the root systems of trees and other vegetation;
- The effects of any grading associated with the creation of new pullouts, or the retirement of old pullouts, particularly with respect to riparian vegetation, and sedimentation and erosion affecting the creek.
- The effect of new paved pullouts being designated as no parking zones. Many users of the road currently park in the pullouts. (Where will people who want stop along the road park?)

Slope Repair

Please see our second comment above regarding Drainage Improvements. The EIR should analyze these same potential impacts in regard to the slope repair at Station 270+25.

Thank you again for the opportunity to comment. If you would like to contact me to discuss this further, call (415) 663-9312 or email to eac@svn.net.

Respectfully,

Frederick Smith
Executive Director

On Nov 24, 2008, at 4:29 PM, Paola Bouley wrote:

> Dear Mr. Bernardi,
> Attached please find comments on DPW's Sir Francis Drake
> Rehabilitation Project EIR scoping submitted on behalf of the
> Salmon Protection and Watershed Network and Center for Biological
> Diversity. A hardcopy of these comments is postmarked and<SFD
> EIR_Final_SPAWN&CBD08.pdf>will arrive by mail too.
>
> Respectfully,
> Paola Bouley
>
> Paola Bouley, M.S.
> Conservation Program Director
> Salmon Protection and Watershed Network
>
> PO Box 370, Forest Knolls, CA 94933 USA
> 9255 Sir Francis Drake Blvd, Tocaloma, CA 94950, PH. 415 663-8590
> ext.111 * FAX 415 488 0372

Because life is good.

RECEIVED
NOV 26 2008
MARIN COUNTY PUBLIC WORKS

November 23, 2008

Marin County Department of Public Works (DPW)

Attn: Dave Bernardi, Senior Civil Engineer

3501 Civic Center Drive, Room 404 San Rafael, CA 94903

Re: Comments on the Sir Francis Drake Boulevard Rehabilitation Project (SFDB Project) Notice of Preparation

To David M. Bernardi,

The following comments are being made on behalf of SPAWN and the Center of Biological Diversity regarding the scoping process for the formulation of the Marin County Department of Public Work's Environmental Impact Report for the Sir Francis Drake Boulevard Rehabilitation Project.

The entire length of Lagunitas Creek within the project area (and an adjacent 300' riparian zone) is designated as critical habitat for both the Central California Coast steelhead trout (Federal Register / Vol. 70, No. 170 / September 2, 2005); and Central California Coast coho salmon (Federal Register / Vol. 64, No. 86/May 5, 1999).

Lagunitas Creek is also habitat for endangered California Freshwater Shrimp (*Syncaris pacifica*) and Red-Legged Frog (*Rana aurora draytonii*) as well as "at risk" species such as the Western Pond Turtle (*Clemmys marmorata marmorata*). California Spotted Owls (*Strix occidentalis*) also occur in the project area. The area is extremely sensitive to disturbance and any project proposed in this area requires the highest standard of review and amendment to minimize all impacts.

At this time, we believe the project has the potential for significant negative impacts on Biological Resources, Water Quality, and Air Quality in the Lagunitas Watershed. We have outlined our concerns about the project as presented, and strongly urge that these comments be comprehensively addressed.

I. Ownership, Funding Disclosures, and Adequate Environmental Review

1. Please indicate on a map the specific ownership of the roadway and adjacent rights-of-way through the project area.
2. What specific funds will be used to construct this Project? Are there Federal or State funds being proposed in addition to Measure A? If so,
    a. Are these funds secured? If not, what project elements will be eliminated in the event that matching funds fall through?
    b. How will the use of non-Measure A funds impact project requirements and the EIR?
3. Does the road project include work on Federal lands? If so, how will you be fulfilling NEPA requirements?
4. How will this project impact accessibility to, and the rural character of West Marin?

II. Comprehensive Assessment of Viable Alternatives to Minimize Environmental Impacts and Improve Safety

It is our opinion that alternatives to the proposed widening of Sir Francis Drake Boulevard have <u>not</u> been adequately assessed and presented to the public. The EIR must provide an assessment of:

1. The use of the existing Cross Marin Trail to facilitate bike traffic instead of widening Sir Francis Drake Boulevard and proposed removal of 24 trees;
2. Alternative and varying widths proposals to accommodate <u>zero</u> tree removals along this sensitive area;
3. The implementation of behavioral changes to facilitate bike and pedestrian safety on both the existing road and Cross Marin Trail, including use of signage at public access areas to indicate that alternative bike and pedestrian trails exist through the reach of the proposed project and the option of signage to drive behavior and shared use on the Cross Marin Trail.
4. Alternative routes (e.g. Use of Nicasio Valley Road) for heavy vehicles (transporting petroleum, gravel, soils etc) that currently use the road between San Geronimo and West Marin and that not only impact safety on the road but also pose a significant threat to Lagunitas Creek in the event of an accident and/or spill;
5. The safety impacts of the proposed widening and straightening along the road. Widening and/or straightening the road is likely to increase traffic speed and result in decreased safety especially in areas where tight curves are being maintained.
6. How many bicycles currently use the existing Trail versus Sir Francis Drake Boulevard;

7. An extension of the life of the roadway. The current proposal is stated as having a life of 30 years. The extension of the life of the project beyond this time-frame through the use of more resistant materials and with dedicated maintenance could reduce environmental impact and must be considered.

III. Loss of Riparian Habitat in Designated Critical Habitat

1. Proposed Option A (removal of up to 24 trees in the riparian zone) would qualify as destruction and/or adverse modification of designated critical habitat for endangered salmonids in the Lagunitas Watershed. Additionally, the Project Proposal is likely to have significant damaging impacts on the health of adjacent trees from heavy equipment and construction, many of which are redwoods with shallow and branching root-systems.

   DPW must address:

   a. Why Option A was not presented adequately at the November 15th scoping meeting, i.e. it was presented in a few sentences and the consultant deferred in-depth discussion of this Option to "later" (please refer to recording of meeting). It is our legal opinion that Option A should not be considered an option at this time OR the County has not met its legal obligation for adequate presentation at its scoping meeting.
   b. Provide a qualified assessment of the anticipated impacts to individual stands of trees in designated critical habitat in relation to the impact of heavy machinery and construction on the root structure of the trees along the proposed construction reach. A thorough assessment of the potential impacts needs to be disclosed using scientifically appropriate metrics.
   c. The cumulative impact of loss of tree canopy in the riparian zone as a result of the project, especially as related to in-stream temperature, dissolved oxygen, aquatic food supplies, and the recruitment of woody debris. A consideration of the projects impacts must also the widespread loss of canopy as a result of Sudden Oak Death Syndrome along the proposed project reaches;

2. The project proposes to decommission turnouts in the riparian-zone based on the claim that these contribute to sediment erosion. DPW also proposed to simply block of decommissioned turnouts with rock or wood.

   a. Indicate which data support your claim that significant erosion occurs from these existing turnouts qualifying their up-grade;
   b. Indicate environmental, and safety and public access, impacts from more concentrated usage of fewer turnouts as being proposed in the current proposal;
   c. Indicate how the proposal fully considers restoring habitat in decommissioned areas with appropriate native vegetation, instead of simply blocking off these areas with rock and wood as currently being proposed.

IV. Salmonid Upstream Migration and High-Flow Refugia

ALL culverts must be evaluated for connectivity issues of gravel and wood recruitment, as well as fish passage and high-flow refuge. The projects must maximize repair of current fish-passage barriers as well as restoration of streams that would serve as high-flow refugia, a documented limiting factor for Federal- and State-listed Lagunitas coho salmon (Stillwater Sciences 2008). report ?

1. A number of spawning tributaries are blocked by culverts that need to be retrofitted to accommodate fish-passage have been mentioned, but these are not clearly currently outlined in public documents or in the current proposal.

    a. Indicate exactly which blue-line and ephemeral streams occur along your project area, and
    b. Indicate which major culverts are being proposed for fish-passage repairs.
    c. Indicate designs for the fish passage structures in accordance with current CA DFG standards.
    d. Address the impacts of climate change, a rise in sea level, and projected increases in the occurrence of severe weather events. Specifically, whether stream crossings are designed to facilitate severe flooding events that could occur during the predicted 30-year life of the project.

2. Culverts currently block a number of ephemeral and intermittent tributaries. These streams, while not necessarily spawning habitat, have a large potential to serve as refuge for salmonids during high-flows, as well as provide habitat connectivity to downstream reaches in the form of gravel and woody debris. At this time, DPW has proposed to simply replace existing culverts without consideration of the habitat value of these tributaries; the EIR must evaluate all these culverts and assess what potential increase in habitat would occur, both directly and indirectly, for endangered salmonids and amphibians. DPW's Ross Taylor report does not evaluate high-flow refuge along these reaches and therefore will not be adequate in addressing this issue. report ?

    a. Clearly and thoroughly indicate (detail and map) which ephemeral and intermittent tributaries exist along the proposed project site;
    b. Please assess refuge potential and connectivity of these streams for fish, gravel and woody debris.
    c. Please indicate which repairs could be proposed to restore their habitat value, and hydrologic and geomorphologic processes, watershed processes such as transport of woody debris.

V. Spotted Owl Habitat

The project area is habitat for California Spotted Owls.

1. Indicate the presence and habitat use of this species in and adjacent to your project area;

2. Indicate what steps DPW will take to avoid disturbance to the owls in accordance with US Fish and Wildlife Service guidelines

VI. Listed and Protected Plant Species

The project area is habitat for listed species, and this far no comprehensive survey of existing resources is available to the public.

1. Please indicate what surveys have been undertaken thus far, and what surveys have yet to occur in accordance with established US Fish & Wildlife Service, California Department of Fish & Game, and California Native Plant Society surveys to identify the occurrence of these species;
2. Indicate how this project will avoid impact to these species and their habitats.

VII. Streambank Alterations along Lagunitas Creek, Designated Critical Habitat

DPW's current proposal includes placing riprap along an area streambank, the extact length of which has not been disclosed. Armoring of streambanks in Lagunitas Creek is inconsistent with established practices for streambank alteration in habitat for endangered coho salmon.

1. Please indicate the exact length of streambank being proposed for stabilization;

2. Please indicate how all construction designs and materials and practices will conform to the most recent available recommendations for restoration of coho habitat (DFG, 2005, NMFS 2009). Any creekbed alterations must include bioengineering additions, using only native plants from local genetic stock for revegetation, and include habitat monitoring and adaptive management of the project site to determine effectiveness.

IX. Water Quality

Polluted runoff from the roadway both during and post-construction will have a negative impact on the environment. The following paragraph is referenced from Sandhal et al. 2007, a peer reviewed publication authored by university and government agency scientists

> "*Motor vehicles are a major source of toxic contaminants such as copper, a metal that originates from vehicle exhaust and brake pad wear. Copper and other pollutants are deposited on roads and other impervious surfaces and then transported to aquatic habitats via stormwater runoff. In the western United States, exposure to non-point source pollutants such as copper is an emerging*

> *concern for many populations of threatened and endangered Pacific salmon (Oncorhynchus spp.) that spawn and rear in coastal watersheds and estuaries."*

DPW must address the following areas of concern:

1. What are the identity and current loads of existing pollutants?
2. How will the project increase/decrease these loads?
3. What is the specific duration of construction activity being proposed? Will construction be restricted to the dry season only to avoid discharge of construction pollutants?
4. PAHs, heavy metals, and particulate matter from diesel emission during the construction and daily traffic is likely to have a negative impact on water quality as these materials settle in the watershed and wash into waterways. Indicate how this project will impact loads of these emissions into waterways, and how these will impact listed species.
5. Milling, crushing and grinding the existing roadway surface is likely to produce significant toxic dust and runoff. Indicate what specific pollutant discharges (identity and quantity) are anticipated to occur, and what the impacts on aquatic health from these releases of pollutants are anticipated to be.
6. DPW proposes to apply an overlay of rubberized asphalt concrete (RAC) - a road material made of recycled tires. What specific pollutants are anticipated to originate from this surface? How will these pollutants impact protected and endangered aquatic resources
7. Disclose what type of sealants DPW is proposing to use on the roadway and how these could potentially impact aquatic resources. A USGS study (http://www.usgs.gov/newsroom/article.asp?ID=718) has shown that coal-tar based sealants are shown to have extremely elevated concentrations of polycyclic aromatic hydrocarbons (PAHs). PAHs are toxic to aquatic life. Possible effects of PAHs on aquatic invertebrates include inhibited reproduction, delayed emergence, sediment avoidance, and mortality. Possible adverse effects on fish include fin erosion, liver abnormalities, cataracts, and immune system impairments.
8. What maintenance procedures are being proposed to ensure that pollutants originating from regular vehicular traffic will be prevented from entering the streams during construction AND over the longer-term? DPW must demonstrate how their management actions (short and long-term) will strive to reduce these pollutants.
9. Indicate what maintenance procedures (and funding commitment) DPW is proposing to ensure removal of debris and particulates from the roadway and pervious surfaces to ensure project performance and minimize impacts on water-quality. Commitment and funding for short and longer-term maintenance procedures must be demonstrated before this project is approved.

Related References

Parking Lot Sealcoat: An Unrecognized Source of Urban Polycyclic Aromatic Hydrocarbons. Barbara J. Mahler, Peter C. Van Metre, Thomas J. Bashara, Jennifer T. Wilson, and David A. Johns

Environ. Sci. Technol., 2005, 39 (15), pp 5560–5566

Sorptive Behavior of Nitro-PAHs in Street Runoff and Their Potential as Indicators of Diesel Vehicle Exhaust Particles. Michio Murakami, Junya Yamada, Hidetoshi Kumata, Hideshige Takada. Environ. Sci. Technol., 2008, 42 (4), pp 1144–1150

A Sensory System at the Interface between Urban Stormwater Runoff and Salmon Survival. Jason F. Sandahl,[†] David H. Baldwin,[‡] Jeffrey J. Jenkins,[†] and Nathaniel L. Scholz[*‡]. Environ. Sci. Technol., 2007, 41 (8), pp 2998–3004

Particles and associated metals in road runoff during snowmelt and rainfall. Camilla Westerlund and Maria Viklander. Science of The Total Environment, Volume 362, Issues 1-3, 1 June 2006, Pages 143-156

X. Air Quality

1. Milling, crushing and grinding the existing roadway surface would probably produce significant toxic dust and runoff that would expose both humans and wildlife, as well as aquatic resources as dust settles into waterways.
    a. Indicate what specific pollutant discharges (identity and quantity) are anticipated to occur from this process. And, indicate how these discharges will impact air quality and protected resources.
2. Particulate matter from diesel emission will occur during the construction and daily traffic impact air quality in critical habitat.
    a. Indicate the extent of these emissions;
    b. Indicate the specific composition of these emissions;
    c. Indicate how the specific pollutants identified are likely to impact human health and water-quality in adjacent critical habitat for listed salmonids, shrimp, turtles and amphibians.

XI. Cultural Resources

No indication of as yet surveyed cultural resource assessments have been presented to the public. Please provide a thorough assessment of these resources and how this project will serve to avoid impact to these resources.

Sincerely,

Todd Ste

Todd Steiner	Jeff Miller	Adam Keats
SPAWN Executive Director	Conservation Advocate, CBD	Senior Counsel, CBD

Marin Audubon Society

P.O. Box 599 | Mill Valley, CA 94942-0599 | MARIN AUDUBON.ORG

Post-it® Fax Note 7671
Date [illegible] # of pages ▶ 2
To Dave Bonade From [illegible]
Co./Dept. Co.
Phone # Phone
Fax # Fax #

November 24, 2008

Dave Bernardi
Marin County Department of Public Works
Marin County Civic Center
23501 Civic Center Drive
San Rafael, CA 94903

RE: Scoping Comments for Sir Francis Drake Boulevard Rehabilitation Project

Dear Dave,

Thank you for the opportunity to submit scoping comments for environmental review of the above project. Marin Audubon supports an alternative that does not require removal of any trees. Trees in the path are older than all of the people involved and, if not destroyed by projects such as this, will be here long after we are all gone. Any perceived benefits of increasing the width of the road are clearly outweighed by the environmental damage that would result in this highly sensitive habitat. People do not have to have wide roads allowing them to go fast everywhere. Environmental constraints of this sensitive area should guide the design of the project so that no long-term environmental impacts occur, and wherever possible, environmental improvements result. An EIR should be prepared unless the preferred alternative involves no widening and no additional environmental impacts, and preferably enhancements, than what exists currently.

We request that the following be addressed in the environmental document:

1. A description of the habitats that could be impacted by the project: including redwood forest, and the species that depend on it, and Lagunitas Creek and its aquatic resources. Lagunitas Creek has one of the largest, if not the largest, salmonid populations in the state. The location of salmonid spawning habitat in the range of the project should be identified. Contact should be made with MMWD for information they have gathered during their years of study of the Creek.

2. An analysis of each project components in terms of potential adverse impacts and habitat improvements/benefits that could result from the implementation of these features.

3. Analysis of the adverse impacts to the creek water quality and habitat that could result from increased sedimentation and polluted runoff? What measures would be required to prevent polluted runoff from entering the creek. Asphalt is an oil based product and, when new, runoff carries these pollutants into nearby waterbodies. In addition, rubberized asphalt concrete overlay is proposed. Rubber from tires also contains pollutants.

4. Larger and more formalized pullouts have the potential to increase pollutants and destroy habitat. How many pullout areas are proposed and how many are new? Each pullout location should be analyzed in terms of size, the new area being covered, habitat type and acreage removed and potential pollutant runoff into Lagunitas Creek. The project description refers to stormwater "will percolate through the asphalt." Since when is asphalt a pervious surface?

5. Show the location of all trees that could be damaged by the project. Discuss measures that would be taken to reduce the potential for loss of trees that remain due to damage to roots or barks. How would damage be avoided?

6. Show the location of new drainage culverts and discuss the potential impacts of replacement of drainage culverts. Ere by any new culverts or just replacement? How many and how would they differ? Would they cover additional habitat, streambank or bottom? Why can culverts with the same footprint be used?

7. The possible use of rock riprap for slope repair is a concern not only because it is not a natural streambank habitat but because the individual rocks can be carried by fast moving water and scattered in the streambed. Discuss how the sue of riprap could be prevented, what spawning habitat is nearby that could be impacted, and what other materials or methods could be used to support and stabilize banks?

8. Discuss how many retaining walls would be constructed, how much habitat they would impact and how?

9. If Alternative A, or any other scenario, is still under consideration, there should be a comparison of alternatives specifically regarding: How many trees would be removed or destroyed; how much streambank would be covered with artificial surface; what surface area would be covered by pullouts; how much habitat would be impacted and how, etc. There should be a thorough discussion of mitigation for each impact. How would the loss of each tree be mitigated and where?

Thank you for considering our comments. We look forward to commenting on the DEIR.

Sincerely,

Barbara Salzman, Chair
Conservation Committee

TO: Dave Bernardi, Senior Civil Engineer 15 Nov. 2008

FROM: Connie Berto, Director, Marin Horse Council, Inc. Connie Berto

RE: Sir F. Drake Boulevard Rehabilitation Project

The Marin Horse Council is pleased to support the project for the renovation, improvement, and rehabilitation of Sir Francis Drake Boulevard from Shafter Bridge, through S.P. Taylor State Park, onward to Platform Bridge Road.

We support this project as it will improve the safety of vehicular traffic and provide lanes for bicycle riders. While the unpaved Railroad Grade runs parallel to the creek and the road, this old Grade is a multi-use, popular recreational path through the park and should never be paved as an alternate to providing bicycle lanes on Sir Francis Drake Boulevard.

The Horse Council suggests that attention be given to the placement of vehicle turnouts in both direction along this route. When our members are driving trucks pulling horse trailers, we necessarily drive slowly to protect our cargoes. Frequently, we pull off to allow vehicles behind us to pass us. Where there is no shoulder, or a sharp dropoff from pavement to the shoulder, or a shoulder comprised of deep potholes and rocks, we will not risk jostling our horses and we can not pull off.

Well-placed turnouts, reserved for this purpose only, would enhance the safety of all.

Thank you for the opportunity to comment.

Connie Berto, MHC
70 Crane Drive
San Anselmo, CA 94970
Phone 415-454-2923
c.berto@earthlink.net

From: "Bernardi, Dave" <dbernardi@co.marin.ca.us>
Subject: **FW: Sir Francis Drake Rehab Project**
Date: November 25, 2008 3:17:58 PM PST
To: "John Roberto" <jraplan@sbcglobal.net>

From: Klock, Ernest
Sent: Monday, November 24, 2008 9:49 AM
To: Bernardi, Dave
Subject: FW: Sir Francis Drake Rehab Project

FYI

Ernest L. Klock
Principal Civil Engineer
Marin County Department of Public Works
3501 Civic Center Drive, San Rafael, CA 94913
Tel: 415.499.6552 Fax: 415.499.3724

From: Lisa Heisinger [mailto:lheisinger@rocketmail.com]
Sent: Saturday, November 22, 2008 10:09 AM
To: Klock, Ernest; Klock, Ernest
Subject: Sir Francis Drake Rehab Project

Dear Ernest,
I have been an avid mountain biker and cyclist in Marin County for almost ten years, and I frequently ride through Samuel P. Taylor on Sir Francis Drake Blvd to connect between west and central Marin. We are blessed to have miles and miles of scenic roads here in Marin, but my friends and I DREAD that section of the roadway. The poor road conditions combined with high-speed traffic, no shoulders and blind corners make for a scary ten minutes. We are so excited about the proposed rehab project and wanted to express our support. I hope you will continue to explore alternatives which will make the resulting roadway as safe as possible for bikes. Please let me know what we can do to support the project.

Best regards,
Lisa Heisinger
Mill Valley, CA

KENNETH HOWARD 40 CAMINO ALTO 8202 MILLVALLEY CA 94941

RECEIVED
NOV 25 2008
MARIN COUNTY PUBLIC WORKS

11.21.08

Public Works Department
3501 Civic Center Dr. Room 304
San Rafael, CA 94901.

Re: Widening Sir Francis Drake Boulevard.

Greetings,

I'd like to add my name to the concerned people who are against this project. I understand there is a bike path adjacent to the road, if this is so, altering the road would seem unnecessary. Even if this is not the case, the idea of cutting down more Coast Redwoods is not a good plan....we've lost too many of these historic trees already. This is a beautiful stretch of a county road, and removing an immense part of this established beautiful natural garden is a very bad move.
Thank you for your consideration.

Yours sincerely,

MARIN COUNTY DEPARTMENT OF PUBLIC WORKS

PUBLIC SCOPING SESSION

ENVIRONMENTAL IMPACT REPORT FOR SIR FRANCIS DRAKE BOULEVARD REHABILITATION PROJECT

RECEIVED
NOV 26 2008
MARIN COUNTY PUBLIC WORKS

WRITTEN COMMENT FORM

November 15, 2008

Name/Affiliation: DUFFY HURWIN & Ron Hurwin

Address: 558 TENAYA DRIVE

City: TIBURON Zip Code: 94920 Telephone: (415) 435 - 3598

Please provide comments and concerns regarding the environmental effects of the proposed project or the environmental process below.

11/21/2008

While we are very concerned about environmental impact resulting from repairing S.F. Drake Blvd. through Samuel P. Taylor State Park, we feel it is more detrimental to not repair the road. We feel that allowing the road to deteriorate further has more of a negative impact than repairing it.

We are not as concerned with the widening of the road as we are of smoothing and resurfacing it. We advocate paving at least 3 turnouts in either direction to allow for safe passing of slower vehicles, bicycles & such. We drive our truck & horse trailer through the park several times a week and do not exceed the speed limit which can infuriate faster cars behind us. It's not our job to "police" their speed by holding them back so we prefer to pull over where it is safe to let them pass. The uneven pitted dropoffs found in nearly every shoulder area are unsafe and unsuitable for pulling over. It makes the ride hazardous for our animals in tow. We would be most happy just resurfacing the existing roadway without the removal of excess trees except where they impair safe sightlines & project unsafely into the roadway as well as do drainage work to prevent erosion of new road surface.

We are adamantly against paving the railroad grade between Irving Picnic Grounds and Ink Wells Bridge. It is a hard enough surface for cyclists to use and in the name of "sharing" the resources, it is the only non-paved section between Ink Wells Bridge and Platform Bridge Road. Many hikers, strollers, horses as well as bikes use this wide trail. It drains well in winter & is fine as is. Bikes travel much more slowly and safely on this road than if it were paved. I rollerskate frequently on the Tiburon Bike path and can tell you that, in spite of having dirt paths on either side of the paved center section, bicycles travel at excess rate of speed and have nearly run me down on my skates. Paving that trail will destroy the sense of nature one has traveling on dirt v.s. asphalt and will encourage high rates of speed by cyclists. It is an access trail to both San Geronimo Ridge and Shafter Trails at the east and Riding and Hiking Trail and Jewell Trail to the west which are also dirt trails suitable for foot and hoof. We must not be 100% paved along this route but leave the natural packed dirt there.

Duffy & Ron Hurwin

Please use backside of page for additional comments, if needed. This comment form may be handed in at the scoping session to County Staff or mailed to the attention of Dave Bernardi, by Thursday November 24, 2008, at the Marin County Department of Public Works, 3501 Civic Center Drive, Room 404, San Rafael, CA 94903.

Susan Swan
PO Box 237
San Geronimo, CA 94963

Nov 22, 2008

Comments on the Sir Francis Drake Blvd. Rehabilitation Project Notice of Preparation

I am writing this letter to express my support of the SFD Rehabilitation Project, and to OBJECT to the Option A proposal.

I feel the repairing, drainage & culvert improvments, pullout & slope repair are all needed. My biggest objection to Option A would be the removal of up to 24 trees, which would enable the road & shoulder to be widened. This would only invite motorists to drive faster, and bicyclists to spread out horizontally. I would like to see the bike path on the north side of the creek paved with permeable surface, and designated as THE bik path.

With so much concern about the dwindling numbers of salmon & rainbow trout in the stream it seems unconciable to think of taking out any trees. The cool water, provided by the shad from these trees, is very important to the fish This is something we can do to help the fish population, as compared to the Moratorium for building within 100 ft. of the stream in the San Geronimo Valley, which has very little, if an affect on the fish.

This beautiful, scenic portion of Sir Francis Drake Blvd should be maintained in all it's beauty, and not made into another fast paced highway. Divert the bicyclists to the path away from the motorists, and keep peace for both partie

Nov. 23, 2008
To: County of Marin, Dept. of Public Works
Attn.: David Bernardi, Sr. Civil Engineer
3501 Civic Center Dr. Room 404
San Rafael, CA 94903

RECEIVED
NOV 26 2008
MARIN COUNTY PUBLIC WORKS

From: Jean Berensmeier, Community Activist
P. O. Box 286, Lagunitas, CA 94938
415-488-9034 email - jeanberens@comcast.net
Note: Hard copy is being faxed

Re: DEIR Scoping comments for SF Drake Blvd. Rehabilitation Project - 5.2 miles

Dear Mr. Bernardi,

Thank you for including me on the two exploratory bus tours beginning Feb. 2007 which allowed naturalists, regional representatives, environmental activists and community representatives to weigh in with questions, comments and suggestions. The tone was indelibly set by Supervisor's Kinsey introductory comment, "This is a fish project with a road on it". – in a State Park purchased to preserve redwoods trees nd salmon habitat. That statement describes my bias and my priorities in all the following scoping comments. This bias began in the fall of 1953 when I walked Devil's Gulch during the coho spawning migration where it would not be an exaggeration to say you could. "walk over their backs to cross the creek". I am awed by the fact that I had that experience in my life time and that in my lifetime I might see a rehab project that will correct the problems created by the 1929 concrete road that will improve the quality of the creek and fish habitat so that in my son's life time he may witness something akin to what I did a half century ago.

Background Information
The eastern terminus of this proposed rehab project is the Inkwells where Lagunitas and San Geronimo creek meet. These legendary stepped pools, when filled to overflowing, are the "road" home to natal streams in the San Geronimo Valley for endangered coho salmon and steelhead trout. Given that the National Marine Fisheries listed the San Geronimo Valley on of its top-10 critical areas for conservation in its draft Coho Recovery Plan AND the Association of Bay Area Governments designated the San Geronimo Valley as a Priority Conservation Area AND the Valley's county adopted Community Plan stresses and details the importance of this resource, it is critical that the basis of any rehab plan is to protect the park resource and improve the fish habitat while making improvements to the road for vehicles.

Comments on Consultants and Staff
I commend the consultants and the staff on their skills and ability to analyze the project and be genuinely receptive of the desires, interests, suggestions and concerns during the two bus tours that began in Feb. 2007. The first community

meeting update in Woodacre was exceptional. They immediately recognized that the *Park* is a unique natural resource of great value to the statewide community and included essential background information about the history of the area and the road, native and immigrant culture and detailed resource information geography, native plants and marine life including endangered and threatened species. I am appreciative of the manner in which this and other information led to the highly detailed options that were reviewed at the second community meeting in Pt. Reyes. The extremes of the three options and comments received appear to have led to a hybrid alternative and Option A to be reviewed in this document. My review of the documents and information provided leads me to suggest another alternative which I will call the "preferred alternative". It is basically the proposed alternative with a reduction of road width:

"Preferred Alternative" Priority
To meet the needs of the environment and needs of autos and bikers
- No tree removal
- No tree removal will provide two 10' car lanes
- No tree removal will provide a road shoulder from 1+' - 4' for bikers

My scoping comments are based on the following understanding:

"Proposed" Option Priority
To meet the needs of the environment.
- No tree removal
- No tree removal will provide two 11' car lanes
- No tree removal will provide a road shoulder from 0' - 4' for bikers

It would be helpful if the road shoulder information was rounded differently to give a more accurate picture of the shoulder available to bikers.

"Option A" Priority
To meet the needs of two and four wheeled vehicles.
- It calls for the removal of 23 redwoods and 1 oak
- Tree removal will provide two 11' car lanes
- Tree removal will provide a 3' wide shoulder for bikers
- Up to 3' high retaining walls will be built in select locations to provide width needed.

Option A is 100% anti-environment. Given that the acquisition of Taylor Park was to recognize, preserve and protect the unique redwoods and salmon habitat for current and future generations Option A is not a reasonable alternative and should be removed from any consideration.

In addition, the document reveals that the current narrow width at the east end are "safety" factors when comparing accident figures. The west end lane width is 12' and shoulders upwards of 4'. Clearly, increasing road width is conducive to more accidents.

.

SCOPING COMMENTS

Tree removal

- Assess the visual, aesthetic and cultural impact of removing redwoods trees that are the gateway to Taylor Park west of Lagunitas.
- Assess the impact and provide information to mitigate and reduce to zero the loss of tree canopy affecting water temperature, shade needs of wildlife, loss of wild life home and refuge in the creek, riparian habitat, trees, shrubs and plants, erosion that would result and sediment that would be produced.
- Assess the impacts and provide information to mitigate the cutting of trees which should include type of tree, location of replacement, process of recycling tree sections and disposition of trees.
- Assess the impact of removing trees that do not provide significant canopy due to their age but are important replacement for trees that eventually succumb to age and disease.
- Provide information to explain how this plan includes coordination with Parks administration to maintain removal of sprouts that take up significant space at the base of redwoods that are near the road. This could conceivably mitigate, to some degree, a biker safety issue by providing a little more space in the proposed shoulder without damaging the redwoods.

Pavement Rehabilitation

- 11' road width throughout the five miles. The information on traffic and the tables appear contradictory. Further information for a different time period appear to be necessary before current recommendations and future estimated traffic can be relied on. The studies show that the accidents and dangerous areas are not at the narrow, curvy 9 -11' wide lanes at the Shafter Bridge end but, interestingly, are at the eastern end where the lanes are up to 12' wide, have 4' or wider shoulders and longer sight distances. Clearly, the wider and longer the stretch of road the heavier the foot on the gas pedal.
- Assess the option of making the road width 10' throughout the park. This would slow the traffic and allow the addition of another foot for bikers without damaging the fishery.
- Assess if narrowing the road to 10' would allow realignment of the road to provide less impact on the creek side habitat.
- Assess the difference in impact of an 11' lane vs. a 10' lane on riparian habitat , the creek, fish and impact on redwoods.
- Assess the safety issues when 11' roadway lanes converge with 10' wide bridge crossing lanes. For guidance review current literature that is impacting this decision in other jurisdictions and the legalities that would need to be addressed.

Interestingly, 3 axle trucks that currently go over the double line in some areas would, practically speaking, go over the shoulder first, in making the turn – regardless of the law.

-Assess the impact of disallowing the use of Taylor Park Road for 3 axle vehicles (that are one unit).

- Provide information, including graphics as to the appearance, number of retaining walls, their location and composition under this proposal. Such walls could dramatically change the visual character and aesthetics of the five mile drive through Taylor Park.

Traffic During Project implementation

- Provide information that details how users will be accommodated during delays and/or road closures.
- Provide information as to how users will be noticed of the impending project and expected delays or closures.

Pollution & toxins

- Analyze the short and long term impacts nd provide mitigation's on the creek, salmonids and marine life for any toxins released as a result of roadwork rehab. That includes recycling concrete for use in the road base (a great idea) or occur as a result of using RAC materials.
- Describe the measures that will be used to control sediment and erosion.
- Assess whether the erosion and sediment controls that include covering stockpiles, watering to reduce dust and sweeping are adequate to protect the environment.
- Crack and seating, on the short term, has the advantage of eliminating truck trips Assess the problems of long term maintenance issues that could impact the safety of bikers.
- Provide a long term maintenance schedule that regularly evaluates any leaching problems of toxins or materials used to rehab the pavement or change the character of the pullouts.

Pullouts - It appears that there are 43 roadway pullouts. 5 to remain and be improved and 38 to be blocked from access and remain in their "natural" state.

Pullouts remaining - All pullouts need to be of sufficient length and width to accommodate vehicles, trucks and recreation trailers.

- Assess impact of remaining pullouts on creased habitat and the fishery.
- Assess and mitigate any impacts, including runoff, that arise from increasing length and/or width of the pullouts.
- Provide information that trees (and their roots) adjacent to improved pullouts will be protected.
- Assess and mitigate the problem at pullouts whereby sightseers create instant "social" trails down steep banks to access the creek. which cause erosion and sediment problems as well as destroy native plants and impact wildlife.

North side pullout at east end - Only one pullout is designated for west bound traffic on the north side of Drake Blvd. This appears to be the location of a very long pullout stretch west of the no parking signs which is currently used for parking by users of the Inkwells pools.

- Assess the impact of this long pullout on the steep banks, creek and salmonids.

- Assess whether the space can also accommodate off road parking. There may be legalities involved, if a pullout is used for parking, that could trigger other agencies involvement which should be avoided if they conflict with our goals.
- Assess the length needed and provide information as to what would be done with the remaining portion in the event it can only be used as a pullout.

South side pullouts at west end - These four pullouts are "clustered."
- Assess the value and need of having this many pullouts so close together.

While the idea of using permeable asphalt in the pullouts to limit sediment discharge appears to have merit:
- Assess the impacts and provide other options to limit sediment discharge.
- Describe how the permeable asphalt will merge with the new pavement overlay of asphalt at the east end or RAC materials at the west end.
- Assess alternatives to the use of permeable asphalt. Blocking by rocks or boulders on existing soil? Native plants restoration?

Devil's Gulch Parking - This is used as an informal pullout and well used parking area and is proposed to remain in its current condition as an unimproved surface.
- Assess the impact of flooding in this area.
- Provide information regarding the elimination of large potholes next to the roadway.
- Assess whether parking signage would be helpful.

Signage - Currently, there are no pullout signs. Traffic speed signs go up to 40 mph Most accidents are recorded in the 40 mph zone.
- Assess the use of signage to mitigate speed, travel conflicts, designate pullouts, designate parking and provide safety for bikers.
- Provide information as to where and what signage should be provided.

Noise

Noise from vehicular traffic has been an ongoing problem the length of the park.
- Assess to what degree the proposed road materials, width of the road, speed of traffic or restoration materials can be used to mitigate and reduce this problem.

Culverts
- Identify all culverts in the 5.2 mil project area.
- Assess whether all the culverts in the 5.2 mile project area would benefit from not only replacement for water flow but improvement for fish refuge, delivery of nutrients and fish passage.
- Explain the procedure that resulted in the choice of the 3 large culverts being replaced as part of fish passage improvements.
- Prioritize culvert replacement based on studies that identify tributaries that provide value to meet diverse salmonid needs. Stillwater Science is one resource.
- Does Measure A provide funding for this costly improvement? In the event that additional grants must be sought is it possible to time the project and grants so that they run concurrently, instead of consecutively, thereby reducing the impact on the

fishery, the park and the inconvenience to commuters and recreation vehicles.

Cumulative impacts - The EIR should provide information to determine the risk to endangered coho salmon and steelhead trout as a result of the cumulative impacts of the implementation of any proposed project.

Timing
- Provide information as to how the project will impact commuters and recreationists during the period of implementation.

Maintenance
- Provide a Maintenance Plan with appropriate funding and time line that will ensure that the changes to the road, creek side habitat, creek and fish, as a result of this rehabilitation project will be regularly monitored and maintained. The Plan should include an on going survey component that would survey cumulative impacts that are a result of this project as well as impacts resulting from increased usage by vehicles, trucks, or bikes.

Road Maintenance - It is my observation that the lack of maintenance of the existing road shoulder between Lagunitas and Shafter Bridge is as serious a safety hazard as the road through the park. In the late '80's, shoulders between 1-3' were provided as part of a three phase shoulder improvement between San Geronimo and Shafter bridge. it was expected that it would be swept regularly. The adjacent owners, near Dead Man's Curve, were notified that the improvements were happening and the shoulder was not to be used for parallel parking. Over the years, the road maintenance is non-existant and as owners have changed hands they ignore the park off the pavement signs. My complaints fell on deaf ears.
- Assess the current level of maintenance of the existing shoulder between "Dead Man's Curve" west of Lagunitas and Shafter bridge as a basis for a plan for shoulder sweeping through the park.
- Provide a plan for road sweeping. Consider a vacuum type road sweeper.

Recorded Right of Way
- Assess whether this issue has been resolved so the project can go forward without undue delay or litigation.

Project Performance Monitoring
- While the Contractor is responsible for protection of environmental resources during construction, it is important that the County have a detailed monitoring plan for the Contractor's performance in this regard. The EIR should spell out in detail how this is to be accomplished in order to ensure full compliance with all the necessary mitigation's.

Road slippage and slope stability
After the scoping meeting the consultant expressed some concern that he had observed some cracks and what appears to be road slippage that was not apparent

during our tours. I checked the site and he is correct. But the areas I observed do not appear to have similar causes.
- Additional studies should be implemented to assess the cause, the impacts and remedies for the cracks and slippage.

The following are not scoping comments but my response to public comments made during the public scoping session regarding use of an adjacent multi-use trails for bikers.

It is my understanding that Measure A does not provide funds for any rehab improvements beyond Sir Francis Drake Blvd. Regardless, the use of an adjacent multi use unpaved path on an old railroad right of way, in the park, as an alternative to meet the needs of road cyclists was suggested and will need to be addressed since it was brought up.

I oppose inclusion of this alternative and oppose any suggestion that Sir Francis Drake Blvd. be closed to road racers. Their goal is speed and the roadway, with some improvements, will serve them well. They are also vehicles and are closer in speed to four wheeled vehicles than the speed of a hiker or equestrian.

I have a long history in this area, a background in biking and preservation of parks. I own 30 acres next to Taylor Park and have used it for a half century. I currently ride my bike 5 days a week in the park. In the summer following the Feb. '07 bus tour I spent 3 hours on 3 days sitting at the fire road entry to the Leo Cronin Parking area counting bikers, hikers and equestrians going both east and west on Drake Blvd. across the Inkwells Bridge as well as the fire road to Bolinas ridge. My comments:

Path section between the Inkwells bridge and parks picnic area: This is an unpaved route currently used by campground families and their children, local hikers, elders, comfort and mountain bikers, equestrians and their horses to experience an intimacy, a reconnection with nature at a slow pace in an historic park. The speed limit for bikers is 15 mph. Very few road racers us this section because it is unpaved. The few that do use this route ride in excess of 15 mph. This change would destroy the redwood park experience for current users and would result in a 2 wheeled vehicle takeover similar to what has occurred at China Camp State Park resulting in the gradual disappearance of hikers, families with children and equestrians. It is regrettable that there are no funds for the number of rangers needed to enforce the 15 mph speed limit . Complaints are useless without a method to identify the offenders. I see speed abuses every day I ride.

Path section between the parks picnic area and Tocaloma: This is a paved section. It begins at the Park entry goes past the picnic area, crosses the bridge and heads west through the parking area which has bike, handicap and regular sites on the left and standard campgrounds and two large bathroom on the right. A maintenance road extends a good distance west to the corporation yard and ranger residences. Near the final bridge at the end of the wide maintenance road begins the 8' paved section built as part of the 1977 centennial celebration. Currently, bike racers, bicycle campers and hikers use this section. Bike racers, particularly in training, veer off of Drake Blvd. at the entrance, and use this paved route at speeds upwards of 20 mph. They use the route more for its safety away from cars than for an aesthetic experience. Despite their considerable and admirable skills they pose a danger to the safety of all campground users and negatively impact their experience. Any serious consideration of this alternative would require an assessment and mitigation of the impact on the experience and safety of campers, children, hikers, equestrians, horses and wildlife as well as an assessment and mitigation of path widening and resurfacing as well as enforcement issues, monitoring and long term maintenance.

RECEIVED
NOV 17 2008
MARIN COUNTY PUBLIC WORKS

60 Drake Summit Rd.
PO Box 5
Point Reyes Station, CA 94956
November 8, 2008

David M. Bernardi
Senior Civil Engineer
3501 Civic Center Dr.
Room 404
San Rafael, CA 94903

Re: Comments on Sir Francis Drake Rehabilitation Project

Dear Mr. Bernardi,

We are unable to attend the public meeting, but we have read the project description online, and would like to register a strong preference for preserving all existing trees.

We live in West Marin and drive through Samuel P. Taylor Park very regularly. We agree that the road surface needs to be improved, and that it is a good idea to provide fewer but better pullouts for slower cars, but we see absolutely no reason to remove any trees. Because there is a paved bike path which parallels the road, we think that bicycles should be required to use it rather than Sir Francis Drake, and that a posted and well enforced speed limit will allow us to have both a better road AND redwood trees.

Sincerely yours,

Charles W. Gay Pamela M. Ross

Charles W. Gay
Pamela M. Ross

ECEIVED
IOV 05 2008
COUNTY PUBLIC WORK

Sandy Greenblat
105 Bay Way
San Rafael CA 94901
Tel: 415/459-1335 Fax: 415/460
email: sandygreenblat@comcast.

October 31, 2008

Mr. Dave Bernardi
Marin County Dept. of Public Works
3501 Civic Center Drive, Room 404
San Rafael CA 94903

Re: Sir Francis Drake Paving Plan

Dear Dave,

Thank you for the information packet mailed to me along with the reference to the website for additional information. It is all really well done and 'we the people' really appreciate it.

I have enclosed my comments addressing turn out construction and detail for your reference. Other issues, if there are any, which involve the horse community will. I am sure, be addressed by the officers of the Marin Horse Council.

I look forward to seeing you at the scoping session.

Yours truly,
Sandy
Sandy Greenblat

Scoping Session for the Sir Francis Drake Rehabilitation Project

Equestrian Truck and Trailer Traffic to the Point Reyes National Seashore:

- The Stewart Horse Camp is located at Point Reyes 3.5 miles south of the intersection of Sir Francis Drake Blvd. and Highway 1 at Olema, CA. This horse camp draws over 9,000 horses each season. All overnight camping as no day use is allowed under the terms contained in the permit with the National Park Service. This is equivalent to 6,000 trips each way over a six month period. At least 80% of those trips come from the east, through San Geronimo Valley and through Taylor Park on their way to Olema and Point Reyes.
- All trips occur when the camp is open, May through the end of October each year.
- A great majority of the trips take place Wednesday-Friday traveling west and Sunday traveling east.
- Add approximately 3,000 trips per year to Point Reyes day parking – day use areas at Bear Valley and Five Brooks, most of which occur via the same roadway as addressed in the ongoing study.
- Add approximately 10% more trips by those of us who travel west to Highway 1, then north to either Limantour Road, to Bayview, Muddy Hollow and Limantour Beach trailheads, or continue on SFD to other trailheads farther west, such as the Estero Trailhead.
- The balance of the travelers who do not use this route mostly come south on Highway 1; with only a few traveling north, up Highway 1 from Bolinas and beyond.
- The study needs to take these numbers into consideration. I do not believe they have been provided prior to this date.

Cross Marin – California Riding and Hiking Trail:

- These trails and trail sections are not included in the scope of the study and should not be included. Such additions will involve the State of California State Parks Dept. which is unnecessary.
- Expanding the study will delay it.
- Expanding the study will bring the Marin Municipal Water District into the process even more, as well as the federal government, originator of the rules, regulations and laws that require protection of the fishery.
- The fishery can be protected without enlarging the study process unnecessarily.
- The question of whether or not the remaining section should be paved, left alone, changed, improved, or otherwise addressed is mute; it should not be included in the study.

Alternatives:

- Leave the roadway as is, but improve the surface and drainage only.
- Improve the roadway per your base plan.
- Do nothing is always an alternative required in any EIR. This is not a viable alternative in this instance due to the fishery.
- **Best choice**: Improve the roadway per your base plan, leave the trees in place, control the speed by doing so, and keep the easterly half of the study section as safe and free of accidents as it has been over recent years.

Incidental:

- Improve signage to warn drivers against passing cyclists where there is not an adequate sight line.
- Improve roadway shoulders and turn outs to allow better passing.
- Enforce the speed limit down the western one-half of the study section.
- Reduce the maximum speed limit through the entire 4.2 miles stretch to 35 miles per hour.

Sandy Greenblat
105 Bay Way
San Rafael CA 94901
415/459-1335
sandygreenblat@comcast.net

To: Klock, Ernest
Subject: Sir Francis Drake Blvd Rehab Project - Request to be Notified of the Project and Scoping for Draft EIR

Date: 11/14/08
To: Mr. Ernest Klock, Marin County Public Works, eklock@co.marin.ca.us
From: Rebecca Atkinson, atkinsonrl@hotmail.com ← Add to mailing list
Re: Sir Francis Drake Boulevard Rehabilitation Project - Request to be Notified of the Project and Scoping for Draft EIR

Dear Mr. Klock.

I am emailing you in order to request being added to your public notification list regarding the proposed Sir Francis Drake Boulevard Rehabilitation Project.

My email address is atkinsonrl@hotmail.com and my mailing address is Rebecca Atkinson, PO Box 5424, Berkeley, CA 94705.

I would like to receive notification of the release of the Draft EIR so that I will be able to comment on the document. I do not need a hardcopy, as I can download a version from a website or an FTP site if a link is provided with the notification.

Please forward my request to the appropriate person that is maintaining the notification list.

I am not sure if you are the correct person to be emailing in regards to my request, as I was not able to find a contact person listed in the document that describes the proposed project. I also called the Engineering Services Department today and the person answering the phone was not aware of who the contact person was for the project, nor was she aware of a public scoping meeting in Woodacre. Lastly, I was also confused as to what public review/comment stage the project is in because the project description was labeled on the Public Works website as "DEIR," which initially made me think that a Draft EIR had already been released and that we might be mid-way through the 45-day public comment period on a Draft EIR.

With this being said, I would like to thank you for the opportunity to provide comments for the scoping of the Draft EIR for the proposed project.

I am in favor of improving public safety and drainage conditions along Sir Francis Drake. I also understand that roads and culverts have a design life and that maintenance/rehab and so forth is necessary.

Regarding the goals/objectives for the project that are listed below, I would like to request a more detailed discussion of the goals/objectives in the Draft EIR in general.

"The following goals have been established to guide the rehabilitation effort for SFDB:
§ The roadway's pavement is to be restored to provide an additional 30 year
design life.
§ Improvements to the roadway's alignment are to be completed where possible
to enhance safety.
§ All proposed improvements shall protect environmental resources during and
after construction.
§ The improvements should enhance pedestrian and bicycle uses of the roadway."

For example, the design life is set for a typical 30 years, but is there a possibility that there could be a longer lifespan? Why/Why not. And, as they are significantly deteriorated now, is there a goal for the design life for the drainage improvements/culverts?

I also request that the term "environmental resources" be clarified in the Draft EIR - does this pertain to biological, cultural, aesthetic, etc resources? I ask for more specificity, as the "protection of environmental resources" section of the project description appeared narrowly defined and also did not mention if tree removal were necessary.

Additionally, I request that a goal be added to include improvement of "environmental resources," such as fish habitat. Including this goal would influence the development of project alternatives to be evaluated.

Furthermore, it is not clear from the goals/objectives listed in the project description if a goal is to increase the capacity of the roadway by the proposed project, or if the goal is purely rehabilitation and vehicle safety oriented. Increasing the capacity or road widening could have other impacts/increases upon visitation/recreation along Sir Francis Drake and other recreation areas. Recreation should be discussed in the Draft EIR.

Additionally, I am also interested in knowing if changes in capacity or just the safety improvements for vehicles - if this would result in higher travel speeds, which in turn could create a travel speed-related hazard for bicyclists. It is clear that the existing pavement is hazardous to bicyclists. Possibly the proposed project could increase this type of recreational use and cause increased on-street vehicle/bicycle conflicts. Are there any improvements to other nearby bicycle and pedestrian facilities that could be done to mitigate the effects of the proposed project, including alignment, signage, emergency facilities, etc?

Regarding the proposed construction timeframe and phasing, I would appreciate the inclusion of a discussion either in the project description or in the mitigation measures for if the project were to get off schedule or delayed such that it would extend construction beyond the target 6 months.

Regarding the three locations where fish passage improvements should be considered as mentioned in the project description, I would appreciate having a clear description and draft designs of the fish passage improvements in the Draft EIR so that the public and agencies can review as part of the Draft EIR process. If these draft designs already exist, then please provide instructions on how to access them for review. ↖ confer with Liz Lewis

Regarding tree removal, the project description indicated that tree removal would not be necessary. However, I would like a mitigation measure included in the case of some project difficulty necessitated tree removal. Additionally, all of the alternatives should include the impact of each alternative on existing trees - not just their potential removal but also encroachment toward root systems.

Regarding fish passage, the project description indicated that there were three opportunities to be considered. Please include the opportunities for fish passage improvements in the description of each of the Draft EIR alternatives.

Regarding stormwater, the project description did not yet include great detail for how sediment and other pollutants would be addressed. Please include this detail in the project description for the Draft EIR. Please also discuss if pull out areas that are created or removed provide opportunities for stormwater treatment. I am also interested in knowing if the use of recycled tires in the pavement provides increased opportunity for metals and other pollutants to leach from the pavement into stormwater and the nearby creek.

As it is still possible to provide comments on the project itself that will be evaluated, I would appreciate a project that minimized stormwater runoff, promoted restoration of fish habitat, promoted fish passage, minimized tree removal, protected cultural resources that may be present, protected aesthetic resources, promoted recreation safety and recreation improvements in addition to vehicle safety.

Thank you for the opportunity to provide comment at this stage in the process.

Regards,
Rebecca

Rebecca Atkinson
PO Box 5424
Berkeley, CA 94705
atkinsonrl@hotmail.com

RECEIVED
NOV 24 2008
MARIN COUNTY PUBLIC WORKS

MARIN COUNTY DEPARTMENT OF PUBLIC WORKS

PUBLIC SCOPING SESSION

ENVIRONMENTAL IMPACT REPORT FOR SIR FRANCIS DRAKE BOULEVARD REHABILITATION PROJECT

WRITTEN COMMENT FORM

November 15, 2008

Name/Affiliation: Peter Hoch

Address: 250 Sequoia Dr.

City: San Anselmo 94960 Zip Code: _________ Telephone: 456-2904

Please provide comments and concerns regarding the environmental effects of the proposed project or the environmental process below.

Comments On The Sir Francis Drake Boulevard Rehabilitation Project Notice Of Preparation

Mr Bernardi

As a motorist, bicycle rider, and walker I would like to state:

The current road is in abysmal condition, engineered for another century, dangerous to all users, and needs to be upgraded.

The upgrade should include adequate width to allow safe passage for both wide vehicles as well as bicycles. While a full Class I bike lane is not possible every effort must be made to provide adequate paved surface for cyclists. An adequate width roadway can not be achieved without removing some trees.

Most cyclists traversing this section of two bridge

Please use backside of page for additional comments, if needed. This comment form may be handed in at the scoping session to County Staff or mailed to the attention of Dave Bernardi, by Thursday November 24, 2008,

Carrie Sherriff Real Estate Broker

RECEIVED

NOV 1 4 2008

MARIN COUNTY PUBLIC WORKS

Dave Bernardi
3501 Civic Center Drive
Room 404
San Rafael, CA. 94903

Dear Dave,

I want to protest the removing of 24 trees for the proposed improvements to Sir Francis Drake Boulevard. Trees are living beings, and the automobile or bicycle traffic should not take precedence over living things. There is the bike path going through the park already, and the road of course needs repaving. A solution may be to have more pull outs so that the slower traffic doesn't delay others.

No cutting of trees, please.

Regards, Carrie Sherriff

Carrie Sherriff

105 Longfellow Road, Mill Valley, CA 94941
415-383-3646 www.CarrieSherriff.com

MARIN COUNTY DEPARTMENT OF PUBLIC WORKS

PUBLIC SCOPING SESSION

ENVIRONMENTAL IMPACT REPORT FOR SIR FRANCIS DRAKE BOULEVARD REHABILITATION PROJECT

WRITTEN COMMENT FORM

November 15, 2008

Name/Affiliation: [illegible]

Address: [illegible]

City: [illegible] Zip Code: [illegible] Telephone:

Please provide comments and concerns regarding the environmental effects of the proposed project or the environmental process below.

In studying alternatives please include a study of creating a hard permeable surface on half of the bike path from Shafter bridge to Redwood Picnic grounds. This would still allow a dirt path for horses pedestrians

Please use backside of page for additional comments, if needed. This comment form may be handed in at the scoping session to County Staff or mailed to the attention of Dave Bernardi, by Thursday November 24, 2008, at the Marin County Department of Public Works, 3501 Civic Center Drive, Room 404, San Rafael, CA 94903.

MARIN COUNTY DEPARTMENT OF PUBLIC WORKS

PUBLIC SCOPING SESSION

ENVIRONMENTAL IMPACT REPORT FOR SIR FRANCIS DRAKE BOULEVARD REHABILITATION PROJECT

WRITTEN COMMENT FORM

November 15, 2008

Name/Affiliation: DAVID GAULT

Address: 7 Terrace

City: Kentfield, CA Zip Code: 94914 Telephone: 415 819 3973

Please provide comments and concerns regarding the environmental effects of the proposed project or the environmental process below.

I use Sir Francis Drake Blvd twice a week to visit my parents who are residents of Inverness. My opinion is that Sir Francis Drake is a good road which is safe and adequate for its present use.

I oppose widening Sir Francis Drake. Safety issues should be addressed by enforcement of existing safety laws and regulation.

David Gault Nov. 15, 2008

Please use backside of page for additional comments, if needed. This comment form may be handed in at the scoping session to County Staff or mailed to the attention of Dave Bernardi, by Thursday November 24, 2008, at the Marin County Department of Public Works, 3501 Civic Center Drive, Room 404, San Rafael, CA 94903.

RECEIVED
NOV 2 1 2008
MARIN COUNTY PUBLIC WORKS

To David Berardi
Marin Department of Public Works
3501 Civic Center Drive
Room 404
San Rafael Ca. 94903

Here we go again, yet another flawed environmental report, the proposal to widen Sir Francis Drake Blvd in SP Taylor Park for the sake of bicyclist is yet another sign of conscience incompetence and a lack of understanding of alternative transportation. The old railroad right of way which extends from Woodacre all the way to Olema would make a wonderful addition for bicycle enthusiasts to enjoy the beauty of west Marin county in safety. In fact a major section of the bicycle road is already done. Where you ask , exactly in the same spot that the master minds of governmental waste are proposing to spend millions duplicating what we already have. The bridge across the creek located at White Bridge has already been built now all that is needed is a simple set of signs sending the bicyclist and hikers onto the cross Marin bike trail which will take then safly and quickly to Olema.

Now , if the bicyclist safety is just a pretext to waste money that is another matter. The stretch of road between Lagunitas and Olema is one of the most beautiful and peaceful places in the county. It would be a lot simpler and economical to add a few pull outs and lower the speed limit and add street lighting and spend the money on improving other aspects west county say like the schools . I think we have had enough of the spendthrifts that just love to plow money into the pockets of a few select engineering and construction companies with the backing of environmental studies tilted to support their project. Call you supervisor and tell them NO on more governmental waste.

Bob Freund

FROM THE DESK OF

HILARY WINSLOW
POST OFFICE BOX 576
BOLINAS, CA 94924
TELEPHONE (415) 868-2587

RECEIVED
NOV 2 1 2008
MARIN COUNTY PUBLIC WORKS

11/15/08

Marin County DPW

Re Sir Francis Drake road "improvements"

I am writing to urge The County to limit work on SF Drake to That which allows all redwood trees to remain. I am an avid bicyclist but disagree That tree removal is required to make The roadway safe for cyclists.

It is imperative That the road be repaved asap. However, shoulders need not be paved + trees need not be felled.

Sincerely, Hil

RECEIVED

NOV 19 2008

MARIN COUNTY PUBLIC WORKS

Karen Nygren
22 Paseo Mirasol
Tiburon, CA 94920
415-435-2233
knygren@aol.com

Marin County Department of Public Works
Atten: Dave Bernardi
3501 Civic Center Drive
Room 404
San Rafael, CA 94903

November 17, 2008

Re: Sir Francis Drake Blvd Rehabilitation Project Scoping Comments

Dear Mr. Bernardi,

Thank you for accommodating the public in helping to identify the environmental issues and concerns we have regarding the scope of the EIR for the Sir Francis Drake Blvd Rehabilitation Project. I look forward to reading the responses and evaluation of the following questions and comments in the DEIR which were formulated after reading the BKF October 17th, 2008 Project Description.

1. What is the priority for this project? Is it more important to improve the speed and flow of traffic (an engineering solution) than to maintain the visual and aesthetic beauty which one currently enjoys as they drive through Samuel P. Taylor Park?
2. It was stated, by the Project Consultant at the November 15, 2008 public scoping session, the project would consider the "fairness of all users" when deciding the final project design. How will the fairness be evaluated and determined? How many bicyclists use Sir Francis Drake through Samuel P. Taylor Park versus vehicles? What is the percentage of bicyclists as well as percentage vehicles (weekday and weekend) which travel through the project area? To "be fair", will the difference of the number of bicyclist versus vehicles be used to evaluate the degree of fairness which should be used in weighing the importance of the final out come of the projects' design? How will this be determined?

<u>Pavement Rehabilitation</u>

3. What level of noise (dBd's) will be generated by crack and seat and milling rehabilitation techniques? What is the existing noise level within the park? How far will loud noise created by crack and seat and milling activities travel within the park? How will this noise level affect the surrounding wildlife and habitat in the very quiet park setting? How can this be mitigated?
4. Will operations occur during day and/or night? How will the time, when construction activities occur, impact the surrounding wildlife, habitat and park visitors?
5. How much additional dust and disturbance to air quality will be generated by crack and seat and milling methods even if mitigation measures suggested in the Project Description's Congestion Phasing are implemented? Will dust and debris filter into the culverts and/or adjacent creek? How might this affect the fish and habitat in the park and creek?

6. How will the crack and seat and milling methods affect the root system of the surrounding trees and vegetation? Redwood tree roots are near the surface and very sensitive to disturbance. Disturbance to the root structure of Redwoods can have long term negative consequences affecting the life of these trees. How will these trees be insured long term protection from damage by this project?
7. How many truck loads will be hauled in and out carrying various materials necessary for the implementation of this project? What will be the impact of these truck trips to the residents and communities on both ends of the project and within the park? How will these truck trips affect the quality of the roads of the existing streets surrounding the project? How will the negative impacts to the roadway on either side of the project area be mitigated? How will the trucks moving in and out from the project area affect traffic outside and within the park?
8. Are there other methods which could be used to improve or rehabilitate Sir Francis Drake Blvd. rather than using a crack and seat and/or milling method? Might any other method be less destructive to the surrounding habitat and wildlife? Are there other ways to reduce the number of truck trips required for the project?

Drainage Improvements

9. The Project Description, page 6, states drainage culverts will generally be placed in the same alignment and grade as existing condition. The discussion of culverts in the scope only talks about existing culverts that extend 10 or more feet beyond the "proposed" edge of the pavement. If a culvert extends between 1 and 10 feet from the proposed new edge of pavement, will these sections of culvert be replaced? If so, what will be the impacts to the surrounding vegetation, trees and habitat between 1 – 10 feet?
10. How will the "proposed edge" of the pavement differ from the existing edge? Please diagram. How will the new "edge" affect placement of new culverts in new locations? What will be the impact to vegetation, trees, habitat and the creek from the newly placed culverts?
11. The roadway is to be realigned and include new sloping to meet Caltrans and AASHTO roadway standards. Please describe changes to run off from the realignment. How will these new alignments affect the rate at which water runs off and drains into the creek? How will this new degree and quality of run off (with new culverts and roadway surface) affect the surrounding environment? How might this affect the fish and water quality of the creek?
12. By changing and redirecting the run off, how will this impact surrounding vegetation, trees and creek habitat?

Roadway Pullout

13. How many pullouts currently exist? How many pull outs will be in the completed Proposed Project and Proposed Project Option A?
14. A diagram of a newly paved pullout is shown in Figure 9. Several of the "new pullouts" will have new hard surface close to and/or surrounding a portion of the base of a tree. What will be the impact to the trees and their root system with the addition of a new paved surface so close to a tree; particularly if it is a Redwood tree with a very shallow and delicate root system? Will these paved pullouts decrease the chance of survival of these trees? Will cars and trucks, which use these pullouts, leave oil and other reside behind which will negatively impact the trees? Will the weight of the vehicles, on top of the root systems, impact the trees? In Muir Woods they have now constructed raised wooden platforms, so people who walk through Muir Woods do not impacts the roots of the trees.

15. Will these new pullouts all be 12 feet wide as shown in Figure 9? Please detail.
16. What will the impacts be to trees and their root structures by the excavating into the ground to install perforated pipe and the creation of areas to hold permeable back fill for the pullouts as shown in Figure 9?
17. What amount of grading and exposure of new surface will be required in creating the revised pullouts? What are the visual impacts to the park setting by creating the "enhanced", paved, approximate 12 foot wide pullouts?
18. How will the reduction of the existing pullouts and the placing of rocks and boulders along the side of the roadway by many of the deleted pullouts affect the safety of bicyclists and pedestrian who travel along Sir Francis Drake Blvd?
19. Will the "deleted" pullouts be hydroseeded and restored with native vegetation?

<u>Slope Repair</u>

20. How many 3 foot high retaining walls will be added along the project route? Where will these be located? What will their various lengths be? Please diagram. Will these retaining walls be seen as a visual or "continuous" retaining wall as one drives through the park? What will their visual impact be in the park setting? Is there a way to screen or minimize the appearance of these walls?
21. Will cutting into the toe of the slopes, to create the retaining walls, cause new areas to experience soil and slope instability?
22. Figure 10 illustrates a major slope repair proposed at approximate station 270 + 25. How many trees will be removed in performing this repair? What will the visual impact be from the removal of the vegetation and trees due to this major slope repair? How will this impact the habitat of the area? How will this repair impact the run off, quality of water and fish in Lagunitas Creek? How can this slope repair be mitigated to protect the environment and mitigate the loss of trees and vegetation?

<u>Proposed Roadway Improvements</u>

23. Currently, there is a lower accident rate in the narrower portion of the project area along Sir Francis Drake Blvd than the existing wider section. Will increasing the width to the roadway in the currently narrower locations increase the speed of vehicles? Might this also increase the accident rate? If so, potentially to what extent?
24. Will the construction of continuous 11 foot wide traffic lanes increase the flow and speed of traffic through the park? If so, how will this affect the land uses and traffic patterns on either end of the project area? Will an increased flow and speed of traffic create a more desirable route for residents and tourist and increase use of Sir Francis Drake Blvd? If so, what impacts will this create?
25. How will the increased speed and flow of traffic, with creation of continuous 11 foot wide lanes, impact the park setting and safety to wildlife and habitat? Do the current narrower roadway segments also have a lower rate of "road kill"? Will this increased speed and flow elevate the level of "road kill" for wildlife and accidents to people?
26. How will increasing speed and flow of traffic impact safety for bicyclists and pedestrians?
27. What is the visual and scenic experience one currently encounters as they drive through Samuel P. Taylor Park? How will the Proposed Project change this experience? Will the Proposed Project reduce the scenic and visual quality of the Park?
28. What will be the noise, traffic and visual impacts to hikers and campers within Samuel P. Taylor Park during construction, upon completion of the Proposed Project or Option A? How will this compare with the existing conditions?

29. What is the visual impact of using concrete retaining walls along the roadway in the park setting of the project area? Is the use of concrete for the 3 foot high retaining walls a harmonious material in such a sensitive and natural setting? If concrete is used, is there a means to make it visually more aesthetically pleasing within the park setting?
30. Figure 11 states, "kicker wall to be installed as needed to maintain roadway width". Please describe and diagram a kicker wall and show potential location for such walls. What are the impacts from a kicker wall?
31. Does this project require a continuous 11 foot wide roadway? Is there another alternative which could be considered which maintains the existing variable roadway widths? Currently the sections of roadway which are narrower have a lower accident rate and reduced vehicle speed. This narrower section currently creates a beautiful and visually aesthetic setting for people to enjoy and appreciate Samuel P. Taylor Park.

Proposed Roadway Improvements – Option A

32. Option A, page 9, requires additional retaining walls and cuts into the toe of slopes. Would this increase soil instability and slides on the steep slopes in the future? Would these cuts and retaining walls increase water, soil and debris run off into culverts and the creek?
33. To what extent would Option A increase the speed and flow of traffic from current conditions? How would this increase compare to the Proposed Project Option and current conditions? What are other environmental impacts of Option A, such as noise, tree loss, aesthetics, grading, "road kill", etc versus the Proposed Project Option?
34. Figure 12 only shows the location for 9 of the proposed 24 tree which are to be removed in Option A. Please diagram and describe the locations and impacts from the removal of the other 15 trees. What are the current and future "horizontal clearances" which require the removal of the additional 15 Redwood trees?
35. Are the 24 trees slated for removal considered heritage trees and/or trees designated as significant based on the diameter of their trunks? What is the approximate age of a Redwood with a 78", 55", 45", and etc diameter? What is the approximate age of an oak tree with a 24" diameter? Are these considered significant trees which should be protected and preserved, particularly in a State Park? What does Marin County's General Plan or zoning ordinances say about the protection of such trees?
36. What will the visual and aesthetic impacts be from the removal of the "cluster" of Redwoods, depicted in Figure 9 as well as removal of the total 23 Redwoods and oak tree along the roadway within the park setting?
37. What wildlife and habitat currently lives in and around the Redwood trees? How would they be impacted by the removal of these trees?
38. Please diagram and describe where the "kicker walls" will be installed to "maintain proposed roadway width" in Option A, as noted in Figure 12.

Project Construction

39. Will construction noise and activities be restricted during periods when birds nest, wildlife have their mating season, habitat sleep, etc. so as not to disturb their natural setting and existence? Will the Construction Phasing program suggested in the Project Description be able to accommodate the wildlife and habitat environmental constraints? If not, what changes might need to be made to the construction time table to protect wildlife and habitat?

Environmental Resource Protection

40. The Environmental Resource section of the Project Description states, page 10, "the protection of environmental resources during construction will be the contractors responsibility." Is this an adequate way to protect the environment? Would the hiring of an independent environmental specialist, to monitor the construction project and contractor be a better way to help insure the protection of the parks environmental resources? Would having a contractor monitor himself be like having the "fox watch over the hen house"?
41. Where is the single location for stock piling all the building materials for this project? This is important to know and be evaluated at this time, due to the sensitive nature of the project area. Please designate. Is this location within the park? What are the environmental impacts from this single staging location; noise, air quality, water pollution, grading, vegetation, habitat, wildlife, etc?
42. The location for the stock piling of building materials is to be hydro seeded with native seed mix after construction is complete. What is the long term monitoring program to insure this area survives and returns to a native state and not one taken over by invasive, non-native species?
43. Will fuel be kept on site during construction of the project? What are the fire hazards in the heavily wooded park from keeping fuel on site? What is the danger to run off into the creek as well as habitat and wildlife by keeping fuel on site even if a mitigation program is implemented? Is there an off site location where fuel could instead be kept for refueling which would be safer for the environment?

Construction Phasing

44. What kind of traffic back ups will be created during construction activities? How will these impact the communities on either side of the project? What is the expected traffic delay time when only one lane of traffic is open for cars traveling in both directions? What type of mitigation program can be used to reduce traffic back ups and delays over the 6 or so months of the project? How will this affect residents, businesses and users of the park? What procedures will be in place for emergency vehicles to pass when only a single lane is open to traffic? How will idling traffic, waiting to pass, affect air quality within the park and surrounding communities?

Once again, thank you for the opportunity to comment.

Sincerely,

Karen Nygren

Dec 15, 08

We support (my wife & I) not removing red wood trees to widen S.F. Drake.

The roadway itself could stand some repavement, but thats another issue.

As a former bike rider & hiker, a dual pathway off the road would be a great project.

Protection of our forests is so impt.

Thank you

Stan Weisenberg

Note:
P.O. Box 823
Inverness, CA
94937

SIR FRANCIS DRAKE BOULEVARD REHABILITATION

County of Marin

Name: Ken Eichstaedt, PE TE **E-mail:** INFO@BEARVINN.com

COMMENTS:

1) Use 10.5 ft to 11 ft. lane widths to increase shoulder width
2) Provide minimum paved shoulder of 3 ft to right of white fog line
3) Increase shoulder widths where sight distance is limited such as on inside of turns.
4) Minimize design cross sections that will increase vehicle speeds
5) Use turn outs / pullouts if appropriate
6) Provide better access for west bound to Cross Marin Trail (conform elevation of road and bike/ped bridge access
7) Narrow lane widths in straight sections but wider in turns
8)

SIR FRANCIS DRAKE BOULEVARD REHABILITATION

County of Marin

Name: Amanda Eichstaedt **E-mail:** info@bearvinn.com

COMMENTS:

- Please evaluate throughout project the sight lines & speed differential while maintaining rural feel.

- In certain areas there will be areas for safe passing, when other, tighter areas w/ lower speeds and better "Shared" roadways.

- No bike lanes. Allow shoulder when possible.

- Improve access to cross marin trail at Shafter and -

SIR FRANCIS DRAKE BOULEVARD REHABILITATION

County of Marin

Name: Connie Berto **E-mail:** C.BERTO@earthlink.net

COMMENTS:

I strongly support the proposal to renovate & rebuild Sir F.D. Blvd. (thru Taylor Park etc.) Its present condition is a disgrace!

On the same vein, I strongly oppose putting any paving whatsoever on the roughly-parallel old Railroad Grade. The RRG is a recreational trail thru a public park, not a commute route. It is a model of shared use by horsemen, hikers, bicyclists (both road & mt. bike). The ballast is still firm and hard after 150 years. Save the money! Use it for re-paving Drake Blvd. Keep it out of the project.
I support Opt. 2. 19 trees removed is a small price for safety. Also, some (many) trees could be diseased anyway.

APPENDIX D

TRANSCRIPT OF PUBLIC SCOPING SESSION

This page intentionally left blank.

Marin County Department of Public Works

Public Scoping Session on the EIR for the Sir Francis Drake Blvd. Rehabilitation Project

Saturday, November 15, 2008, 10:00 a.m.

Woodacre Improvement Club
1 Garden Way
Woodacre, CA 94973

1

ORIGINAL

California Reporting, LLC
52 Longwood Drive
San Rafael, California 94901
(415) 457-4417

Item I. Comments and Welcome from Supervisor Steve Kinsey.

Supervisor Kinsey - Good morning and thank you all for joining us on this incredibly delicious autumn day. My name is Steve Kinsey, County Supervisor, and Valley resident, and happy to be in Woodacre always, and especially for this important reason. The project to rehabilitate our Sir Francis Drake Blvd. through one of the most remarkable pieces of nature we have in our county, Lagunitas Creek Watershed.

I think the purpose of today is very -- is really a dual purpose, it is the continuation of a discussion we have been having about this road, its needs for rehabilitation, to improve it for all user safety, but also to be very thoughtful about this watershed we live in, and see what we can do to protect and actually improve the watershed as we go along. I think it is a dual purpose project that we are going to be talking about. We have a number of folks from the County, including our consultants, who are going to talk about the project specifically, and are really going to guide us through a very technical piece of the project, a development related to Environmental Quality Act requirements, so this is a formal scoping session under our County and State guidelines. But, as important as that, it is a chance for all of us to better understand both what is being anticipated, and to contribute your own thoughts about what are important issues that need to be understood, resources that need to be protected, character that needs to be defined, as we go forward. Unlike many projects, actually, many of you have been with me in this room, and out in Point Reyes, or actually in Olema at the Red Barn, at the graciousness of the National Park Service, talking about this project, even to get us ready to have this initial meeting today. So there has been an understanding, I think, upon many, that this is a special project. It does require all of our hard thinking to get it right, and that is why I appreciate both your presence here today and this deep caring that you have for the place that this road runs through.

If this was an easy project, it would not have been delayed for 30 years to deal with the repair issues that it has. This is a tough project; that is why all of us are going to need to work together on this. But I think that, for those who have come today with this concern that the County's interest is in widening the road, I would just ask for the opportunity for anyone here in the room who is here today, to advocate for widening the road to raise your hand, if you are brave enough. Okay. So we have only a few. My point is, your thoughts are going to be welcome and respected, and I assure you of that. But the cry on this road has been for repair and for fairness for all users, which includes the pedestrians and bike cyclists. And that, I think, is the key piece to the rehabilitation of this road that the County is going to be interested in. As to the improvement of the watershed, I am confident that we will be able to have this project achieve those results. It is consistent with the way we have been working in the Lagunitas Creek Watershed for some time. We have improved fish passage on a number of the tributary creeks, we have assessed where we can go next with our fishery restoration projects, and culvert replacement programs. We have evaluated all of the open space lands that lie in the valley and looked for the siltation hot spots and fire road repairs that we can do and we are actively pursuing grants to achieve those goals, as well. Presently, in the San Geronimo Valley, just upstream from this project area, we actually have a moratorium to allow for us to develop an enhancement plan that really addresses the watershed issues very specifically in the San Geronimo Watershed, leading in to Lagunitas.

So I believe that you will see, and we will see, how important it is to keep the watershed elements associated with the project of rehabilitating the road to improve it for all users. And I think that is the key point that I would like to make. We are at the beginning of the process. Before any decision is made as to exactly what lane widths, what spots might be repaired, trees, if any, that would be removed or replanted, siltation barriers built, all of those issues, there will be hearings at the Board of Supervisors to select an actual project. And so that is a year away, so do not pull your calendars out. It is not even known when it will be, but I think the point to make at the beginning of the journey, the official journey, is that we have a ways to go. Today is an opportunity to collect ideas, concerns to be evaluated. And before a decision is made, any of you who want to be in front of the decision makers will have the opportunity to do that.

Thanks for being here today. And I am going to turn it over to John and he will explain the process for the rest of the agenda. John Roberto.

Item II. Introduction. Item III. Purpose of the Meeting/Meeting Procedure/CEQA Process.

Mr. Roberto - Thank you, Steve. My name is John Roberto. I am a Planning Consultant that is working with the County of Marin. My responsibility is really to coordinate the preparation of the Environmental Impact Report for the County. I want to introduce you to a couple of key personnel that are here, and the names you should know if we did it back right to where the slide is supposed to be -- here we go. Dave Bernardi is the Project Manager and Dave is standing over here. He is with the Department of Public Works, Senior Civil Engineer at the Department of Public Works. Of course, I am John Roberto; I am a consultant to the Department of Public Works. We also have with us Cord Hute from Synthesis, who will be doing the Environmental Impact Report, and we have Robert Stevens from BKF Engineers for the engineers responsible for designing the work.

I want to present the project to you today, tell you a little bit about how it came together. Steve gave you some of the background that has been going on for awhile. The Department of Public Works in consultation with their engineers had to make a decision about what project they wanted to propose to the Board of Supervisors. And they have made a decision, and they are going to present that project to you here today. I want you to listen to what is being said. You will have a good understanding for the project. The real purpose of this meeting, though, is to hear what you have to say about the environmental issues that need to be studied in the Environmental Impact Report. That is what this meeting is about. This is not a meeting about whether you like the idea of doing the overlay, or the road rehab, or we should not do that. That comes at a later date before the Board of Supervisors. Right now, we want to understand what the environmental issues are from your standpoint. We already know this is a beautiful watershed, along [inaudible] is pre-care; the resources are very sensitive in this area, any work in this area would give the Redwood trees, the creek, and everything else in that area, we have got to do it very sensitively. And so the process right now is the Department of Public Works has defined a project. There is going to be an independent environmental analysis of that project and what assumed facts and mitigations are. And that information will be developed, there will be draft EIR prepared and circulated to everyone here. There is a sign-in sheet, if you put down that you want to receive a copy of the draft, you will get a copy of that when it is produced. And I will go through a time line at the end of the session here to give you a little idea of when you can expect that to happen. When that is done, there will be hearings on that draft. You will be allowed to attend the public hearing before the Board of Supervisors, and we will have a Final Environmental Impact Report prepared that will be taken to the Board of Supervisors for certification. Following that, all that information developed, the Board will hold a hearing on the project itself and make a decision about what they want to do. And that will be -- I am going to guess about a year out from now. So right now, we are getting into analyzing what the effects are of the project idea that the Department of Public Works has come up with.

Some very important points -- this is a formal meeting required by the state. There were some green comment cards; if you would like to speak today, please fill one of these out. We need your name. We have got to get the spelling right, and I will call names today, but only names that are on these green sheets, to make a presentation to us. We have a Court Reporter here. Everything you say will be recorded, there will be a report prepared, we call it Scoping Report, and that will be included in the Draft Environmental document that is produced. So you will have a chance to see that your comments are there, and wherein the EIR are the issues that you raised have been dealt with. So this is really important. If you do not like to speak, and I do not know of many people who really do not like to speak, but if you do not want to speak, or something comes up afterwards, we also have little sheets of paper we prepared and you can add 20 pages if you want, but this is to mail in any comments that you would like to make. Today is November 15th. We will receive comments on what we should study in the EIR through November 24th. So about another nine days. So if there are more things you want to do, but the 24th is the cut-off date. At that date, we have to pull it into this process and start working on the EIR. And we will do that. Although you still have a chance to comment on the Draft and bring up other issues as we go through the process, especially when you read the information.

I counted earlier and more people have come in. I counted about 30 people, and I think the number may have gone up from there. We want to end this meeting around noon. We do not plan to take too much more time in the presentation, but even if I limit it to three minutes per person, we are going to be eating up about an hour and 20 minutes, if everybody here speaks. So I think right now, given the number of people here, I would like to limit this to two minutes per person to make your statement. I would ask, if someone has already made your statement, you get up to say, you know, it has already been said, and I concur that this should be studied, if you can do that. If it starts to go too long, then bear with me, I am going to do this and there may be one minute remaining or not, but it is to let you know, really, that I would like to move on and have the next speaker speak. We are not going to talk here at the County. We are not going to talk. This is not a question and answer period. If you get up and say, "Look, I want to talk about this issue and have you respond," we are not responding today, we are only listening. So it is not a back and forth. We really want to listen. So if you listen to what the project is, it will help you through some of the questions in your mind about this. I do not want to go too much further, but is everyone here kind of familiar with the

Environmental Impact Report process? Can someone raise their hand if it is new to them? All right. An Environmental Impact Report is required by state law. It is a document whereby the agency that is responsible for approving this project must make a decision where they think the project might have an effect on the environment. The County of Marin has already determined that they think this project has a possibility for a significant environmental effect, and accordingly, they must prepare an environmental impact report and study all the possible effects of that. The significant effects are identified; they have to come up -- the consultant responsible for preparing the document must make recommendations on how one could reduce those effects. They are called mitigation measures. When all this analysis has been done by the consultant, in consultation with myself, and I have been doing this for 30 years, we will prepare a draft and we will give it to everyone to review. And no decision will be made [inaudible] comment on the draft, and by law we must respond in writing to those comments that you make. So if you disagree with what this says, they must respond to that and state why they agree with you or do not agree with you, so that all of this becomes part of the public record that the Board then has before it makes its decision. After you have had a chance to comment on the draft, we will prepare a

Final Environmental Report, you will see all the responses to your comments, and then we will go the Board of Supervisors for them to certify that document, and hold your hearing on the project and they make whatever decision the Board deems appropriate at that point in time. So that is the EIR process, and that is what we are doing, looking at the environmental effects of this proposal.

So I would like to get on with this. I am going to introduce Robert Stevens. He is going to take you through a very quick presentation of the project. We apologize for the small scale drawings. We have some larger scale drawings here, and we have a very large scale drawing -- this is 5.2 miles long. We could not even put it up in the room for you to see it, so we have to work with these small drawings. We will have plots in the Environmental Report of specific sections that are important, along this 5.2 mile stretch. So, Robert?

IV. Project Overview.

Mr. Stevens - Good morning everybody. I see a lot of familiar faces here. Thanks for having me back. I am going to go kind of quick through here so that we can hear your comments. I am very interested about that. Again, the project begins just west of Shafter Bridge Road and heads in a westerly direction towards Platform Bridge Road, and it is 5.2 miles. The road was originally constructed in 1929, of concrete pavement, the thickness of existing concrete is about six-inches to nine-inches thick. For repair strategies in the past, the county's Public Works Maintenance Department has added asphalt overlays in sections. On the easterly section, the roadway is the thinnest with section widths of about 19-feet wide, and westerly it goes to about 33-feet wide. There are sections of asphalt shoulders that have been added to the concrete pavement that are starting to dislocate and fall. Also, the roadway's profile is fairly flat. It does not have a lot of significant grade to it, which we will discuss later.

The pavement condition, as I am sure all of you are aware, is fairly distressed. The area on the easterly section with this color right here has a fairly high degree of shattered slab conditions. And what that means is the concrete pavement has cracked and broken into chunks. The cracks, some of them are as large as two-inches in width, and that allows additional water intrusion in there, which further weakens the sub-grade, causing additional cracking. In certain locations, the roadway is actually starting to -- it is actually deflecting, and part of it appears to be sliding in towards the creek. This area in black here, the pavement condition improves. The distress in this area is primarily horizontal and transverse, and horizontal cracking. It has not further progressed to a shattered slab condition, but in a few more years, it will go that way. The red area in this location here, the pavement is actually in fairly serviceable condition. There are sections of alligator cracking, but it actually works pretty well. And as you are aware, these areas where there is dislocated slabs, cars run over there, and their vehicle tires create a lot of noise, and if you ever walked or rode a bicycle around the route, you will feel the vibrations as the cars bump along the slabs that are cracked.

As mentioned, the following project goals have been established. We want to rehabilitate the roadway to improve traffic safety for all users. We are going to look to improve the environmental conditions, including developing a storm drainage system that improves runoff to Lagunitas Creek, enhancing culverts where possible to promote fish passage. We are going to limit and improve vehicle pull-outs along the alignment, and repair failing creek banks that both cause silt into Lagunitas Creek and damage to the integrity of the roadway. The project is also here to retain existing trees along the alignment. There is an Option A which we will discuss later that would remove 24 trees.

Again, as Supervisor Kinsey mentioned, this is a very difficult project. There are significant constraints along the alignment. When the original people who built the road, they really chose the optimal alignment for the time; now there is significant vegetation along the roadway, there is very very steep banks that really limit any amount of widening that you could potentially do here, there is very large trees located right adjacent to the roadway. And as the roadway profile is very flat, and the banks are right adjacent to the road, there are very small drainage areas that, during high rainfall events, create significant inundation.

As I see many people here from the past meetings, you probably remember some options we had previously studied. Briefly, this Option 1, we were just going to repair the pavement in the existing condition, and existing alignment, just re-pave the roadway; Option 2 was to build it consistent with 28-foot-wide roadway; and Option 3 was to build a 45 mph roadway, using standard highway design standards. And, as you can see, there were significant impacts -- tree removals, removals to creek, a lot of grading, and a lot of removal. This option we kind of just regretted, it is just not feasible for this area. The option we chose is the hybrid of these first two here, as is what we are going to present.

So there are basically five components of the proposed project: 1) we are going to repair the pavement, 2) we are going to improve the drainage systems, 3) we are going to improve the roadway pull-out's, 4) we are going to repair the unstable slopes where we find them, and the final, 5) we are going to revise the alignment where feasible, and adjust the width where possible. So again, this here is Platform Bridge Road, and this is Shafter Bridge Road here. Along the alignment, you will see a sequence of numbers, each one of those represents 100 feet, and so at station 1 + 00, that is known as Station 1, Station 2, that is 2+00, that is a 100-foot interval. Starting -- as this area has the worse pavement condition, we are going to use a technique known as a crack and seat technique, a large vehicle will travel down the roadway, a piece of machinery crushing the existing concrete in place to chunks that are probably two to three-feet square, and then another piece of machine will compress that into place. And then we will do an application of rubberized asphalt pavement over that material. That saves all the existing base in place, we basically put a new surface over the top of it, it extends the design life of the roadway to 30 years. There is not a lot of trucking and excavation, removing material, bringing material back in. In this area here, the roadway is in fairly good condition. We are proposing to grind off the existing asphalt and do an overlap of rubberized asphalt pavement. In this condition here, these sections here represent the condition that will be found along the roadway, given this alignment. Basically it will give us an 11-foot travel lane in each direction, and shoulder widths as little as 1-foot, or as much as 4-feet along the corridor. There are 62 corrugated metal, or plastic culverts that currently discharge water from the slope into the creek underneath the roadway. Also, there are two large concrete box culverts. We are proposing to replace every corrugated metal pipe that goes underneath the roadway with a new HDP, or High Density Polyethylene or plastic pipe.

In these locations, some of these culverts discharge fairly high on the slope. We are hoping to get those down closer, and put some energy dissipating devices -- riprap, level spreaders, other devices to help decrease the downstream erosion in some of these gulleys. If you look, you can see there are some pretty significant cuts that are discharging out of these culverts here. Also, in locations where the roadway slopes back towards the hillside, what we are looking to do is to improve the drainage condition there by excavating out the area there, putting a perforated pipe, and backfilling with sand, and then planting with a native seed mix. This allows the water to kind of run off the road, sink into the sand, be collected in the sub-drain pipe, and then it will route to the nearest culvert which will then discharge out into the watershed. What this helps to do is not only does it stop water from filling up and inundating the travel lane, but also sediment, hydrocarbon, and other debris get caught in the sand layer here, and it enhances the discharge into the creek, or improves the discharge into the creek.

There are a lot of existing locations along the roadway where cars tend to pull off, creating a lot of erosion and sedimentation in the creek. What we are proposing to do is pick those locations that make the most sense from a safety perspective, to allow cars to safely pull off the roadway if they have an emergency, or if somebody wants to pass them, stop, and then enter the roadway in a safe manner. What we are proposing to do in these locations here is pave the area with a permeable asphalt on top of a sand layer, that would allow the water to sink through the asphalt, into the sand, be collected in the sub-drain pipe, and then routed into the creek. This, too, will definitely decrease the amount of sedimentation that is currently where these cars that are pulling off here and allowing the water to flow into the creek. The existing pull-out areas will be blocked using something -- rocks, stumps, something along those lines, and there was a good comment made about allowing for bicycles to pull off in these existing locations, and there could possibly be a way to strategically locate the rocks to allow bicycles to get off, but still stop cars from using those locations.

The Public Works Department has been repairing a section of Sir Francis Drake Boulevard right here. There is a section of a concrete that is sinking, and they have been overlaying consistently. You can see there is some settlement in this location here; there is a large culvert that is located here, that is causing additional erosion on the hillside, and sedimentation in the creek. This is the worst possible, or the worst case repair strategy, where we excavate all the material, backfill the sound material, and put riprap down at the base. We also adjust the culvert in this location to discharge closer down at the base of the hill, and provide a proper energy dissipation device there.

Unidentified Audience Member - Say again where that is, please.

Mr. Stevens - It is located right here, right as you pass --

Mr. Roberto - Do you know where the mile marker on that is?

Mr. Stevens - 16.5, I think. I will look for it before the meeting is over. Now, again, the final option, this is an option of the project that is to widen the pavement by removing trees primarily in this location here. The repair technique of the roadway is the same, basically we just cut down some existing trees that are located adjacent to the road, and it buys an additional foot or two of asphalt, shoulder width.

Mr. Roberto - Thank you, Robert. What I would like to do right now is go through this process again, but today is November 15th, this is the Public Scoping Meeting, and we are going to take your comments. There is a microphone up in front, but please speak loudly. These microphones are not to project voice, but to have the Court Reporter record on her tape recorder what you are saying so that we have a complete record of the comments made. Right now, I have 13 comment cards. Is there anyone else that would like to speak today? As I mentioned earlier, if you do not fill out a card, you will not be speaking. So if someone could pick up the cards and bring them to me, that would be great. Since we have less than 30 cards, I am going to be a little lenient in the time allowed to speak, but I will call these. Please bear with me, I am very bad with pronunciation of last names, and I apologize now if I do not get it right, but maybe you can help me. So after -- could we go back to that last slide one second, Robert? I just want to run back the process one more time.

This is a formal public scoping meeting. The end of the public scoping process is November 24th, so if you still want to get a comment in, you can send it in. We have some sheets that give you even the address where to send it, and to fill in the comment are over here on the table. You can do that. If you forget to take that and you have a copy of the Notice of Preparation, it will tell you where to mail your comments. If you do not have a copy of the notice, there are some on the table over here, so take one on your way out. And that way you can get your comments in to us, but they must be received by 4:00 p.m., November 24th. After that, we will start working on the Draft EIR, and we expect that the Draft EIR may be available by June, June of '09. And if that is the case, we expect that there will be a hearing on the Draft EIR probably late July at the Board of Supervisors, maybe August, on the draft EIR. After that, we will prepare the Final EIR, and once that is done, we will circulate that final EIR for 14 days to allow people to submit some written comments on that, and then the final EIR will be brought back to the Board of Supervisors, what we call certification. Certification of the EIR is nothing more than saying we have all the environmental information we need, it is in this document, and we certify it. They have to do that by law. Then, they will hold hearings on what to do with the roadway. Then you will be able to comment on that, and we expect that to occur in the fall of '09. We are now in the fall, although it feels like the spring, of '08, so it is about a year from now. If the Board approves a project, if the Board approves a project, we think the earliest start date on that project would be the summer of 2010. So that is giving you an idea of the timeline on that. So with that, I will reiterate, if you can hold your comments to three minutes, comment only on the environmental issues, this is not a question about whether this is a good or bad project, we will record those comments, we will not be responding to any questions, and when I click the spoon on the table, we are going to start, and when everybody is done speaking, I will click the spoon on the table and we will be done for the day, and I will thank everyone again for coming out. So here we go. The first speaker, and then I will call the second speaker, as well, but Joe Kohn followed by Chris Pincetich.

ITEM V. Public Comment

Mr. Kohn - My name is Joe Kohn. I am on the Board of Directors of the California Native Plant Society. And I have five comments that I want to make, so I am going to be really brief. The first one has to do with the lack of publicity about this meeting, about comments, perhaps I am computer illiterate, but I could not find anything on the website for the Department of Public Works, aside from the proposal. There was nothing about this meeting, no addresses given to submit public comments. That needs to change. People need to know about this process and need to know who to contact. Okay, 2) 23 Redwoods, one of which is

6.5-foot diameter, that is old growth Redwood. That has been here for 800 to a thousand years, or more. It is preposterous to consider cutting that down. Even Pacific Lumber, you know, who is doing it for profit, they have announced a moratorium on cutting old growth redwoods. We cannot allow that to happen. Public safety is a concern, and I want to mention that, I do not know how much it costs to build a sign, a metal sign, but there is no signage at the east end of Shafter Bridge to indicate that one of the most beautiful bicycle trails in probably the United States is 100 feet away -- no signage, none at all. Well, I am a bicycler. I love that trail, yet there is no indication that it is there, and it is quite dangerous for people to be driving on Sir Francis Drake. In the proposal, there is no mention of the word "Coho", no mention of the word "salmon", and no mention of the phrase, "endangered species" or "Endangered Species Act." All of those come in to play, and I think it would be a shame after all these years of attempting to reverse the possible extinction of the Coho Salmon that all of a sudden we contribute to their demise. Number 5) excuse me, I am a little nervous, at one of the pull-out's on Sir Francis Drake is the only population in Marin County of a beautiful plant in the Saxifrage family, mytella oxalis, otherwise the common name is Bishop's Cat. It is the only population. There cannot be more than five plants there. And those need to be protected. They are locally rare. That is my comments. [Applause]

Mr. Roberto - Thank you. Chris Pincetich.

Mr. Pincetich - Thank you. Yes, this is Chris Pincetich. First I will speak on behalf of an organization I represent, SPAWN. This is critical habitat for endangered Coho Salmon, California threatened steelhead, the California endangered freshwater shrimp, many plants that I do not know, that Joe is more familiar with. He mentioned the redwoods are shrinking in every possible forest around. We need to also address the many invertebrate populations that depend on the good stream bed conditions, so the sediment is being addressed, but I want to speak now a little bit on behalf of the constituents in the sediment. Roads are a major source of pollution, litter, and PAH's, and heavy metals, and anything that just gets thrown out of the car. As an Environmental Impact Report, I want you guys to treat this as a clean slate project. This will have cumulative impacts for many years, and this is your chance to mitigate for those chronic lifetime impacts of the road in the current design and in the current EIR, and those include the accumulation of those pollutants, the permeable mill (phonetic)services that you are proposing do need maintenance, and that is something that I have been talking to the County a lot about, that you can install a permeable surface, but if you do not maintain it, over the long term it is not a permeable surface. And the pesticides and heavy metals that come off cars, mostly heavy metals off cars, but I will speak to pesticides also because that was my graduate school research, they have a major impact on the migratory olfactory chemical synapses and neurological functions needed by those fish, and even though it is hard to link the very well done studies by NOAA, biologists, government biologists in the state of Washington on these fish to, you know, a big project like a road, because they did not build the road in the lab and do that test, but those effects are there and they are real. And you need to try to design to mitigate for those long term chronic inputs of fine contaminants into the creek and the critical habitat for all those endangered species. [Applause]

Mr. Roberto - Wendi Kallins. Wendi, spell your last name again?

Ms. Kallins - K-a-l-l-i-n-s.

Mr. Roberto - I should know it by heart. Thank you.

Ms. Kallins - Yeah. I will be very brief. I am a resident of Forest Knolls, and I am a bicyclist. And I ride this way quite frequently. My preference in riding a bike through this area is to use the bike path. And I would very much like included in the EIR a study of putting a permeable surface on the bike path itself, rather than widening the road. So that is basically it. I also want to say, you know, for those people who are not the professional bike riders, you know, the people who are very used to riding on the road, they do not like riding on the road, they do prefer bike paths, and we have been wanting to get this surface that is usable year-round for a long time and I hope this might create an opportunity for us to get that. Thank you.

Mr. Roberto - You are proposing an alternative, correct?

Ms. Kallins - Yes. I would like that alternative included in the EIR. [Applause]

Mr. Roberto - Mary Ann Maggiore.

Ms. Maggiore - I am Mary Ann Maggiore. I am the Mayor of Fairfax and I am a Commissioner on the Transportation Authority of Marin. And I am going to read to you a letter that the Town of Fairfax approved unanimously at the end of May. [Reading:] "The Fairfax Town Council has reviewed the project outline for the Sir Francis Drake Blvd. Rehabilitation, and though it is still early in the process, we feel it is not too early to voice our concerns. As this project would severely impact the human, wild animal, and vegetative life in our environment and, as it will utilize Measure A funds to which we all contribute, we would like to voice our preference. After reviewing the options stated in the publicly presented report of Project Manager, David Bernardi, we feel that Option 1, which repairs the road and seeks to leave as much of the stream bank and vegetation intact is the best option. In any case, we feel that it is important to articulate what we value, and would support any option ultimately offered. No cutting of old growth redwoods. At least one of the proposed options and all of the public discussions have made mention of the destruction of at least 19…" and I see in the new Option 1 it is 24, "…if not more, old growth redwoods, a sum upwards of 1,000-years-old. We do not support the destruction of any of these magnificent trees. Protection of fish: As this stream is one of the last remaining Coho Salmon runs, it is vitally important that the stream be protected from construction and roadway runoff. Safeguarding of water: It is vital that the purity of water be preserved to serve all animal and vegetative life, as well as the streams' fish. Protection of owl habitat: This area is flush with birds and is a sheltering home for some of the area's last remaining owls. We seek to protect them, as well. Safety of bike cyclists: On a county-wide level, we are all currently in the process of expanding bicycle mobility to replace motor vehicle traffic wherever we can. In every case, and especially in this project, we seek to make bicycle friendly passageways that are safe for all bicycle riders." I was intrigued by something that had been mentioned before about the alternative route of bicycles, which we did not fully discuss at the Council meeting, but it sounds like a very good option. "We understand an Environmental Impact Report is the next stage of consideration on this project, but we feel it is best, and most useful, to readily express areas and preferences that are most important to us. We seek to guide the project early toward a positive focus, protection of nature, and of human kind. We urge you to support our requests and honor our considerations. One last thought, and this is something that came up several times in our meetings. When you alter a highway, and when you alter a road, you might alter the culture of the towns and the human habitat along the way. We do not want to speed up this road for any purpose. It is a voyage to the ocean, and that is what it should remain. Thank you very much." [Applause]

Mr. Roberto - Jene Berensmeier, followed by Sandy Greenblat.

Ms. Berensmeier - My name is Jene Berensmeier. I have lived in Lagunitas for almost 50 years. Quickly, this is my fifth meeting on this project. I was privileged to go on the bus tours, two bus tours, and attended the Woodacre Improvement Club community meeting and Point Reyes community meeting. I am truly impressed with the caliber of the consultants. I wish you could have all been here to see the cultural and the historical graphics that we had here at the original meeting. And I am very glad to be here to provide my own opinion. First of all, in regards to Option A, I believe it is fundamentally environmentally unsound. It requires the removal of 24 trees, which is an unacceptable sacrifice in order to have 11-foot-wide lane for cars, and a three-foot shoulder for bikers cleared through the park. In addition, it would require three-foot high retaining walls to provide the width needed. That is totally unacceptable. The proposed option, I think, has a lot of merit to it, many positive aspects -- no trees would be cut; this is major, which impacts, then, the width of the driving lanes, and the amount of shoulder a size of a number of turn-outs. The road shoulder would be from zero to four-feet, which is about 100 percent improvement over what we have got there now for a major part of the park. The proposed project is attendant to road slope drainage issues, which I support, I like the recycling of the concrete base in place, and utilizing the rack surfaces which will eliminate truck trips and lessen the significant noise pollution we experience in the park. The culverts will be replaced. And I am particularly interested in knowing the three large culverts referred to that are proposed for improved fish passage, that is most welcome, but I am not sure if there is enough funding for that through Measure A, and if there is not, could we look at grants that might be useful immediately and used in conjunction with the construction of the restoration and rehab of this area, rather than being separate further on? These are my comments in regards to some of the environmental issues. I will be writing more, but the key ones are these: The 11-foot road width throughout the five miles of this route: Studies show that accidents and dangerous areas are not in the narrow curb, nine to 11-foot wide lanes at the Shafter Bridge end, but surprisingly are at the eastern end where the lanes are up to 12-feet-wide with four-foot shoulders. Clearly, the wider the road, the heavier the foot on the gas pedal. Study the option of making the road with 10-feet-wide throughout or part-way through the park, which will slow traffic, and allow the addition of another foot of shoulder for bikers without damaging the fishery. The disadvantage, of course, is for three-axle trucks that currently go over the double line in some areas. I think you need to consider working closely with parks administration to maintain the removal of sprouts that take up significant space at the base of redwoods that are next to the road. This, again, would allow a little more safety for bikers. Assure that the concrete being recycled for road base, which is a great idea, or any additions will not include toxics or heavy metals or methods of implementing that are negative to habitat, water, or fish. The crack and sealing method appeals to me because of the elimination of truck trips, but I am concerned about the maintenance issues that could impact the safety of bikers, and feel that any maintenance of anything that is proposed needs to be considered on an ongoing basis after this project is finished. I have concerns regarding timing and the length of the implementation of this project, and the impact on commuters from West Marin. I think that is a sensitive issue because there are a lot more people coming here than in the 60's -- there were none. I could go all day across the valley and never see a car. And it is an interesting change. Pull-outs -- I am winding up here -- what is the number and location of existing pull-outs? What is the number and location of proposed pull-outs? How will the creek be protected from the social trails where I see people pull out, park, and then they want to get down to the creek right from the pull-out, and they do excessive damage. Provide information about the existing pull-outs that are proposed for discontinued use. Blocking them off with boulders and rocks is a good start, but some appear to negatively impact the area. Would this include native plants? What are other options? Please provide information as to the number of retaining walls, their location, and composition under this proposal. Such walls could change the character and aesthetics of this five-mile route. And then, in just response to something else I had heard, I do not have much time here, but I oppose an alternative which includes paving the unpaved portion of the bike path. I have currently been riding my bike five days a week, and I have learned some new things that not only confirm my earlier concerns, but provide some new concerns, and that is that the unpaved portions are used by campers, by families, by families with children, by elders, by equestrians, and their horses. Once you pave these routes, paved routes are for vehicles. They will go faster. And in my experience in riding, that is 15 mile per hour which is required, I am going that rate, and my wonderful exceptional bike racer friends are going 20 plus. This endangers the experience for those for what that natural resource is about. Get them off that, do not provide that alternative, and let us fix Drake so that we have vehicles on there, and space for bikers, and their safety. Thanks. [Applause]

Mr. Roberto - Sandy Greenblat followed by Ron Hurwin.

The Reporter - Can I just ask the last speaker to state your name one more time?

Mr. Roberto - Jene Berensmeier.

Ms. Berensmeier - Jene Berensmeier, Box 286, Lagunitas.

Mr. Roberto - Sandy Greenblat, followed by Ron Hurwin.

Mr. Greenblat - I am an equestrian member of the Marin Horse Council, but I did not come here to discuss equestrian issues. I want to discuss this question of roadways, turnouts, shoulders, pull-outs, etc. The Environmental Impact Report and the resulting final grading and paving plan must include widening of all shoulders, turnouts and pullouts to the greatest extent allowable under physical limitations. I am not suggesting that they be widened at all costs. These areas designed to provide room for vehicles to pull away from the roadway, and then allow other vehicles to pass must include pavement levels that are as wide as possible, or alternative pavement levels as discussed today, when viewed away from and to the right of the usable right edge of the traffic lane. There must be no variation in the level of the pavement, or the alternative pavement. Present conditions include drop-offs from one-inch to as much as four and five-inches, when leaving the roadway to allow passing. This creates a very dangerous situation, particularly for all vehicles other than automobiles. It results in a lack of constant tire contact with the surface, and continually breaks up the edge of the pavement. All one has to do is drive out there to see this.

The result is a constant creation and recreation of unstable areas many vehicles, including me, choose not to utilize. Repeated dropping off the roadway and re-entering the roadway by essentially climbing back upon to the roadway is damaging to vehicles. Many drivers, including me, will simply not tolerate the risk of damage to their vehicles, or upsetting my cargo, which happens to be horses. Retaining a constant pavement level to allow cars, trucks, trucks with trailers, all the doubles and rock carriers, gravel carriers, cement trucks we see on this roadway, and other vehicles to property and safety leave the roadway to allow passing is important. It will provide a safe method, also, to re-enter the roadway, without incident or damage. Failure to provide such a safe surface area will defeat the very purpose of these turnouts, pullouts and shoulders. Signage, really critical as indicated in your study, is absolutely necessary to prevent people from parking there. Having said that, I would add two things; one is, this statement is on file with David Bernardi at his office, but I did want to read it publicly and into the record. I am encouraging the engineers to make the pullouts as long as possible because some of us are driving vehicles that are longer than 18-feet and to please consider the effect of the cargos that all of the truckers are carrying, let alone the live cargos that we are carrying. Thank you.

Mr. Roberto - Ron Hurwin, followed by Duffy Hurwin.

Mr. Hurwin - Hello. Obviously we are horseback people. The biggest problem that we are having with the road is that we ride four days a week and we seem to go to Point Reyes most of the time, so we are on the road four days a week. We have had many close calls and head-on collisions, including with the shuttle -- I think it is called a "shuttle." The road is so narrow that where we are driving 20 miles an hour because the road is so chopped up, with the horses in the back, and we always have some shocks, so I cannot even imagine what the horses are going through, we have been on the straightaway and the shuttle with their mirrors and our mirrors, we actually clipped -- we actually called them one day where they clipped our mirror, and we were right in the middle of the road, and they were in the middle of the road, that is how narrow it is. The other day, we were driving and a car was coming towards Fairfax, I guess. We were going towards Point Reyes. A bicyclist was on the road and into the road because there is no bike lane technically on most of that road, and they were coming across a double lane to get around the bike as we were going straight, and missed a head-on collision by that much. I honestly closed my eyes. I said to her, "We're dead." And that was because bicyclists, although we would appreciate sharing the road with them, there is no bike lane on that road going towards Point Reyes. So we are in favor of widening the road. And I understand that there are 800-year-old or 1,000-year-old trees, but the fact is there are more people going to Point Reyes and coming into Fairfax than there was 800 years ago. If you do not widen the road, the trucks, the cars, and the bikes are going to have collisions. And before we had horses, I used to be behind a horse trailer, and always wondered why they were going so slow, well, now we are the ones that people are behind and honking, and any chance we get, we pull over -- if you are ever behind our trailer, you will recognize our trailer, we pull over. Unfortunately, the turnouts are drop-off's, and therefore we do not use the turnouts, what we do is we go up to like where Devil's Gulch is, and I pull the trailer along, and cars have to kind of go semi-across the lane to pass us, but we will sometimes pull over six to seven times if the opportunity is there. We are going to ask, then, that if you do the turnouts, you make them long enough and wide enough so that a horse trailer and a truck can pull over. So we are absolutely for widening it, we are absolutely for a bike lane, we are sharing the road, but without widening it, you will not be able to have the road shared. That is my comment.

Mr. Roberto - Duffy Hurwin followed by Erica

Heimberg.

Ms. Hurwin - Hi. I am Duffy Hurwin. I'm trailoring with him. Sandy, I think Sandy and Jene Berensmeier, they made a lot of the same comments I was going to make, so what I will add onto that is that we are into sharing the road. What I am finding is that a lot of the cyclists are not traveling single file, they are traveling two and three abreast, and it is like I am a major environmental advocate, and I do not want to harm the fish, the trees, or anything, but the reality is we have to co-exist with these other species. My concern is signage for the bikes. I think that, you know, we do have a paved bike lane from Irving Picnic Ground all the way to Platform Bridge. A lot of people who travel on that lane, they may be people who are not familiar with the area, so they do not know that they could actually get off the Sir Francis Drake at Irving Picnic Ground, and pick up the bike lane from there, going west. So I advocate putting signage saying bike -- you know, there are other areas where they say "bike lane here," even in Fairfax. So I advocate putting good signage so the bikes know they can get off the road and take that paved road. I do want to make a comment about that paved road, though, in Tailor Park. From the division of Tailor Park and GGNRA, they slurry sealed that surface, and it is so slick, two of my friends' horses went down on that road. So I absolutely do not want to pave the rest of the bike lane because I agree with Jene, you have got a lot of people with baby strollers, and hikers, just people who use that and enjoy that it is a natural setting, and it is not an asphalt road going east of Irving Picnic Ground. But west of Irving Picnic Ground, that is paved, and that should be indicated, that the bikes cannot get off there. I will not cover the same thing about the paving because it has already been covered as far as the turnouts, but I think if we can take the existing turnouts and make them smoother and safer to get onto, then it makes it easier for all the traffic -- slower traffic and such -- to get over, and maybe even have signage for bikes to pull over into the pullouts because I have been where there has been a bike and 20 cars that are all stacked up, and then you get some antsy people that cannot wait, and they just try and take their chances, close their eyes and go around the double yellow line to try to get around the bikes, and we have gotten in a number of near misses. So I think that is about it. But I do advocate a lot more signage for the traffic, and some widening where possible.

Mr. Roberto - Erica Heimberg followed by Connie Berto.

Ms. Heimberg - Hi. I am Erica Heimberg and I have raised my kids in Woodacre for 15 years, and both of them are bicyclists, just to let everybody know that. I commute on this road by car and by stage, just about every day, and I know it needs to be re-paved. My tires know it needs to be re-paved. I am also on the staff of SPAWN and its nonprofit organization, Turtle Island, but I am speaking on my own behalf right now. I am very concerned about the character change with some of the proposed options beyond repaving the road as it is. I am concerned about more bicycles on the roadway. I have experienced even in areas of Sir Francis Drake where the road has been widened, and bicycle paths have been provided, that bicyclists do not stay on the right hand side of the white line, and I think that that will continue due to the character of the road, and the way people like to bicycle in this area when they come here. I am also concerned about increased car speed on the road. I think that the bike path on the other side of the creek is a great resource for the community and I would like to have options explored to capitalize the use of that pathway. We just a couple years ago spent a million dollars on a bridge to provide people more access to that pathway, and I would like to see us leverage that for greater use, and provide signage and explore options that are environmentally safe for making that more friendly to the bicyclists. I think that protection of natural resources is paramount. This is the creek that shelters the last largest remaining population of endangered Coho Salmon, other aquatic species, birds, and rare plants. I agree with what Chris Pincetich and Joe from the Native Plant Society said. And I would also like to ask that the issue of county staff time and financial resources going to a larger project on this road be addressed. And whether this is diverting any resources from addressing roads in towns like Woodacre, where there are badly needed repairs, I would like to have that addressed in the EIR.

Mr. Roberto - Thank you. Connie Berto followed by Andy Peri.

Ms. Berto - Thank you for the opportunity to speak. Good morning, Supervisor and everyone else. I am Connie Berto. I have lived in Marin County for over 50 years. And I am a horseback rider. I have also done five centuries on my road bike, and I have climbed Mt. Whitney and done other hiking, too, so I have done a lot of recreational work. This road has to be fixed. There is no question about it. It is way overdue for a good face-lifting. And it is important to have good bike lanes on this road, too. We recognize that. And while I am a tree hugger, but there are some trees that I understand you found out were diseased and should be taken out, they present a hazard to users, and I have great faith that, when all the reports are in, and the EIR is made, that you will find that you can save a lot more trees, and you will not have to cut up to the 24 that you planned. About the railroad grade, which I have been told is not actually a part of this project, at all, this is something else, this project concerns Sir Francis Drake, however, I would like to say that Lanny Wagoner (phonetic), who was a previous superintendent of the park, wrote a letter a few years ago before he retired, that paving the western section of the railroad grade negatively impacted the experience of the railroad grade permanently. The swiftness of the bicycles, the silence, as Jene Berensmeier said, it imperils the hikers, the family groups, the equestrians. I have been almost thrown by such speeds silently coming up behind me. The eastern section of the railroad grade is useable just as is, even in the rain. A year ago, I was riding my horse eastward in the rain on that section, and I met a road biker with narrow tires going westward in the rain, and I am sure we each thought the other one was crazy, but there we were in the rain and the mud and so forth, but that railroad grade is such a hard surface, it is perfectly usable year-round, and it is heavily used by equestrians that camp at the horse camp -- yeah, Devil's Gulch, thank you very much. I had a senior moment there. I myself am very conscious about holding up vehicle traffic on Sir Francis Drake. I have heard comments about, well, we do not want people to speed, and my thought was, well, then you should not be upset when you are stuck behind a slow moving horse trailer, but that is another question entirely. I would like to close by reading a short letter from the Marin Horse Council, of which I am a Director, and I sent an e-mail copy to you, Steve, and am going to give this copy to you right today. [Reading:] "The Marin Horse Council is pleased to support the project for the renovation, improvement, and rehabilitation of Sir Francis Drake Blvd. from Shafter Bridge through S.P. Taylor Park, onward to Platform Bridge Road. We support this project as it will improve the safety of vehicular traffic, and provide lanes for bicycle riders. While the unpaved railroad grade runs parallel to the creek and the road, this old grade is a multi-use popular recreational path through the park, and should never be paved as an alternate to providing bicycle lanes on Sir Francis Drake Blvd." Parenthetically, I might say that this is part of the old California Riding and Hiking Trail. "The Horse Council suggests that attention be given to the placement of vehicle turnouts in both directions along this route. When our members are driving trucks pulling horse trailers, we necessarily drive slowly to protect our cargos. Frequently, we pull off to allow vehicles behind us to pass us. Where there is no shoulder or a sharp drop-off from pavement to the shoulder, or a shoulder comprised of deep potholes and rocks, we will not risk jostling our horses, and we cannot pull off. Well-placed turnouts reserved for this purpose only would enhance the safety of all. Thank you for the opportunity to comment. Connie Berto, Marin Horse Council." Thank you. [Applause]

Mr. Roberto - Andy Peri followed by -- is it Cela O'Connor?

Mr. Peri - My name is Andi Peri. I am here representing the Marin County Bicycle Coalition. The Marin County Bicycle Coalition wishes to maximize safety through the corridor for all users, while minimizing the impacts of the ecological environment, including trees, soils, water quality, aquatic, as well as terrestrial endangered species in that corridor. Since 1999, there have been four bicyclists killed in West Marin, indicating the highest rate of fatalities for bicyclists in the whole country, and when you look at that particular region. And the treatment of this section is particularly critical for those safety reasons. One specific concern that we have regarding safety is the prospect of both experienced and inexperienced riders weaving in and out of zero to four-foot shoulders. Often times, people are upset by experienced riders taking the road, but it actually, even though it seems more dangerous to someone driving a car, someone that has not been on the road on a bicycle, by going in onto the shoulders, and then weaving out when the tree is coming, presents much more of a hazard for bicyclists. So we like the idea that the bike lane option be studied within this EIR process. With regard to a continuous shoulder throughout the park, we request that a lower impact version be studied; right now, there is the three-foot option. We would like to look at possibly an 18-inch option throughout the park, thereby minimizing the number of trees that would be impacted in this project. In doing that, it would include the study of minimizing road lanes. I understand -- I think somebody when they gave their presentation, said that the road widths were as small as 19-feet, which does not allow for a 10.5-foot road lane width -- but to look at narrower road widths and thereby creating a shoulder, a smaller shoulder. So we would like to see that option studied and the number of corresponding trees that would be impacted, if that were to be built. Also, regarding permeable pavement on the turnouts, it is really really important that the permeable pavement interface between the asphalt and the permeable pavement not be within the shoulder areas. What that would create is a situation where bicyclists would be going from pavement to permeable pavement, to pavement, where those interfaces could shift, that could present a hazard with possible cracking or whatever difference of the roughness between those two surfaces. We think that improving the surface of the roadway is obviously, as I have said, fundamental safety benefit to bicycle riders, and want to make sure that whatever options are done are done correctly, and that have long term benefits so that we do not have to go back in there in a few years and re-do the project. Also, we would like to please have you evaluate the potential of increased speeds of automobiles from doing the widening, so whereas we would like to see wider lanes for safety, if that is going to increase speeds, then there is detrimental effects from that; so what are the increased speeds from doing the three-foot option, or even the 18-inch option as we are requesting that you study? Regarding the pathway, a lot of people think that bikes should just get on the pathway and it has already been talked about here why that is problematic. I know the horse people do not want to see it paved, but there are many riders that, no matter what all of us think in this room, are going to use the road. The road, California Vehicle Code, allows bicyclists to share the road; it is not just a preference, it is just the law that they are allowed to use the road. And the question is we need to make this safe for the riders that are going to be there, whether we want them there or not, whether some people want them there, or not. Issues around signage, I want to echo that again, is critically important. We think there should be much better signage out there. And then, finally, I just want to express my appreciation for the opportunity to comment and look forward to the County and all the stakeholders' comments being considered in this process to protect, again, both safety and the environmental integrity of the system. Thank you. [Applause]

Mr. Roberto - Cela O'Connor followed by Frank Egger.

Ms. O'Connor - Good morning, good morning, Supervisor Kinsey. Thank you for having this meeting. I am here -- I was born and raised in this county. This vote has serviced this county well since 1929, before I was born -- I was born in '31. This road is not failing. This road needs to be resurfaced. Option 1, your original surface is what really needs to be done with this road, and we would not all be sitting here today wondering what is going to happen to the fish, the bicyclists, the horses, and the hikers. Parallel, running to this road, right on the other side of the creek is a perfectly safe bicycle access way to cover that distance in the road, and we keep hearing safety from cyclists -- they will not be safe on this road because where the bike accidents happen is where the roads are widened, and where the speeds -- you get the speeds up. And we will have bicycle accidents on this road when it is widened and when it is straightened, and not until. We have not had bicycle accidents on this road. Otherwise, we would be hearing all about them today. I believe that our taxpayer dollars are being thoroughly wasted on a whatever you are calling this project, that I do not believe needs to be done for probably another 50 years -- if the subsurface fails. This road has survived enormous flooding where the water was this high above the road. It did not take that road out. That road is still there. And the county needs to do a better job maintaining that road, so the cracks in the concrete do not get watered, so that you have a disappearing subsurface underneath the concrete. So I believe that what we have left of the Coho populations come first. Our Redwood trees come first. Transportation comes however we can get it, we have it, over the hill, thanks to Steve, we have got that great little stagecoach, we can increase bus service, we do not need a wider road. Horses -- I publicly trained horses for years in West Marin, and I trailered horses out of West Marin, and I never use Sir Francis Drake, it is too darn hard on the horses. It has got an underlined concrete just like that, and if people live in Fairfax, they should be going back over the road, over to where Terra Linda comes in, and then just go right on out, and get out to the coast that way. We have three roads to take our horses in and out of West Marin. We do not need to fix this road to suit horses. We do not need to fix this road to suit cyclists. We have perfectly safe situations, alternatively existing close by in this county. And this is supposed to be a scoping session; it is turning into a discussion on the merits of the project, which should come later, but I do not feel we all would be sitting here if the County had not just plain -- the original option 1 that was up there, just to resurface this road, not to expand it, not to increase the footprint, keep every permeable surface natural, as great as possible. We cannot lose a tree. That watershed is losing its canopy. Those are the high trees. We cannot take those out, especially along the creeks. It will increase the temperature of the water. So I am not going to take up any more of your time, we have got a lot of people here that are echoed a little bit of what we said, but believe me, if Marin County Taxpayers Association thought this was happening, this is the way their tax dollar was being spent, on a project that did not need to happen, you would probably have this room filled up. So I am going to stop here. Thank you very much. [Applause]

Mr. Roberto - Frank Egger followed by Karen Nygren.

Mr. Egger - Thank you. Frank Egger, 13 Meadow Way in Fairfax. I am representing the North Coast Rivers Alliance today. My family first passed through the project area by rail, to the family ranch in West Sonoma County in the 20's. I have been using and enjoyed the San Mateo area since the 40's. I drove this roadway as a commercial driver daily from 1960 to 1970 to West Marin. The Draft EIR must address adverse impacts on the state and federal parks, and adromous fisheries, and other listed species, growth, and traffic inducing impacts on West Marin and in the Upper Ross Valley. One alternative is insufficient. The Draft EIR must address a no project alternative. It must address as an alternative a load limit on that portion of Drake and redirection of commercial trucks through Nicasio to West Marin, just take them off the road. As the speed of the traffic increases, adverse impacts on wildlife increase. This must be measured. The Draft EIR must address the following: the ownership of the right of way, the width of the right of way, the license of the agency contractor who surveyed the right of way, the boundary markers of the right of way must be staked all along the right away so we can physically see where the right of way actually is. The Draft EIR must address the question as to why the county is spending Measure A money on a roadway they do not own. Ownership of that right of way is a key to this whole project. If in fact the County deems some project as necessary, then they must use County gas tax funds, not Measure A money that belongs to all of us in Marin. Thank you. [Applause]

Mr. Roberto - Karen Nygren followed by Candace

Hale.

Ms. Nygren - Hi. Karen Nygren, speaking for myself. I belong to several environmental organizations and it is important I clarify that. Three points. One, when you were describing the EIR process you said that you were going to have a 14-day Final EIR circulation. I am not quite too sure what the DRAFT EIR circulation is. The standard frequently is 30 days, not 14 days. I request that we all have both a 30-day minimum for both the DEIR, as well as the Final EIR, so the public has adequate time; 14 days is not adequate; secondly, there seems to be quite a bit of discussion about the bike path which would be running parallel, and since there is so much discussion about that, it should absolutely be included as an alternative in the EIR even though it is not in the project description. It might be used or it might not be used, but I think it is important for the public to understand the impacts of that project, one way or the other, and thus it should be added as an alternative of the study. As an alternative, it could possibly enhance the bicycle safety, as well as other equestrian and pedestrian, and how it could be done is to look at it in a different way, as other bikes paths are around Marin County. What they have done is they have taken the bike path and separated it into two different segments, where you can have half divided as one means of surface and also being used one-half as pedestrians and the other half by bicyclists, so that both can use the same path without having a conflict if in fact you have signage that makes sure, or some way to make sure that it is a separate path, and being looked at as such. And I suggest that that be looked at as an alternative. My other point, I am going to be submitting -- I already have written up to five pages of questions, and I am not going to belabor the point, and I will be submitting that with a lot of other concerns -- but one of the other ones that I do want to bring up right now is funding. I know an EIR in money is not to be part of an environmental review, but in this particular case, it is an important part of what will drive the ability for this project to be completed. Frequently, there are "strings attached" to receive funds from Caltrans, the state, and Feds to meet the design standards to receive their funding. Right now, we have Measure A funds which I believe are inadequate to really fund the entire project. So, if in fact that is the case, we are going to have to be looking elsewhere besides maybe in the county of where we are going to get adequate funds to be able to completely do this project as proposed. So the other agency requirements for funding might drive the design and configuration of this project, that the community really would like to see. How can the county find ways to fund this project as preferred by the community, without being forced to meet the Caltrans and the AASHTO standards? These standards would be contrary to what the majority of the community appears to desire. How can the county find the funds to guarantee they will be able to deliver this project, as proposed, without needing to meet the Caltrans, state, and other requirements? That will make a big difference as to what the outcome is. We can do a lot of talking here of what we want, but then the money is what is going to drive the project, and that is what talks. Thank you. [Applause]

Mr. Roberto - Candace Hale followed by Chuck Ford.

Ms. Hale - Hi. I am Candace Hale. First, I would like to say that, what was presented does not talk at all about removing trees. I understand Option A talks about removing 24 Redwoods. I would say that is absolutely and completely unacceptable. The idea that you would remove a single tree that exists in one small pocket left in the country is insane. And I would like the EIR to address something that no one has really mentioned in terms of your project, which is the intangible quality of all our lives, that is provided by undisturbed nature. People move to West Marin, people live in West Marin, and people travel to West Marin, because they are seeking surcease from the City, they are seeking a quieter, calmer, more beautiful, more natural space. This is not a highway where you want to get in there and straighten out the corners so people can go faster. The whole point of crossing the hill at White's Grade is to come into a quieter, wilder place. The wider you make this road, the faster you make this road, the noisier you make this road, every person camping in Samuel P. Taylor, every person that hauled their family from the City to have a moment of peace and quiet, gets less and less of that. Every person who is hiking, every person who is on their way to Point Reyes to experience the beauty of the ocean gets less calm, less peace, less happiness knowing that they are in community with the Coho, with the birds, and with the trees. It is your responsibility and the EIR must address your responsibility to maintain as much of nature as you possibly can, consonant with safety. Thank you. [Applause]

Mr. Roberto - Chuck Ford followed by Gordon Bennitt.

Mr. Ford - Hi. I am Chuck Ford. I live in Lagunitas, and I have lived in the valley for 35 years, and I represent nobody except myself. The problem with going at the end is everyone has pretty much said everything that I would want to say, but I want to particularly concur with what Wendi had to say, and also with some of the observations of Jene Berensmeier, so I will just add on to a couple, then. With respect to what Jene had to say, and Connie, I think we have to recognize that, if we have a separate bike path for bikes and paved, we are trading off a car cyclist interface with a pedestrian cyclist interface. At the end of the day, I would concur with Wendi that I think that it would be better to do a permeable surface on the bicycle trail. With respect to cutting down the trees, I think some trees you can cut down, and some you cannot, but the most obvious trees to not cut down are those big redwoods near the entrance to Samuel P. Taylor Park, and those trees, I think, are our own little Avenue of the Giants. Those trees make that experience driving through Samuel P. Taylor Park a pleasurable experience. And I think there are a million other reasons for not taking those trees out, but I think that ought to be noted, too, that if those big trees come out, the ones that are almost in the road, that is going to take a lot of the pleasure of the drive away from the thousands and thousands and thousands of people, both in this county and out of this county that come here. Widening the road itself, you have a risk homeostasis issue, I think. And I think people noted that. I ride my bike, I put about 6 or 7,000 road miles on my bike every year. The three scariest stretches of road in Marin County I ride on are the very bottom of the east side of White's Hill because the road is bad, and because the cars go fast. On Nicasio Valley Road, which is actually pretty safe, but the road is straight, the cars go a million miles an hour, and then Lucas Valley Road, because they seem to re-pave that every third week, and -- Steve -- and you know, and cars just go faster on that than they should. This stretch to Samuel P. Taylor is not all that scary, it is not that pleasant to ride a bike on, but it is not scary because cars are going slow there, too, because the road is so bad. But when the road gets better, it is going to be like Lucas Valley Road. Cars will be going too fast for the kind of turns you have there. So I think that part of it absolutely needs to be recognized, so at the end of the day I would support doing a permeable surface on the bicycle trail and, you know, this is probably heretical, but I would say make it illegal -- illegal -- to ride bicycles on Sir Francis Drake from Shafter Bridge down to the other end, Platform Bridge Road. [Applause] You know, get the cyclists off there because -- but just to reiterate, you are trading off -- you are trading off those three together, spandex clad idiots from Berkeley, or wherever they are coming from, those same people who are holding you up in your car, and I get road rage on a weekly basis, you know, driving through there because of cyclists. You are trading that off to those same people who are going to be going like bats out of hell through the park, where you have got little kids. And they will be yelling at the little kids to get the hell out of the way. Okay. [Applause]

Mr. Roberto - Gordon Bennitt followed by Todd Steiner.

Mr. Bennitt - Hi. I am representing the Sierra Club here. I persist in thinking that there is a still a possibility for a win-win here, where we can get something good for the bicyclists, something good for the autos, and something good for the fish. We will see how it comes out in the end, but I am still hopeful. At the beginning of this process, we had Options 1, 2 and 3, and I know I asked, and got a favorable response, that the options were shrunk so the Option 3 went off the table, and we ended up having Option 1 and a half. So I am going to start with my ask first, and that is could we do that again? I think the Option A with the number of trees being cut is too many, and I am wondering if you could -- I do not know how your data is assembled, but I am wondering if you could basically reverse the analysis so you start from the trees, and end up with the widths. It looks like now you are starting with the widths and you are ending up with the trees, and I think it might be better to work the other way. Again, this is something that the Bike Coalition brought up, and I will reiterate it. I do not know whether your measurements are rounded to the nearest foot or not, but if they are, the different between a half foot of shoulder and a one and a half foot shoulder is 300 percent difference -- that is big.

I think if it is possible to get a finer definition there, an 18-inch -- in other words, an 18-inch bike path might be quite good. And if that still results in no trees, or one tree, that might be great. And just as an example, Option A has two percent of the linear width of the project is shoulders two-feet and under. The preferred option with no trees out has 39.6 percent of the linear distance, two-feet and under. That is a broad difference, so that is why I am asking if there could be an Option A and a half or something, that we could see, that would shrink that difference down a little bit. Now, a couple of smaller asks. Figure 10 shows a bunch of riprap in the creek because of slope failure. It does not say how long it is, but I did a cross-section and divided it by 2,000-cubic-yards, and I came up with 120-linear-feet of riprap. That is a lot. And I am wondering, is there any other way to do that, just hoping that if that is engineering-wise necessary, or if there is another way to do that other than putting riprap in the creek. I reiterate SPAWN's point about toxics, it is not just from the road use itself, but I want to ask the question about whether it is toxics from the rubber asphalt. I know there are advantages to rubber asphalt -- traction, sound reduction, but is there an offset to potential toxics from that? There are only three culverts in the plan now for fish passage, and I know Still

Water Science identified high flow refuge as the limiting factor in this section of Lagunitas Creek, so I am wondering what the criteria was. If the criteria was upstream breeding habitat, to determine whether there should be a fish passage culvert, that is the wrong criteria. Basically, we would want to ask for every stream, every tributary that comes in there, to have a fish passage culvert so the fish can use it, even if it is not breeding up there, to get out of the high flow. A question on 30 years of the project lifetime -- what will happen to the tree girth and roots that are proposed to be at the pavement edge? In 30 years, are we going to looking at another situation with trees in the middle of the shoulder? And lastly, you can have a 10-foot-wide bike lane, and if you do not sweep it, the bikes are going to be in the travel lanes. So, particularly when you have got these relatively narrow bike lanes with the retaining wall next to them, the County has got to provide regular funding for sweeping these things, so that the bicyclists are safe and do not have to use the travel lanes. Thanks a lot. [Applause]

Mr. Roberto - Todd Steiner.

Mr. Steiner - Hello. I am Todd Steiner from SPAWN. I have lived in Forest Knolls for about 15 years. I commute on this road every day, either on the bike path, or on the road, to Tocaloma from Forest Knolls. So I am going to put these mostly in questions, but these are things that we would like to see in the EIR, so that we can make an informed decision. We want to know about the cumulative impact of additional loss of riparian habitat from widening the road. We want to know about the cumulative impact of the loss of trees that are considered to be cut down, especially in regards to the trees that are being cut down now because they have died of Sudden Oak Death Syndrome. So we need to know what the cumulative impact of those additional trees will be. Steve started off -- these are not in order -- by saying this project had a dual purpose, and then we were told we were just supposed to address environmental issues, but safety issues have come up here, as well. So I want to reiterate what was just said by Gordon, if we do not do road sweeping of these roads, it does not matter how wide that path is because it is in a forest and stuff falls on it. And you cannot ride a bicycle on it very effectively. To add to that, there is an environmental component, just road sweeping the roads, that gets all of the pollution that falls on those roads from our break line, or etc. and keeps that out of the creeks. So I would like to see that analyzed and be put into this project. As someone already spoke, faster is more dangerous, but faster can also mean more pollution. I would like to see the impacts of potentially speeding up traffic on this road on water quality be addressed. The crushing of the current base, I would like to understand what the impacts of that will be on the current trees that are not proposed to be cut in the long run. I also want to know what the environmental impacts are of crushing those trees on water quality. Grinding off the current surface, which was mentioned, what are the water quality issues associated with that? That needs to be determined. There has been talk about significant erosion from the pull-offs and the trails down to the creek from those pull-offs. I would like to see some data to support that, if that is being used as a reason for this project. I would like to see an analysis of the pollution of leaving the road in place. That road is there and is a source of pollution now. What is the impact of leaving that road in place? The safety issue, I ride on that bike path now about two days a week. There are, just as bicyclists have a right to ride on the road, bicyclists have a right to ride on the bike path, and whether it is partially paved, paved, or unpaved, I can tell you that street bikes pass me on my slow riding there, in my present condition, all the time. They zoom right by me. So it is being used. So I think we need an analysis of how many bikes are using the road, and how many bikes are using the bike path currently, and what change this would be. I think that is enough for now. Thank you. [Applause]

ITEM VI Adjournment.

Mr. Roberto - I have gone through all the speaker cards and we still have a little time. Is there anyone who has not spoken to an environmental issue that would like to speak to an environmental issue? Okay, I am going to count to three. One, two, three. We are ending the public scoping portion of the meeting. And I wanted to just point out a couple of things, then re-state them so you can remember. All the environmental issues that were raised here today will have a summary in the Draft Environmental Impact Report. It will indicate in that summary where those issues are addressed in the DEIR. So then you can look at that Appendix and see the comments made, the environmental comments and look to it. There were many comments today about projects and alternatives, and which is better than the other. We will not be discussing that. We will look at the issue of alternatives that were raised today when we evaluate and include alternatives in the Environmental Impact Report. One point of clarification, a question was raised about circulation times and dates. The Draft EIR will be available for 45 days for you to review and comment on, and there will be a hearing during that time period before the Board of Supervisors, where you can comment on the Draft EIR to the Board. Following that comment period and the production of the Final EIR, the County's regulations provide for a 14-day circulation period. This goes beyond what the state -- the state says you do not have to do anything, you just have to prepare the Final EIR. But the county allows 14-day comment period, written comments can be submitted on the Final EIR, and county staff does address those issues before bringing the matter back to the decision making body, which would be the Board of Supervisors. So that is the commenting periods on the EIR. So with that, I think I will turn it over to our -- do you want to say anything?

Supervisor Kinsey - Thank you everyone. And to let you know that we certainly will make every effort to publicize the presentation to the Board of Supervisors of the Draft EIR, and also the public hearing [inaudible].

(Whereupon the proceedings were closed)

NOTARY PUBLIC
STATE OF CALIFORNIA)   SS.

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a notary public and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF,

I have hereunto set my hand this 19th day of November, 2008.

Tahsha Sanbrailo
Notary Public

TAHSHA ANN HAVIS SANBRAILO
COMM. #1775172
NOTARY PUBLIC • CALIFORNIA
MARIN COUNTY
Comm. Exp. NOV. 1, 2011

APPENDIX E

BIOLOGICAL ASSESSMENT

This page intentionally left blank.

Biological Assessment
Marin County Department of Public Works
Sir Francis Drake Boulevard Rehabilitation Project
Marin County, California

Prepared for:

Marin County Department of Public Works
3501 Civic Center Drive
Room 304
San Rafael, California 94903
Contact: Mr. Dave Bernardi
(415) 499-6530

Prepared by:

Synthesis Environmental Planning
6 Carmen Court
Novato, California 94945
(415) 328-7923

July 2009

Edited and Amended by:

LSA Associates, Inc.
157 Park Place
Point Richmond, California 94801
(510) 236-6810

April 2010

TABLE OF CONTENTS

APPENDICES

FIGURES AND TABLES

FIGURES (APPENDIX A)

TABLES

ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway Transportation Officials
BA	Biological Assessment
BMP	Best Management Practice
CalIPC	California Invasive Plant Council
CALTRANS	California Department of Transportation
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
CWA	Clean Water Act
DBH	Diameter Breast Height (approximately 4.5 feet above ground)
DPW	Department of Public Works
ESA	Endangered Species Act
ESH	Essential Fish Habitat
FR	Federal Register
MBTA	Migratory Bird Treaty Act
MCCD	Marin County Community Development Department
MMWD	Marin Municipal Water District
NOAA	National Oceanic and Atmospheric Administration
OHWL	Ordinary High Water Line
RAC	Rubberized Asphalt Concrete
RWQCB	Regional Water Quality Control Board
SEP	Synthesis Environmental Planning
SFDB	Sir Francis Drake Boulevard
SWPPP	Storm Water Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

KEY TERMS USED IN THIS DOCUMENT

Project Site	The area that will be physically disturbed or has the potential to be physically disturbed by the proposed project which includes the SFDB paved roadbed and an approximate 20-foot wide zone from the edge of pavement.
Project Vicinity	The project site and surrounding region within approximately one mile of the project site, containing occurrences of special-status biota or suitable habitats for such species.
Project Study Area	The project site and a zone of approximately 200 feet on either side of the project site within which habitat types were mapped and the potential for indirect biological impacts from the project were assessed.

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

The Marin County Department of Public Works (Marin DPW) is proposing to rehabilitate approximately 5.2 miles of Sir Francis Drake Boulevard (SFDB) located about 0.58 mile west of the Town of Lagunitas between Shafter Bridge and Platform Bridge Road (Figures 1 and 2).[1] The portion of SFDB affected by the project is characterized by deteriorated pavement that has exceeded its design life. Prior maintenance by Marin DPW has included removal and replacement of damaged sections of roadway and overlays of asphalt concrete. However, these repairs are no longer effective as the pavement's structural section has failed. Without major rehabilitation, the roadway's condition will likely further deteriorate as cracks in the pavement allow water to infiltrate, thus weakening the sub-grade and creating additional distress.

As shown in Appendix C, the following three distinct pavement conditions along SFDB need rehabilitation:

- **Segment 1 -** composed primarily of concrete pavement with shattered slabs of medium to high severity. The pavement is considered to have failed and has exceeded its design life.
- **Segment 2 -** composed of concrete pavement with a thick layer of asphalt overlay. The primary distress is low to medium severity longitudinal/transverse cracking. This segment has received remedial repairs to extend its design life, but rehabilitation will soon be required to prevent a failed condition.
- **Segment 3 -** composed primarily of asphalt pavement over aggregate base. The primary distress is low severity longitudinal/transverse cracking.

1.2 PROJECT LOCALE AND SETTING

The project site is located in the west central region of unincorporated Marin County, approximately 2.8 miles southeast of Point Reyes Station, and 0.6 mile west of Lagunitas, California, respectively (Figure 1). The City of San Rafael is located approximately 9.8 miles to the east. The SFDB roadway within the project site winds along Lagunitas Creek for its entire length and traverses numerous named and unnamed tributary streams of Lagunitas Creek. Properties adjacent to the project site are either wooded or vegetated by annual grassland and scrub habitats.

Surrounding land uses consist primarily of recreational uses within publically-owned lands (Samuel P. Taylor State Park and the Golden Gate National Recreation Area). A working ranch (the McIsaac Ranch) is located at the western end of the project site along the north side of SFDB and is used for cattle ranching. A small number of residences occur along SFDB within the project study area. These residences are either used as housing for State Park employees, leased

---

[1] All Figures are found in Appendix A.

out for private use, or are vacant and not currently in use. Camping facilities are located within Samuel P. Taylor State Park.

The project site varies in elevation, but is generally flat or near flat in most areas. Some areas adjacent to the project site are also flat, but the majority of the adjacent land consists of mountainous terrain with steep slopes or down slope stream channel. Flatter lands are more commonly found adjacent to the western one-third of the project site. Elevation within the project site ranges from 82 and 209 feet. Representative photographs of the project study area are provided in Appendix C.

1.3 PROJECT CHARACTERISTICS

1.3.1 Project Objectives

The objectives of the project are the following:

- The roadway pavement is to be restored to provide an additional 30-year design life.
- Improvements to the roadway alignment are to be completed where possible to enhance safety.
- All proposed improvements shall protect environmental resources to the greatest extent possible during and after construction.
- Proposed improvements shall enhance pedestrian and bicycle uses of the roadway, where feasible.

1.3.2 Project Description

Pavement Rehabilitation. The project primarily consists of pavement rehabilitation of three continuous segments along approximately 5.2 miles of SFDB, as shown in the conceptual plans in Appendix B. Pavement rehabilitation approaches for the three segments are summarized below.

The Segment 1 road base layer will be rehabilitated using a “crack and seat” method that will crush the existing concrete roadway material in place. The process will commence by milling all existing asphalt overlay from the concrete pavement. Equipment will then be used to apply loads to the existing concrete pavement at one to three feet intervals, cracking up the concrete into smaller panels. After the cracking is complete, a roller is used to compress and interlock the panels into the sub-grade.

The base layers for Segments 2 and 3 will be rehabilitated using a method that also commences by milling all asphalt overlay from the concrete pavement. Following milling, the surface of the concrete pavement will then be ground to remove areas with vertical displacements. In segments where the existing pavement is asphalt, concrete pavement would be ground to a depth that leaves a structural section of at least 1.5 inches. All localized failures would be removed and replaced with aggregate base.

Once the base course is created by either method, two layers of asphalt concrete would be applied to the base course. The first layer would be rubberized asphalt concrete (RAC). RAC is a road material made of recycled tires that has been successfully used in California since the late 1970s.

It provides a longer design life than conventional asphalt. The second, upper layer would be a permeable friction course (PFC), which is a layer of porous asphalt that has the following benefits:

- Water Quality Improvements – PFC results in lower discharges of total suspended solids and other pollutants than conventional asphalt. Runoff will percolate through the first layer of friction course until it reaches the asphalt and then drain to the roadside, after being effectively filtered.
- Safety Improvements – PFC reduces spray in wet weather conditions, improving visibility and providing excellent traction as the potential for hydroplaning is reduced.
- Noise Reduction – PFC reduces the noise of vehicular movement along the pavement.

Drainage Improvements. A total of 57 of the 72 existing culverts, composed of corrugated metal, plastic, and concrete are proposed to be removed and replaced (Appendix D). Culverts will be replaced in the same approximate alignment and grade as the existing culvert structures. For existing culverts that extend ten or more feet beyond the proposed edge of pavement, only the culvert section within the project disturbance area will be replaced. Existing degraded concrete headwalls will be replaced with new headwalls at 54 culverts, and 3 new headwalls will also be constructed at culverts that do not currently have headwalls. The headwalls of the remaining culverts will remain.

In locations where culverts currently discharge onto a natural slope and there is evidence of erosion, the slope will be reconstructed and reinforcing fabric and seeding/plantings will be applied to reinforce the slope (Figure 3). In certain locations where significant erosion is present, limited rock riprap will be placed beneath the culvert along the upper creek bank (Figure 4).

Replacement culverts will have the same diameters as the existing culverts except in those locations where the existing culverts consist of a smaller diameter segment beneath the road and a larger diameter segment extending beyond the edge of pavement. In these locations, the replacement culvert will match the larger diameter segment, usually resulting in an upgrade of culvert capacity to the 100-year storm flow level (Appendix D).

To reduce the inundation of the traveled lanes in locations where the roadway slopes to the existing bank, a subdrain will be installed. As shown in Appendix B, a layer of pervious material will allow runoff from the roadway to percolate and be collected into a perforated pipe. The pipe will be connected to the nearest culvert. To reduce the discharge rate from the pipe, a weir or orifice structure may be installed. These swale areas would require maintenance by the County of Marin. The maintenance would consist of clearing the swale of any materials that could prevent proper percolation as well as intermittent replacement of the previous material layer. The maintenance should be performed in a manner that protects the underlying pipe.

Roadway Pullouts. Numerous unpaved areas along SFDB are currently used by vehicles to pull off the roadway (Appendix B). Many of the existing pullouts are too small to safely accommodate a vehicle. Furthermore, at some locations, inadequate vehicular sight distances create hazardous conditions. Boulders or large rocks will be placed at these and other locations to discourage use as pullouts and parking. To provide a refuge for slower traveling vehicles, three paved pullouts will be provided. Each pullout will be signed as a no parking zone.

The roadway improvements are designed to limit sediment discharge from the pullouts into the watershed during rainfall. Designed pullouts will be paved with porous asphalt, allowing storm water to percolate through the asphalt and to be collected in a perforated pipe for discharge to the nearest culvert. To reduce the discharge rate from the pipes, weirs or orifice structures may be installed. The existing parking area at Devil's Gulch is proposed to remain in its current condition as an unimproved surface.

Slope Repair. The project includes slope repair work at station number 270+25 where the road was constructed across a broad, east-facing colluvial drainage (Appendix B). The original road construction at this location required the placement of fill along the outside edge of the roadway. This improper placement of fill has resulted in settlement and/or lateral movement of the paved portions of the roadway over time, resulting in an unstable slope between the road and Lagunitas Creek. As the slope has eroded, it has steepened, creating an unstable gradient. Approximately 60 feet of the shoulder and edge of roadway appear to have settled by as much as two feet. As the slope continues to erode, it will result in an increasingly steeper and unstable gradient.

Other factors have also contributed to slope erosion in this location. Flow from one of the channels within the colluvial drainage is collected within a culvert that passes beneath the road and discharges directly onto the downward slope support of the roadway. The culvert outfall has no energy dissipation features and as a consequence has resulted in significant localized erosion. Additionally, sheet flow from the roadway is discharged directly onto the slope in this location, exacerbating the erosion.

To repair the roadway, a pier supported cantilevered tie-back concrete retaining wall will be constructed at the roadway's edge (Figures 5 and 6). The wall will retain the roadway's sub-grade and be anchored in firm material. The existing culvert under the roadway will be routed down-slope where an appropriate energy dissipation device will be installed. The repair work will require the removal of eight trees as shown on Figure 6 and summarized in Table A.

Table A: Tree Removal for Slope Repair at Station #270+25

	Tree Tag Number[1]	**Species**	**Diameter (DBH)**	**Estimated Height**
1	33	California Bay"	16"	50'
2	32	Coast Redwood	32"	60'
3	(no tag)	Coast Redwood	8"	20'
4	(no tag)	California Bay	12"	20'
5	(no tag)	California Bay*	12"	15'
6	31	Coast Redwood	12"	28'
7	(no tag)	California Bay	Two trunks 19"/19"	50'
8	30	California Bay	28"	50'

[1] Tree tags from Arborist's Tree Survey (Horticultural Associates 2008).

Roadway Realignment. The project also includes improvements to the roadway's alignment and width. Where possible, modifications to the horizontal alignment will be made to ensure compliance with design guidelines of the State of California Department of Transportation (CALTRANS) and the American Association of State Highway Transportation Officials

(AASHTO). The proposed alignment and width improvements are shown in Appendix B. This design maintains much of the construction within the existing roadway limits and does not require tree removal or major excavations. To provide for additional shoulder width and to minimize the expansion of the roadway's grading limit, low retaining walls of no more than 3 feet will be provided (Appendix B). A total of approximately 2,000 linear feet of retaining walls will be constructed over the entire 5.2 mile project alignment. The retaining walls will be constructed from prefabricated, tinted concrete providing a wood-like appearance. Drain rock will be placed behind the walls to allow for the hillside runoff to move freely to the base of the wall. The walls will include weep holes, spaced properly to drain subsurface water.

Proposed Roadway Improvements – Option A. The project includes an optional element ("Option A") to provide additional shoulder area, more uniform width, and increased sight distance along an additional 2,400 linear feet of road (Appendix B). This option would require the removal of nine existing mature, native trees located adjacent to the roadway (Table B).

Option A is limited to the 2,400 linear feet of road because any additional shoulder width elsewhere along SFDB could not be achieved due to critical topographic constraints. These constraints would require filling portions of Lagunitas Creek and cutting into the existing slopes. Because the slopes are very steep, the volume of earthwork would be extensive. Furthermore, this work would require the removal of many more existing trees that occur between the slopes and the existing road shoulder.

Table B: Tree Removal under Option A

	Station	**Side of Road**[1]	**Tree Tag Number**[2]	**Species**	**Diameter (DBH)**	**Est. Height**
1	70+00	Left	580	Coast Live Oak	25"/20"	35'
2	159+25	Right	1099	Coast Redwood	77"	80'
3	186+15	Right	1228	Coast Redwood	55"	90'
4	187+05	Right	1231	Coast Redwood	60"/60"	90'
5	193+05	Left	422	Coast Redwood	24"	70'
6	193+20	Left	425	Coast Redwood	40"	80'
7	204+40	Right	1315	Coast Redwood	50"	80'
8	210+60	Right	366	Coast Redwood	78"	120'
9	277+00	Left	3	Coast Redwood	95"	120'

[1] Side of road traveling west toward Point Reyes Station.
[2] Tree tags from Arborist's Tree Survey (Horticultural Associates 2008).

Equipment to be used during Project Construction. Construction equipment to be used during the project will include an asphalt milling machine, concrete breaker, concrete saw, smooth drum compactor, soil compactor, front end loaders, back hoe loader, track excavator, asphalt pavers, asphalt rollers, portable crushing plant, dump trucks, asphalt trucks, water trucks, and miscellaneous support vehicles.

Basic Best Management Practices during Construction. The project will include a Storm Water Pollution Prevention Plan (SWPPP), prepared in accordance with the State Water Resources Control Board National Pollution Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, dated September 2, 2009. The SWPPP will contain a range of best management practices (BMPs) that the project's contractors will need to follow during construction to ensure that runoff from the project site will not violate State water quality standards as they apply to Lagunitas Creek. The SWPPP must also include a Construction Site Monitoring Program that will likely entail monitoring of site discharges and receiving waters.

Post-project Water Quality Protection. The project will include vegetated bioswales that will be installed in locations where the road slopes toward the hillside and away from Lagunitas Creek. The bioswales will be underlain with permeable backfill that will function like a sand filter. A perforated pipe will be installed within the permeable backfill to direct infiltrating runoff to the nearest culvert; the underdrain will reduce the ponding of water that inundates the road during significant storm events. The bioswales will be seeded with forbs and grasses native to Marin County, suitable for erosion control.

The bioswales will function by increasing storm water detention time, which aids in the trapping and uptake of pollutants, silt and other sediments. The bioswales are designed to remove sediments, inorganic contaminants, organic chemicals, petroleum based pollutants (oils, hydrocarbons), oil/grease, total suspended solids and metals (e.g., lead, chromium, cadmium, and other heavy metals). Dissolved pollutants will be removed and/or transformed as runoff infiltrates into the ground.

In locations where the road slopes toward Lagunitas Creek and there is adequate space, a vegetative buffer strip will be established adjacent to the road. The buffer strip will be vegetated with erosion control grasses and forbs native to Marin County, and will be protected from vehicle traffic and illicit parking by a barrier (e.g., guardrail, boulders).

Another post-project water quality feature is the use of PFC as the top surface layer above rubberized asphalt concrete on all paved road and pullout sections. PFC results in lower discharges of total suspended solids and other pollutants than conventional asphalt. Runoff will percolate through the first layer of friction course until it reaches the asphalt, and will then drain to the roadside, after being effectively filtered.

The project will require long-term maintenance of the bioswales to maintain their effectiveness. The buildup of brush, soil, rock, and other debris will reduce bioswale effectiveness in absorbing pollutants. Regular maintenance will be required to remove debris and to manage vegetation growth in the bioswales. This regular maintenance will require occasional removal of dead vegetation, and in some cases, the planting/seeding of new vegetation. The DPW conducts regular maintenance of this roadway, and these new maintenance activities will be incorporated into the regular maintenance plan for the roadway.

The overall system of the PFC road surface, bioswales, and vegetated buffer strips will provide a significant upgrade from the current conditions along SFDB which are not designed for any treatment of runoff.

Construction Schedule. It is expected that the project will require approximately 200 working days or 9 months to complete construction activities. Construction will need to commence during dry weather as the early stages require excavation into native soils. Native soils exposed to rain can make construction extremely difficult. Construction will need to be complete prior to cold temperatures because asphalt concrete cannot be placed in atmospheric temperatures below 50 degrees Fahrenheit. Thus, the preferred start of paving work will be in May; paving will likely need to be completed by October.

2.0 METHODS

A literature review and field surveys were conducted to identify habitats, vegetation types, special-status plant and wildlife species that could be present within the project study area. The following sections describe the survey methods used and the literature and databases reviewed.

2.1 LITERATURE REVIEW

Biologists independently reviewed databases and reports that address biological resources on the project site including the following: (1) the *California Natural Diversity Database* (CNDDB) (CDFG 2009); (2) the CNPS *Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2009); and (3) the U.S. Fish and Wildlife Service (USFWS) online electronic database of endangered species (USFWS 2009). These databases were accessed and reviewed during 2007, 2008, and 2009 to verify that surveys covered any new wildlife species that may have been added between a previous and new survey year. The target list of wildlife species identified in the databases did not change significantly between 2007, 2008, and 2009. Relevant technical information from these databases is incorporated and referenced as appropriate.

2.2 RECONNAISSANCE SURVEYS

Biologists Cord Hute, Dan Hack, and Peter Melde of SEP conducted reconnaissance-level field surveys of the project study area on the following dates:

- March 2007 (14, 15, 22, 23, 27, and 30)
- April 2007 (3, 4, 6, 12, and 16)
- July 2007 (16, 17, 18, 25, and 26)
- June 2008 (16, 17, 18, 19, 20)
- July 2008 (7, 8, 9, 10, and 11)

Habitat types encountered during the surveys were characterized primarily by dominant and subdominant plant species. Wildlife use of the site was described based on known and anticipated occurrences. Most species were recorded as present if they were either observed, if species' vocalizations were heard, or if diagnostic field signs were found (i.e., scat, tracks, pellets). Some species known to occur in the region, or for which suitable habitat is present within the disturbance zone or buffer area, were recorded as "expected, but not observed." Plant taxonomy is based on the *Jepson Manual* (Hickman 1996), and wildlife taxonomy on Laudenslayer et al. (1991). Plant and animal species observed on-site are provided in Appendix E.

The surveys focused on the presence or absence of special-status species and their suitable habitats. If a special-status wildlife species occurrence was observed, the following was done: (1) digital photographs were taken; (2) the occurrence was noted on a U.S. Geological Survey

(USGS) 7.5-minute quad map; and (3) an estimate of the number of individuals present was recorded. For each special-status species occurrence identified, a CNDDB field survey form was completed.

Surveys included the following:

1. Suitability of habitat(s) to support sensitive wildlife species;
2. Presence of wildlife species and their habitats;
3. Potential of the site to contain wetlands, or other aquatic habitats;
4. Potential of the site to support sensitive small mammal species;
5. Potential of the site to support sensitive bird species (e.g., waterfowl, etc.);
6. Potential of the site(s) to support special-status plant species;
7. Habitat condition, quality and vegetation associations; and
8. On-site, adjacent and surrounding land uses.

2.3 SPECIAL-STATUS PLANT SURVEYS

Focused protocol-level botanical surveys within the project study area were conducted by Molly Boyes Botanical Consulting on the following dates:

- April 2007 (3, 4, 5, 14, 18, 23, and 24)
- May 2007 (5, 8, 9, 14, 20, 22, and 24)
- June 2007 (2, 3, 12, 13, and 14)
- July 10, 2007

Botanical surveys were conducted in accordance with CDFG (2000) protocols, as adopted by CNPS (2000). Additionally, focused surveys for Koch’s cord-moss (*Entosthodon kochii*), a CNPS List 1B moss species, were conducted by SEP on February 11-15, 2008, to determine if this plant species was present in the project study area. (Surveys for moss species are ideally conducted during the wet season.) All field surveys were conducted on both sides of SFDB for the full length of the project site and were conducted within the zone between the edge of the roadway to a distance of 50 feet from the road edge. No special-status plant species or populations of these species were detected during these botanical surveys. The botanical survey report prepared by Molly Boyes Botanical Consulting is attached as Appendix F.

2.4 ARBORIST SURVEY

A certified arborist from Horticultural Associates, Inc. conducted a survey of all trees with 6 inches or greater Diameter Breast Height (DBH) within 20 feet of the edge of pavement along SFDB within the project site (Horticultural Associates 2008). Data collected were: tree species, DBH, height, dripline radius, tree health and tree structure. Each tree was tagged with an individual identifier number; a total of 1,368 trees were surveyed.

3.0 BIOLOGICAL RESOURCES SETTING

3.1 VEGETATION COMMUNITIES AND WILDLIFE HABITAT

The project study area is located within the Bay Delta Bioregion. This bioregion encompasses the San Francisco Bay area and the Sacramento-San Joaquin River Delta. The Bay Area/Delta Bioregion extends from the Pacific Ocean to the Sacramento Valley and San Joaquin Valley bioregions to the northeast and southeast, and a short stretch of the eastern boundary joins the Sierra Bioregion at Amador and Calaveras counties. The bioregion is bounded by the Klamath/North Coast on the north and the Central Coast Bioregion to the south.

Eight vegetative communities were documented in the project study area during field surveys, as follows:

- **Seasonal Wetland -** similar to *Sedge* series in Sawyer and Keeler-Wolf (1995).
- **Stream/Riparian -** corresponds to *White alder* and *Mixed willow* series Sawyer and Keeler-Wolf (1995).
- **Annual Grassland -** corresponds to the *California annual grassland* series in Sawyer and Keeler-Wolf (1995).
- **Oak Woodland -** corresponds to *Coast live oak* series in Sawyer and Keeler-Wolf (1995).
- **Coastal Scrub -** corresponds to *California coyote brush* series in Sawyer and Keeler-Wolf (1995).
- **Mixed Evergreen Forest -** corresponds to *Douglas-fir* and/or *Douglas fir – tanoak* series in Sawyer and Keeler-Wolf (1995).
- **Redwood Forest -** corresponds to *Redwood* series in Sawyer and Keeler-Wolf (1995).
- **Ruderal Disturbed -** no correspondence to vegetation types in Sawyer and Keeler-Wolf (1995).

Each of these communities and their associated wildlife habitat value is described below. Maps depicting the general boundaries of these communities are provided as Figure 7a and 7b in Appendix A. A complete list of all plant species observed in the project study area during field surveys is found in Appendix E.

Seasonal Wetland. Seasonal wetlands are found primarily in roadside swales and ditches along either side of SFDB. Seasonal wetlands are also found within some streams and drainages and on side slopes along the existing roadway. The roadside ditch/swale wetlands are characterized by freshwater emergent vegetation types consisting of ruderal non-native and native sedges, grasses and forbs adapted to seasonally saturated soils, and periods of surface inundation.

Dominant and subdominant plant species that were observed within this vegetative community during biological surveys were sedges (*Carex amplifolia, C. densa),* European pennyroyal

(*Mentha pulegium*), sheep sorrel (*Rumex acetosella*), rush (*Juncus effusus*), umbrella sedge (*Cyperus eragrostis*), and miner's lettuce (*Claytonia perfoliata* ssp. *perfoliata*). Other observed plant species included perennial ryegrass (*Lolium perenne*), poison hemlock (*Conium maculatum*), toad rush (*Juncus bufonius* var. *bufonius*), California buttercup (*Ranunculus californicus*), creeping beardless (*Leymus triticoides*), bulrush (*Scirpus microcarpus*), narrow-leaved cattail (*Typha angustifolia*), and broad-leaved cattail (*Typha latifolia*).

Seasonal wetlands can provide food, cover, and water for numerous wildlife species and many species rely on fresh emergent wetlands for their entire life cycle. During periods of inundation, seasonal wetlands in roadside swales can provide feeding and foraging habitat for wading birds and waterfowl; however, the narrowness of the swales, the very close proximity of the SFDB roadway, and the disturbances associated with relatively constant daytime traffic probably limit the utility of the habitat for feeding and foraging. The habitat value is probably higher in locations with stands of cattails and bulrushes not directly adjacent to the roadside. Wildlife species commonly associated with this habitat in Marin County include song sparrow (*Melospiza melodia*), red-winged blackbird (*Agelaius phoeniceus*), northern raccoon (*Procyon lotor*), and California vole (*Microtus californicus*). Red-winged blackbirds were observed in this habitat during the field survey.

Streams/Riparian. The project site contains various ephemeral, intermittent, and perennial streams that are tributaries of Lagunitas Creek, a perennial stream that flows to Tomales Bay. Lagunitas Creek borders or lies in close proximity to SFDB within the project area along the roadway's entire length. SFDB crosses Lagunitas Creek at Irving Bridge at Station 212+00 (Appendix G); however, no rehabilitation work is proposed at this bridge crossing.

All tributary streams on the site drain from watershed areas located to the north and west side of SFDB into Lagunitas Creek (Appendix G). The mapped segments of each tributary stream consist of the culverted reaches flowing beneath SFDB and small portions of the non-culverted beds and banks on either side. Major intermittent or perennial tributary streams that pass beneath SFDB include Barnabe Creek, McIssac Creek, Cheda Creek, and Devil's Gulch.

Lagunitas Creek has a stream width of 50 feet between ordinary high water lines (OHWL) with top-of-bank height of 12 feet at the Irving Bridge crossing. Ephemeral tributaries on the project site typically are shallow (depths of 1–3 feet) and narrow (1–2 foot widths at the OHWL), have non-vegetated beds and banks, and lack riparian vegetation. Intermittent and perennial tributaries are typically deeper and wider with top-of-bank depths ranging from 2–10 feet and widths ranging from 2–8 feet at the OHWL.

Lagunitas Creek and its intermittent and perennial tributaries have stands of riparian vegetation within the study area. Riparian vegetation was observed within the upper banks and floodplains of Lagunitas Creek, Barnabe Creek, as well as a number of other named and unnamed streams crossing under SFDB. This vegetative community is quite variable and often structurally diverse. Common canopy and shrub species that were observed within this community during biological surveys included: California buckeye (*Aesculus californica*), white alder (*Alnus rhombifolia*), creek dogwood (*Cornus sericea* var. *sericea*), California hazel (*Corylus cornuta* var. *californica*), Oregon ash (*Fraxinus latifolia*), Himalayan blackberry (*Rubus discolor*), thimbleberry (*Rubus parviflorus*), California blackberry (*Rubus ursinus*), arroyo willow (*Salix lasiolepis*), Sitka willow (*Salix sitchensis*), blue elderberry (*Sambucus Mexicana*), and California bay (*Umbellularia californica*).

Woody understory and herbaceous plants commonly observed were: five-finger fern (*Adiantum aleuticum*), columbine (*Aquilegia formosa*), California pipe-vine (*Aristolochia californica*), Douglas' mugwort (*Artemisia douglasiana*), coastal lady fern (*Athyrium filix-femina* var. *cyclosorum*), winter cress (*Barbarea orthoceras*, *B. verna*), sedge (*Carex amplifolia*, *C. densa*), woodland sedge (*Carex globosa*), torrent sedge (*Carex nudata*), virgin's bower (*Clematis ligusticifolia*), umbrella sedge (*Cyperus eragrostis*), stream orchid (*Epipactis gigantean*), giant horsetail (*Equisetum telmateia ssp. braunii*), wild strawberry (*Fragaria vesca*), toad rush, rush (*Juncus effusus*, *J. patens*), California honeysuckle (*Lonicera hispidula* var. *vacillans*), bush monkeyflower (*Mimulus aurantiacus*), watercress (*Rorippa nasturtium-aquaticum*), bulrush (*Scirpus microcarpus*), stinging nettle (*Urtica dioica ssp. holosericea*), huckleberry (*Vaccinium ovatum*), and stream violet (*Viola glabella*).

Riparian forest habitat provides water, forage, breeding areas, migration and dispersal corridors, and thermal cover on a year-round and seasonal basis for an abundance of wildlife. Amphibians and reptiles that typically use this habitat include the following: the Sierran treefrog (*Pseudacris sierra*), foothill yellow-legged frog (*Rana boylii*), and several species of garter snake. Mesic areas with shallow pools may support California newts (*Taricha torosa*). Mammals that use this habitat for foraging and cover include: Virginia opossum (*Didelphis virginianus*), black-tailed deer (*Odocoileus hemionus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), mountain lion (*Puma concolor*), and northern raccoon. Riparian woodlands in Marin County provide important nesting habitat for a variety of migratory birds such as: Pacific-slope flycatcher (*Empidonax difficilis*), warbling vireo (*Vireo gilvus*), Swainson's thrush (*Catharus ustulatus*), and black-headed grosbeak (*Pheucticus melanocephalus*).

The site's perennial and intermittent streams provide habitat for a variety of other fish and wildlife species such as: threespine stickleback (*Gasterosteus aculeatus*), California newt, belted kingfisher (*Ceryle alcyon*), and American dipper (*Cinclus mexicanus*). Some species of insectivorous birds such as barn swallows (*Hirundo rustica*) and black phoebe (*Sayornis nigricans*) will forage for flying insects over water. Wildlife species observed in this community during surveys included: mallard (*Anas platyrhynchos*), great blue heron (*Ardea herodias*), house wren (*Troglodytes aedon*), mourning dove, northern raccoon, and Sierran treefrog.

Lagunitas Creek provides important spawning and rearing habitat for the following special-status salmonid species: steelhead (*Oncorhynchus mykiss*), coho salmon (*O. kisutch*), and California Coastal chinook Salmon (*Oncorhynchus tshawytscha*). Chum salmon (*O. keta*) are also occasionally found in the creek. One or more of these species also occur within the Cheda Creek, McIssac Creek, and Devil's Gulch tributaries (Ross Taylor and Associates 2003), and may have historically occurred in other tributary streams on the project site.

Annual Grassland. The annual grassland vegetative community was observed primarily within the western one-third of the project site on the north side of SFDB. This plant community is generally composed of introduced grasses and broadleaf weedy species, which quickly re-colonize disturbed areas.

Common dominant and subdominant plant species that were observed within this vegetative community during biological surveys included: slim oat (*Avena barbata*), field mustard (*Brassica rapa*), rattlesnake grass (*Briza maxima*, *B. minor*), soft chess (*Bromus hordeaceus*), woodland brome (*Bromus laevipes*), Italian thistle (*Carduus pycnocephalus*), bull thistle (*Cirsium vulgare*), bindweed (*Convolvulus arvensis*), orchard grass (*Dactylis glomerata*), annual Italian ryegrass

(*Lolium multiflorum*), and perennial ryegrass (*Lolium perenne*).

Other species observed included: yarrow (*Achillea millefolium*), three corner leek (*Allium triquetrum*), fiddleneck (*Amsinckia menziesii* var. *intermedia*), English daisy (*Bellis perennis*), morning-glory (*Calystegia purpurata* var. *purpurata*), blue dicks (*Dichelostemma capitatum* ssp.*capitatum*), foxglove (*Digitalis purpurea*), blue wild-rye (*Elymus glaucus* ssp. *glaucus*), northern willow herb (*Epilobium ciliatum* ssp. *ciliatum*), Australian fireweed (*Erechtites minima*), woolly sunflower (*Eriophyllum lanatum* var. *arachnoideum*), broad-leaf filaree (*Erodium botrys*), red-stem filaree (*Erodium cicutarium*), California brome (*Bromus carinatus*), California poppy (*Eschscholzia californica*), fennel (*Foeniculum vulgare*), French broom (*Genista monspessulana*), sneezeweed (*Helenium puberulum*), hayfield tarweed (*Hemizonia congesta* var. *lutescens*), cow parsnip (*Heracleum lanatum*), hawkweed (*Hieracium albiflorum*), colchita (*Lotus humistratus*), hill lotus (*Lotus micranthus*), deerweed (*Lotus scoparius* var. *scoparius*), dove lupine (*Lupinus bicolor*), broadleaf lupine (*Lupinus latifolius* var. *latifolius*), bur clover (*Medicago polymorpha*), forget-me-not (*Myosotis latifolia*), bristly ox tongue (*Picris echioides*), common plantain (*Plantago major*), annual bluegrass (*Poa annua*), radish (*Raphanus sativus*), dandelion (*Taraxacum officinale*), notched-leaf clover (*Trifolium bifidum* var. *bifidum*), and tomcat clover (*Trifolium willdenovii*).

Annual grasslands provide important habitat for various species of lizards and snakes, foraging raptors, various songbirds, and small mammals. Typical wildlife of annual grasslands in Marin County include gopher snake (*Pituophis catenifer*), northern American racer (*Coluber constrictor*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), western meadowlark (*Sturnella neglecta*), and savanna sparrow (*Passerculus sandwichensis*). Common mammals include California ground squirrel (*Spermophilus beecheyi*) and Botta’s pocket gophers (*Thomomys bottae*).

Wildlife species observed in this community or flying over during surveys include Cooper’s hawk (*Accipiter cooperii*), red-winged blackbird, house finch (*Carpodacus mexicanus*), turkey vulture (*Cathartes aura*), killdeer (*Charadrius vociferus*), common raven, black-tailed jackrabbit (*Lepus californicus*), California ground squirrel, wild turkey (*Meleagris gallopavo*), coyote (*Canis latrans*), mule deer (*Odocoileus hemionus*), western fence lizard (*Sceloporus occidentalis*) western bluebird (*Sialia mexicana*), and western meadowlark.

Coastal Oak Woodland. Coastal oak woodland is associated with annual grassland areas within the western one-third of the project site on the north side of SFDB. This is a highly variable community that is generally dominated by deciduous and evergreen hardwoods, particularly oaks. The canopy can be closed with an understory of shrubs, ferns, and forbs or a dense layer of litter with sparse vegetation. The canopy can also be open savannah with an understory of grasses, forbs, and shrubs, which is the typical manifestation of this community in the project site and study area. Slope, soil, precipitation, and moisture relationships determine the composition of this vegetative community.

Common dominant and subdominant plant species that were observed within this vegetative community during biological surveys included: coast live oak (*Quercus agrifolia* var. *agrifolia*), canyon live oak (*Quercus chrysolepis*), California bay (*Umbellularia californica*), Pacific madrone (*Arbutus menziesii*), tanbark oak (*Lithocarpus densiflorus* var. *densilforus),* California blackberry (*Rubus ursinus*), creeping snowberry (*Symphoricarpos mollis*), toyon (*Heteromeles arbutifolia*), bracken fern (*Pteridium aquilinum*), California polypody (*Polypodium* *californicum*), miner's lettuce, coyote brush (*Baccharis pilularis*), and ceanothus (*Ceanothus sp*). In drier, savannah areas, understory can consist almost entirely of species named in California Annual Grassland above.

Coastal oak woodlands provide habitat for a variety of wildlife species. At least 60 species of mammals may use oaks in some way. One hundred ten (110) species of birds can be observed during the breeding season in California habitats where oaks form a significant part of the canopy or subcanopy. California quail (*Callipepla californica*), wild turkey, squirrels (Family Sciuridae), and black-tailed deer may be so dependent on acorns in fall and early winter that a poor acorn year can result in significant declines in their populations.

Common wildlife species observed in this community during surveys included western scrub-jay (*Aphelocoma californica*), Steller's jay (*Cyanocitta stelleri*), California towhee (*Pipilo crissalis*), mourning dove (*Zenaida macroura*), white-throated sparrow (*Zonotrichia albicollis*), golden-crowned sparrow (*Zonotrichia atricapilla*), white-crowned sparrow (*Zonotrichia leucophrys*), red-tailed hawk, common raven, wild turkey, and western fence lizard.

Coastal Scrub. The coastal scrub vegetative community was observed on the north side of SFDB within the portions of the central section of the project site. This vegetative community is typified by low to moderate-size shrubs with mesophytic leaves, flexible branches, semi-woody stems growing from a woody base, and a shallow root system. This habitat consists of a dense and continuous two-layer cover of tall, overstory shrubs with a short, perennial herb/sub-shrub understory. Coastal scrub tolerates drier conditions than the other vegetation types in the study area. It is typical of areas with steep, south-facing slopes; sandy, mudstone or shale soils; and low average annual rainfall.

Common dominant and subdominant plant species that were observed within this vegetative community during biological surveys included: coyote brush (*Baccharis pilularis*), California sagebrush (*Artemisia californica*), poison-oak (*Toxicodendron diversilobum*), bracken fern (*Pteridium aquilinum*), sword fern (*Polystichum munitum*), blue blossom ceanothus (*Ceanothus thrysiflorus*), coffeeberry (*Rhamnus californica* ssp. *californica*), and bush monkeyflower (*Mimulus aurantiacus*). Other common species include: black sage (*Salvia mellifera*), yellow bush lupine (*Lupinus arboreus*), western hazelnut (*Corylus cornuta* var. *californica*), salal (*Gaultheria shallon*), blackberry (*Rubus* spp.), wax myrtle (*Myrica californica*), woolly sunflower (*Eriophyllum lanatum* var. *arachnoideum),* cow parsnip (*Heracleum lanatum*), Indian paintbrush (*Castilleja* spp.), yerba buena (*Satureja douglasii*), California oatgrass (*Danthonia californica*), and California buckwheat (*Eriogonum fasciculatum*).

Coastal scrub communities provide habitat for birds and cover for small mammals and reptiles. Common species associated with these habitats include: western fence lizard, California quail, western scrub-jay, California towhee, dusky-footed woodrat (*Neotoma fuscipes*), and brush rabbit (*Sylvilagus bachmani*). Wildlife species observed in this community during surveys included western fence lizard, California quail, western scrub-jay, and California towhee.

Mixed Evergreen Forest. The mixed evergreen forest community occurs within the project study area intermixed in upland areas with annual grassland and intergrades with the redwood and riparian vegetative communities. Mixed evergreen forest is composed of a pronounced hardwood tree layer, with an infrequent and poorly developed shrub stratum, and a sparse herbaceous layer. In mature stands, the hardwood tree canopy tends to be uniform, but is subordinate to conifers.

Common canopy and subcanopy tree and shrub species that were observed within this community during biological surveys included: California buckeye (*Aesculus californica*), tanbark oak, madrone, Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*), coast live oak, canyon live oak, and coast redwood (*Sequoia sempervirens*).

Understory plants commonly observed were: pearly everlasting (*Anaphalis margaritacea*), columbine (*Aquilegia formosa*), California pipe-vine (*Aristolochia californica*), wild ginger (*Asarum caudatum*), coastal lady fern (*Athyrium filix-femina* var. *cyclosorum*), milk maids (*Cardamine californica* var. *californica*), Indian paintbrush (*Castilleja subinclusa* ssp. *franciscana*), red larkspur (*Delphinium nudicaule*), coastal wood fern (*Dryopteris arguta*), mission bells (*Fritillaria affinis* var. *affinis*), climbing bedstraw (*Galium porrigens* var. *porrigens)*, wood-sorrel (*Oxalis albicans* ssp. *pilosa*), ninebark (*Physocarpus capitatus*), cream-cup (*Platystemon californicus*), California polypody (*Polypodium californicum*), western sword fern, bracken fern (*Pteridium aquilinum* var. *pubescens*), western rhododendron (*Rhododendron macrophyllum*), western azalea (*Rhododendron occidentale*), wood rose (*Rosa gymnocarpa*), spoon-leaved stonecrop (*Sedum spathulifolium*), checkerbloom (*Sidalcea malviflora*), white wake-robin (*Trillium ovatum* ssp. *ovatum*), huckleberry (*Vaccinium ovatum*), inside out flower (*Vancouveria planipetala*), American brooklime (*Veronica americana*), periwinkle (*Vinca major*), western chain fern (*Woodwardia fimbriata*), and coast range mule ears (*Wyethia glabra*).

Bird and mammal species typically found in mixed evergreen forest include: band-tailed pigeon (*Patagioenas fasciata*), Steller's jay, and black-tailed deer. Many amphibians and reptiles are found on the forest floor in the mixed evergreen community; among them are: ensatina (*Ensatina eschscholtzii*), California slender salamander (*Batrachoseps attenuatus*), and western fence lizard. Snakes include the northern rubber boa (*Charina bottae*) and ring-necked snake (*Diadophis punctatus*). Common wildlife species observed in this community during surveys included: pileated woodpecker (*Dryocopus pileatus*), western scrub-jay, California slender salamander, California quail, Steller’s jay, and golden-crowned sparrow.

Redwood Forest. The redwood vegetative community was observed primarily along SFDB within the eastern half of the project study area. This community was also found in scattered areas within the western half of the project site; however, in much lower density. This vegetative community is restricted to coastal areas of California where temperature regimes are relatively stable and are within the influence of summer coastal fog and inland marine air flows.

Common canopy and subcanopy tree and shrub species that were observed within this community during biological surveys included: Douglas-fir, coast redwood, madrone, and tanbark oak. Woody understory and herbaceous plants commonly observed were: five-finger fern, California maidenhair, wild ginger, coastal lady fern, coastal wood fern, huckleberry, western chain fern, bracken fern, western rhododendron, western azalea, brook foam (*Boykinia occidentalis*), blue blossom (*Ceanothus thyrsiflorus*), brittle fern (*Cystopteris fragilis*), bleeding heart (*Dicentra formosa*), alum-root (*Heuchera micrantha*), ocean-spray (*Holodiscus discolor*), wood-sorrel (*Oxalis albicans* ssp. *pilosa*), redwood sorrel (*Oxalis oregano*), western coltsfoot (*Petasites frigidus* var. *palmatus*), ninebark (*Physocarpus capitatus*), mist maiden (*Romanzoffia californica*), fetid adder's tongue (*Scoliopus bigelovii*), fringe-cups (*Tellima grandiflora*), inside-out flower (*Vancouveria planipetala*), periwinkle, and redwood violet (*Viola sempervirens*).

In Marin County redwood forests provide habitat for wildlife that prefer deep shade and relatively mesic conditions such as the California giant salamander (*Dicamptodon ensatus*), northern spotted owl (*Strix occidentalis caurina*), winter wren (*Troglodytes troglodytes*), and varied thrush (*Ixoreus naevius*). Wildlife species observed in this community during surveys included: chestnut-backed chickadee (*Poecile rufescens*), western scrub-jay, Steller's jay, pileated woodpecker, and California towhee.

Ruderal/Disturbed. The ruderal/disturbed vegetative community occurs in portions of the study areas with disturbed soils and on other areas of existing or past human disturbances. This vegetative community was primarily observed along the shoulders of SFDB. Typical vegetative species found in this community are weedy non-native species.

Common dominant and subdominant plant species that were observed during surveys included: fiddleneck, slim oat, field mustard, soft chess, Italian thistle, bull thistle, bindweed, foxglove, northern willow herb, broad-leaf filaree, red-stem filaree, dandelion, bur clover, bristly ox tongue, common plantain, radish, fennel, salal, French broom, shepherd's purse (*Capsella bursa-pastoris*), mouse-ear chickweed (*Cerastium glomeratum*), pineapple weed (*Chamomilla suaveolens*), petty spurge (*Euphorbia peplus*), cut-leaved cranesbill (*Geranium dissectum*), shortpod mustard (*Hirschfeldia incana*), hedge mustard (*Sisymbrium officinale*), chickweed (*Stellaria media*), and vetch (*Vicia villosa* ssp. *varia*).

Ruderal/disturbed areas, particularly areas with landscaping vegetation, can provide moderate habitat value for wildlife. This vegetative community provides habitat for opportunistic animal species that can coexist with humans and human-related disturbances. Examples of species found in this habitat type are: Anna's hummingbird (*Calypte anna*), northern mockingbird (*Mimus polyglottos*), house finch, northern raccoon, and Virginia opossum. Wildlife species observed in this community during surveys included: American goldfinch (*Carduelis tristis*), house sparrow (*Passer domesticus*), house finch, common raven, western meadowlark, mourning dove, black-tailed jackrabbit, and western fence lizard.

3.2 SENSITIVE HABITATS

Sensitive habitats are especially diverse, regionally uncommon habitats as defined by the CNDDB, and/or regulated by state or federal agencies (e.g., Section 404 of the CWA). Most sensitive habitats are given special consideration because they provide important ecological functions, including filtering of surface waters (wetlands) and providing essential habitat for common and special-status plant and wildlife species. Habitat types described previously that qualify as sensitive habitats in the project study area include: freshwater emergent wetland, streams, redwood forest, and riparian forest.

3.3 JURISDICTIONAL WETLANDS AND OTHER WATERS OF THE U.S. AND/OR STATE OF CALIFORNIA

Wetlands are areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted to life in saturated soil. Streams are channels that convey water permanently or seasonally to the extent that discernible bed and bank features and an OHWL can be defined. Streams need not have flow on any regular basis but rather may flow ephemerally following storm events. Wetlands and streams are recognized as important features on a regional and national level due to the following: (1) their inherent value to fish and wildlife; (2) capacity to convey and/or store flood waters; and (3) water recharge, filtration, and purification functions.

The U.S. Army Corps of Engineers (USACE), CDFG, and Regional Water Quality Control Board (RWQCB) have jurisdiction over wetlands and other waters, including streams, ponds and lakes. Jurisdiction by the Corps is established under Section 404 of the Clean Water Act, which prohibits the discharge of dredged or fill material into "waters" of the U.S. without a permit, including wetlands and unvegetated "other waters of the U.S." The Corps also has jurisdiction over navigable waters, including tidally influenced ones below Mean High Water, under Section 10 of the Rivers and Harbors Act. Streams may also be considered wetlands if they contain wetland vegetation.

Jurisdictional authority of the RWQCB is established pursuant to Section 401 of the Clean Water Act, which typically requires a water quality certification when an individual or nationwide permit is issued by the Corps. The RWQCB also has jurisdiction over "waters of the State" under the Porter-Cologne Water Quality Control Act.

Corps jurisdiction over Waters of the U.S. and their lateral limits are defined in 33 CFR Part 328.3(a) and include streams that are tributaries to navigable waters and their adjacent wetlands. The lateral limits of jurisdiction for a non-tidal stream are measured at the line of the OHWL or the limit of adjacent wetlands. Any permanent extension of the limits of an existing water of the U.S., whether natural or man-made, results in a similar extension of Corps jurisdiction. Corps regulatory jurisdiction under Section 404 of the Clean Water Act is based on a connection between the water body in question and either: (1) navigable waters of the United States; or (2) interstate commerce. This connection may be direct linkage or proximity to a traditional navigable water used in interstate or foreign commerce, or may be an indirect ecological or hydrologic nexus (such as wildlife use or water quality influence).

The limits of RWQCB jurisdiction over Waters of the State of California are generally dependent on Corps jurisdictional criteria, however, the RWQCB is not bound by the Corps' requirements for linkages to navigable waters or other ecological or hydrologic nexuses. As a consequence, wetlands and other water bodies determined by the Corps to be isolated and, therefore, non-jurisdictional under Section 404 of the Clean Water Act, may nevertheless be jurisdictional Waters of the State under Porter-Cologne Water Quality Control Act.

Jurisdictional authority of the CDFG is established under Section 1602 of the Fish and Game Code, which pertains to activities that would disrupt the natural flow or alter the channel, bed, or bank of any lake, river, or stream. The Fish and Game Code states that it is "unlawful to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream or lake" without notifying the Department, incorporating necessary mitigation, and obtaining a Streambed Alteration agreement. CDFG jurisdiction for a stream channel under Section 1602 typically extends from the bottom of the channel to the top of bank (often well above the OHWL).

Culverts that pass under roads and other structures are generally considered jurisdictional by all three agencies if the culverts connect jurisdictional waters on either side. Therefore, many of the culverts that pass beneath SFDB are jurisdictional waters.

A delineation of wetlands and streams within the project study area was conducted by SEP wetland ecologists during March and April 2007 (SEP 2009 – see Appendix G). The delineation mapped 29 individual wetlands and 32 streams within the current roadway right-of way, or 30 feet on either side of the centerline of the existing roadway. The 29 wetland areas together encompass approximately 0.94 acre consisting largely of roadside swales with seasonal wetland vegetation. The 32 streams total 0.39 acre and consist entirely of those portions of Lagunitas Creek tributaries that pass beneath SFDB through culverts within the 30-foot zone from the road centerline. (Under Corps of Engineers delineation guidelines, both the stream channel and the culverts are considered jurisdictional.) A total of 6 perennial streams, 9 intermittently flowing streams, and 17 ephemerally streams flow through culverts beneath SFDB.

3.4 WILDLIFE MOVEMENT CORRIDORS

Wildlife movement includes migration (i.e., usually one way per season), inter-population movement (i.e., long-term genetic flow), and small travel pathways (i.e., daily movement corridors within an animal's territory). While small travel pathways usually facilitate movement for daily home range activities such as foraging or escape from predators, they also provide connections between outlying populations and the main corridor, permitting an increase in gene flow among populations.

These linkages among habitat types can extend for miles between primary habitat areas and occur on a large scale throughout California. Habitat linkages facilitate movement among populations located in discrete areas and populations located within larger habitat areas. The mosaic of habitats found within a large-scale landscape results in wildlife populations that consist of discrete sub-populations comprising a large single population, which is often referred to as a meta-population. Even where patches of pristine habitat are fragmented, such as occurs with coastal scrub, the movement between wildlife populations is facilitated through habitat linkages, migration corridors, and movement corridors. Depending on the condition of the corridor, genetic flow between populations may be high in frequency, thus allowing high genetic diversity within the population, or may be low in frequency. Potentially low frequency genetic flow may lead to complete isolation, and if pressures are strong, potential extinction.

Open space areas (Samuel P. Taylor State Park and Golden Gate National Recreation Area) on either side of SFDB provide a suitable movement corridor for a variety of common wildlife species. However, the utility of the wildlife movement corridor from habitats north and south of SFDB is somewhat reduced by vehicular traffic. Movement across SFBD by smaller mammals, amphibians, reptiles, and other less mobile wildlife species is probably more negatively affected by traffic than by larger mammals and other more mobile wildlife species. Movement by diurnal wildlife species that are active when the traffic volumes are highest are expected to be the most limited by traffic. However, because SFDB is only a two-lane, non-urban roadway, and traffic is much less constant than on other larger roadway types, wildlife would be expected to regularly cross SFDB to access habitat areas north and south of SFDB.

Water conveying structures (i.e., culverts) traversing under SFDB are also potential movement corridors for small mammals, reptiles, amphibians between wildlife areas north and south of SFDB. These culverts allow wildlife to cross safely under the roadway without the danger of mortality from automobiles and other types of vehicles. Existing culvert pipes range from 12 to 48 inches in diameter (Appendix D). Additionally, larger tributary crossings (i.e., Devil's Gulch, Cheda Creek) have box or arch culverts with openings ranging from 20 to 118 inches in size that potentially allow for fish passage and other aquatic fauna.

The culverts' potential to allow passage by terrestrial and aquatic fauna varies depending on culvert size and elevation of the culverts' downstream inverts relative to the existing slope and the OHWL in Lagunitas Creek and tributaries. Larger culverts (18 or more inches in diameter) with inverts at or below the OHWL have the highest potential to facilitate the passage of aquatic fauna, particularly during the rainy season when intermittent and ephemeral tributaries may have flow. Larger culverts located above the OHWL but with outlets relatively close to the ground, can be accessible for passage by small terrestrial fauna. However, culverts of all sizes that have their downstream outlets situated above the OHWL and several feet above the ground have limited or no potential to allow for the passage of aquatic or terrestrial fauna. Based on these factors, at least 32 of the 72 culverts that occur within the project site may have the potential to provide significant terrestrial and/or aquatic faunal passage (Appendix D).

Three box or arch culverts (Culverts 5, 19, and 32 - see Appendix D) are capable of allowing relatively unimpeded passage by all age classes of salmonids, based on the percent of passable flows and water depths relative to swimming abilities and depth requirements of the salmonids (Ross Taylor and Associates 2003). These culverts are summarized as follows:

- Cheda Creek Crossing (Culvert No. 19) – 68-inch x 118-inch open bottom arch culvert.
- McIssac Creek Crossing (Culvert No. 5) – 90-inch x 90-inch box culvert.
- Devil’s Gulch Crossing (Culvert No. 32) – 12-inch x 20-inch open bottom arch culvert.

A fourth culvert (Barnabe Creek Crossing - Culvert No. 27) was found by Ross Taylor and Associates (2003) to provide little or no fish passage capability due to its undersized capacity, elevation of outlet, and overall condition.

3.5 SPECIAL-STATUS SPECIES

Special-status species are plants and animals that are legally protected under state and federal Endangered Species Acts (ESAs) or other regulations, and species that are considered sufficiently rare by the scientific community to qualify for such listing. Special-status plants and animals are species that fall into the following categories:

- Plants or animals listed or proposed for listing as threatened or endangered under the federal ESA (50 Code of Federal Regulations [CFR] 17.12 [listed plants], 1711 [listed animals] and various notices in the Federal Register [FR][proposed species])
- Plants or animals that are candidates for possible future listing as threatened or endangered under the federal ESA (61 FR 40, February 28, 1996)
- Plants or animals designated as "California Species of Special Concern" by CDFG and USFWS
- plants or animals listed or proposed for listing by the State of California as threatened or endangered under the California ESA (14 California Code of Regulations [CCR] 670.5)
- Plants listed under the California Native Plant Protection Act (CDFG Code, Section 1900 et seq.)
- Plants that meet the definitions of rare or endangered under California Environmental Quality Act (CEQA) [State CEQA Guidelines, Section 15380]
- Animals fully protected in California (CDFG Code, Sections 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians])

- Plants listed by the CNPS under Lists 1B and 2 (CNPS 2009)
- Plants listed by CNPS as plants about which more information is needed to determine their status and plants of limited distribution (Lists 3 and 4 in CNPS 2009), which may be included as special-status species on the basis of local significance or recent biological information

Special-status species known to occur, or with potential to occur in the project study area, were determined based on:

- A search of the CNDDB (CDFG 2009a), the CNPS *Electronic Inventory of Rare and Endangered Plants* (CNPS 2009), and the USFWS online electronic database of special-status species (USFWS 2009) for the project vicinity
- Contact with regulatory agencies and others with knowledge of biological resources within the project vicinity
- A review of literature that describes special-status wildlife and plant species that are present in the project vicinity, as described in *Section 3.0, Methods* above

Special-status plant species potentially occurring in the project study area were defined as those special-status species with known populations in the project vicinity, and those known from habitats either identical to or similar to those found in the project study area. Figure 8 shows the locations of the known populations of special-status plant and animal species occurrences within the project study area and vicinity.

Seventy-three special-status species were identified as potentially occurring within the project vicinity, consisting of 44 plants and 29 animals. Of these 73 species, 8 special-status plant species have been documented in the project vicinity, and 21 additional plant species have the potential to occur (but have not been documented) in the project vicinity. Twelve special-status animal species have been documented in the project vicinity, and 7 additional animal species have the potential to occur (but have not been documented) in the project vicinity. Information on the special-status species (plants and animals) that have been documented within the project vicinity are presented in Appendix H. Appendix H also provides a likelihood of occurrence analysis for each species that may have the potential to occur within the project study area.

The following sections provide a description of special-status plant and animal species potentially occurring within the project study area, and a discussion of survey findings for these species. Species listed in Appendix H that were determined to have no potential of occurring within the project study area based on lack of appropriate habitat or other factors are not discussed below.

3.6 SPECIAL-STATUS ANIMALS

Tomales Roach (*Lavinia symmetricus*). The Tomales roach is a fish classified as a California Species of Special Concern. The Tomales roach is limited to Walker Creek and other tributaries of Tomales Bay in Marin County, including Lagunitas Creek. Tomales roach are generally found in small, warm, intermittent streams; dense populations are frequently found in isolated pools. They are most abundant in the lower reaches of coastal streams. The Tomales roach is tolerant of relatively high temperatures and low oxygen levels as they are habitat generalists (CDFG 2009b).

Tomales roach are omnivores and feed primarily on filamentous algae, but ingest lesser quantities of crustaceans and aquatic insects. During the winter their diet consists largely of diatoms and other unicellular algae (CDFG 2009b).

Reproduction occurs from March to June, but may be extended through late July. During the spawning season, schools of fish move into shallow areas with moderate flow and gravel/rubble substrate. Females deposit adhesive eggs in the substrate interstices and the eggs are fertilized by attendant males. Typically, 250-900 eggs are produced by a female and the eggs hatch within two to three days. The fry remain in the substrate interstices until they are free-swimming (CDFG 2009b).

This species has been documented to occur in Lagunitas Creek in the project study area (CDFG 2009a), however it was not observed during field surveys. Potential habitat is also present in larger tributary streams to Lagunitas Creek.

Central California Coastal Evolutionarily Significant Unit (ESU) Coho Salmon (*Oncorhynchus kisutch*). Central California Coastal coho salmon is a federal and State Endangered species. The coho salmon is an anadromous salmonid species that was historically distributed throughout the North Pacific Ocean from central California to Point Hope, Alaska, through the Aleutian Islands, and from the Anadyr River, Russia, south to Hokkaido, Japan. Historically, this species probably inhabited most coastal streams in Washington, Oregon, and northern and central California. Some populations, now considered extinct, are believed to have migrated hundreds of miles inland to spawn in tributaries of the upper Columbia River in Washington, and the Snake River in Idaho (NOAA 2009).

In contrast to the life history patterns of other anadromous salmonids, coho salmon on the west coast of North America generally exhibit a relatively simple 3-year life cycle. Adults typically begin their freshwater spawning migration in the late summer and fall, spawn by mid-winter, and then die. Run and spawn timing of adult coho salmon vary between and within coastal and Columbia River Basin populations. Depending on river temperatures, eggs incubate in “redds” (gravel nests excavated by spawning females) for 1.5 to 4 months before hatching as “alevins” (a larval life stage dependent on food stored in a yolk sac). Following yolk sac absorption, alevins emerge from the gravel as young juveniles, or “fry,” and begin actively feeding. Juveniles rear in fresh water for up to 15 months, then migrate to the ocean as “smolts” in the spring. Coho salmon typically spend two growing seasons in the ocean before returning to their natal streams to spawn as 3 year-olds. Some precocious males, called “jacks,” return to spawn after only 6 months at sea (NOAA 2009).

In the 1940s, estimated abundance of coho salmon in this ESU ranged from 50,000 to 125,000 natural spawning adults. Today, it is estimated that there are probably less than 6,000 naturally reproducing coho salmon, and the vast majority of these fish are considered to be of non-native origin (either hatchery fish or from streams stocked with hatchery fish) (NOAA 2009).

Sufficient quantities of good quality water are essential for coho survival, growth, reproduction, and migration. Important elements of water quality include the following: (1) water temperatures within the range that corresponds with migration; (2) rearing and emergence needs of fish; and (3) the aquatic organisms upon which they depend (Sweeney and Vannote 1978; Quinn and Tallman 1987). Desired conditions for coho salmon include an abundance of cool (generally in the range of 53.3 °F to 58.3 °F (Reiser and Bjornn 1979)), well-oxygenated water that is present year round, free of excessive suspended sediments and other pollutants that could limit primary production and benthic invertebrate abundance and diversity (Cordone and Kelley 1961; Lloyd et al. 1987).

Central California Coastal coho salmon are known to occur in the project study area and have been well documented in Lagunitas Creek and its tributaries. Surveys of adult coho spawners by CDFG and other documented observations of adults and juveniles date back to the early 1950s; more systematic annual surveys of adult spawners, redds and juveniles have been conducted by the MMWD since 1994/1995 (NMFS 2001, Stillwater Sciences 2008, CDFG 2009a, MMWD 2009). An average of 557 spawning coho and 230 redds have been observed in Lagunitas Creek and its tributaries during the MMWD surveys with a high count of 1,342 spawners/496 redds in 2004/2005 and a low of 43 spawners/26 redds in 2008/2009 (MMWD 2009). These numbers are believed to be a significant reduction from historic populations in Lagunitas Creek, mirroring an overall population decline throughout the species' range (NMFS 2001)

Despite the population decline, Lagunitas Creek is considered one of the highest quality stream reaches for this species in the state of California and has one of the largest and most stable populations of this ESU (Moyle et al. 2008, MMWD 2009). The Lagunitas Creek population of Central California Coast coho salmon, including those occurring in tributary streams (i.e., Devil's Gulch, San Geronimo Creek) is the largest and most stable population south of the Noyo River in Mendocino County (Stillwater Sciences 2009).

In 2008, the Marin Resource Conservation District, in cooperation with the MMWD, the Salmon Protection and Watershed Network (SPAWN) and others, conducted an analysis of possible limiting factors controlling salmonid populations in the Lagunitas Creek watershed (Stillwater Sciences 2008). The analysis, which focused on coho salmon and steelhead, entailed development of a conceptual model linking salmonid life history and habitat requirements. This effort allowed field testing and refinement of a hypothesis that a paucity of over-wintering habitat (i.e., low velocity off-channel areas such as floodplains, backwater channels, slough beaver ponds and complex in-channel areas with large woody debris) may be a key limiting factor in salmonid populations in Lagunitas Creek. The results of the MRCD study are reflected in the recently released NMFS draft Recovery Plan for Central California Coast coho salmon (NMFS 2010). The Recovery Plan provides a range of actions needed to restore populations of this species to self-sustaining levels, including several specific high priority actions for Lagunitas Creek and its tributaries. Several of these actions are particularly relevant to the proposed project in the context of impact avoidance and possible mitigation, including the three following: (1) increase the frequency and functionality of off-channel habitats; (2) increase the amount of large wood in the stream; and (3) reduce impacts from existing roads.

Federally designated critical habitat for this species includes Lagunitas Creek in the project study area. Essential Fish Habitat (EFH) has been designated for this species within Lagunitas Creek and the adjacent riparian corridor within the project study area (NOAA 2009). EFH is broadly defined to include "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and is designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). The MSFCMA requires Fishery Management Councils (FMC) to describe and identify the essential habitat for the managed species, minimize to the extent practicable adverse effects on EFH caused by fishing, and identify other actions to encourage the conservation and enhancement of EFH. The MSFCMA also establishes measures to protect EFH. NOAA Fisheries (NOAA) must coordinate with other federal agencies to conserve and enhance

EFH, and federal agencies must consult with NOAA on all actions or proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH. In turn NOAA must provide recommendations to federal and state agencies (including CDFG and RWQCB) on such activities to conserve EFH. These recommendations may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from actions or proposed actions authorized, funded, or undertaken by that agency (NOAA 2009).

Central California Coast Steelhead (*Oncorhynchus mykiss*) ESU. Central California Coast steelhead is a federally Threatened species. Steelhead require cold-water streams with adequate dissolved oxygen. Spawning habitat consists of gravel substrates free of excessive silt. The central California coast steelhead ESU inhabits coastal streams from the Russian River in Sonoma County south to Soquel Creek in Santa Cruz County, and tributaries of San Francisco and San Pablo Bays (NOAA 2009).

Adult steelhead migrate from the ocean into freshwater streams to spawn between December and April, and juveniles migrate downstream to the Bay or ocean in late winter and spring. Female steelhead dig a nest (or redd) in a stream area with suitable gravel composition, water depth, and velocity. Male fish battle for the right to spawn with females. Females may deposit eggs in four to five nests within a single redd. Steelhead eggs hatch in three to four weeks. Juvenile steelhead typically spend one to two years rearing in freshwater before migrating to estuarine areas as smolts and then into the ocean to feed and mature. Steelhead can then remain at sea for up to three years before returning to fresh water to spawn (NOAA 2009).

An estimated 94,000 steelhead spawned in streams of the central California coast in the early 1960s. Steelhead numbers in the Russian and San Lorenzo Rivers, which support the largest runs in the area, have declined seven-fold since then. Most coastal streams in the region have remnant runs of 500 fish or fewer. Of the 58 watersheds tributary to the San Francisco Bay estuary, only 24 still support steelhead and/or resident rainbow trout (NOAA 2009).

Central California Coast steelhead has been well-documented to occur in Lagunitas Creek and tributaries in the project study area (CDFG 2009a, MMWD 2009), but was not observed during field surveys. An average of 121 spawning steelhead and 97 redds have been observed in Lagunitas Creek and its tributaries during annual MMWD surveys since 1994 (MMWD 2009). As many as 588 spawners and 303 redds have been counted during these surveys. These numbers are believed to be a significant reduction from historic populations in Lagunitas Creek, mirroring an overall population decline throughout the species' range.

Federally designated critical habitat for this species includes Lagunitas Creek in the project study area. EFH has not been designated for this species in the project study area (NOAA 2009).

California Coastal Chinook Salmon (*Oncorhynchus tshawytscha*) ESU. California coastal Chinook salmon is a federally Threatened species. Chinook salmon are dependent on rocky, coldwater streams for spawning and development as smolts. Adults migrate from the marine environment into the freshwater streams and rivers of their birth in order to mate. They spawn only once and then die. Adult female Chinook salmon will prepare a redd (or nest) in a stream area with suitable gravel type and composition, water depth and velocity. After laying eggs in a redd, adult Chinook salmon will guard the redd from just a few days to nearly a month before dying. Chinook salmon eggs will hatch, depending upon water temperatures, three to five months after deposition.

Juvenile Chinook salmon may spend from three months to two years in freshwater before migrating to estuarine areas as smolts and then into the ocean to feed and mature. Chinook salmon remain at sea for one to six year(s). Populations exhibit considerable variability in size and age of maturation and at least some portion of this variation is genetically determined. Different seasonal (i.e., spring, summer, fall, or winter) "runs" in the migration of Chinook salmon from the ocean to freshwater occur, even within a single river system (NOAA 2009).

California Coastal chinook salmon have been documented to have a small population within Lagunitas Creek but were not observed during field surveys (CDFG 2009a, MMWD 2009). An average of 26 spawning chinook and 22 redds have been observed in Lagunitas Creek and its tributaries during annual MMWD surveys since 1994.

Although federal critical habitat for this species has been designated, the designation does not include the project study area. EFH has not been designated for this species in the project study area (NOAA 2009).

Pacific Coast Chum Salmon (*Oncorhynchus keta)* ESU. The Pacific chum salmon ESU is a California Species of Special Concern that occurs within a broad region from northern California to British Colombia. Although spawning populations may historically have occurred as far south as Monterey, the current limits of spawning and distribution are not well known. Significant Pacific Coast chum spawning populations are believed to be limited to streams from Oregon northwards (NMFS 1997; Good et al. 2005). Reports of chum salmon spawning in California are not believed to represent permanent populations but rather “episodic colonizations” (NMFS 1997). The NMFS has determined that at present the Pacific Coast ESU is not at risk of extinction nor likely to become so, although two other ESUs of this species are federally listed.

Pacific Coast chum salmon generally spawn in the lower reaches of streams and rivers because they have a poor ability to surmount blockages and fall (NMFS 1997). In California they spawn in the summer and fall, although spawning runs have been observed in the winter in the Sacramento River (Moyle 1976). They spawn in gravel riffles; each female lays between 2,400 and 4,000 eggs in redds of approximately 2.25m^2 in size. Following hatching, the alevins remain in the gravel for 2–3 months. Juvenile chum salmon may migrate quickly downstream to estuarine areas, particularly if the eggs are hatched close to the river outlets or they may spend several months in feeding in the freshwater stream before migrating (Moyle 1976).

Although Pacific Coast chum salmon appear to infrequently stray into Lagunitas Creek, and spawning runs rarely occur, the creek is not believed to support a permanent population of this species (Greg Andrew, MMWD pers. com.). Small numbers (1-28) of chum salmon were recorded by MMWD scientists during 6 of 8 annual surveys between 2001 and 2009. Smaller numbers of chum salmon redds (1–10) were observed during these surveys (MMWD 2009).

Northwestern Pond Turtle (*Actinemys marmorata marmorata*). The northwestern pond turtle is a California Species of Special Concern. Although primarily found in natural aquatic habitats, this species also inhabits impoundments, irrigation ditches, and other artificial and natural water bodies (Ernst et al. 1994), and is found at elevations ranging from sea level to 6,700 feet (Stebbins 2003). The species is usually found in fresh water, but brackish habitats are also utilized. The aquatic habitat may be comprised of either mud or rocky substrates and usually contains some vegetation (Ernst et al. 1994). Habitat quality often seems to be positively correlated with the number of available basking sites (Jennings and Hayes 1994). Turtles seem to avoid areas lacking in significant refugia (Holland 1994). Basking sites may be rocks, logs, vegetation, terrestrial islands within the aquatic habitat, and human-made debris (Holland 1994).

Copulation occurs in May, June, and late August (Holland 1988). Oviposition (egg-laying) may occur as early as late April in central California (Rathbun et al. 1993) to late July, with most occurring in June and July (Holland 1994). Incubation time ranges from 80 to more than 100 days in California. In northern California, hatchling northwestern pond turtles (which are about the size of a quarter) overwinter inside the nest chamber and emerge the following spring. Hatchlings utilize shallow, slow-moving waters with emergent vegetation, such as that found along side channels of stream or pond margins; while juveniles one year old or more tend to utilize the same aquatic habitats as adults. Northwestern pond turtles may overwinter in aquatic or upland habitats (Holland 1994).

Upland habitats are also important to northwestern pond turtles for nesting, overwintering, and overland dispersal (Holland 1994). Nesting sites may be as far as 1,300 feet or more from the aquatic habitat, although usually the distance is much less (Jennings and Hayes 1994, Slavens 1995). Nesting sites typically have a southern or western aspect, with slopes of 0 to 46 percent and compact, dry soils (Holland 1994, Bury et al. 2001). When turtles choose to overwinter in upland habitats, individuals typically leave the aquatic habitat in late fall. Turtles typically burrow into duff (leaf litter) and/or soil, where they remain during the winter months (Holland 1994).

This species has not been documented to occur in the project study area, nor was it observed during field surveys. Appropriate foraging, breeding, nesting, basking, and wintering habitat for this species was observed in Lagunitas Creek and upland habitat areas adjacent to the project site.

California Red-Legged Frog (*Rana draytonii*). California red-legged frog is federally listed as Threatened and is a California Species of Special Concern, as well as a Fully Protected Species under Fish and Game Code 5050. This species breeds primarily in ponds, but will also breed in slow moving streams, or deep pools in intermittent streams. Inhabited ponds are typically permanent, at least 2 feet in depth, and contain emergent and shoreline vegetation. Sufficient pond depth and shoreline cover are both critical because they provide frogs with a means of escape from predators. Additionally, emergent vegetation is usually needed for the deposition of eggs (Stebbins 1985, CDFG 2009b). However, while the presence of emergent vegetation is important to successful red-legged frog egg deposition, it is not required. Red-legged frogs can and have been documented depositing their eggs in barren ponds lacking emergent vegetation (Stebbins 1985, CDFG 2009b, USFWS 2002).

The breeding period for this frog species begins during heavy rains, from early to late winter, usually November through early May. Larvae mature in 11 to 20 weeks. Non-breeding frogs have been found in both aquatic and upland habitats (Stebbins 1985).

California red-legged frogs are documented to occur in Lagunitas Creek in the project study area, and have also been documented in San Geronimo Creek to the east of the project study area (CDFG 2009a). The species was not observed in the project study area during field surveys, however, breeding, foraging, and aestivation habitat was observed within Lagunitas Creek, as well as other streams in the project study area that contain permanent pool habitat with the proper characteristics.

Federal critical habitat for this species has been designated but does not include the project study area. On September 16, 2008, the USFWS proposed the designation of 1.8 million acres of critical habitat for the California red-legged frog, a tripling of the existing critical habitat for the species. The proposed rule was opened up again for public comments on April 28, 2009 (USFWS 2009). The final rule was adopted on March 17, 2010 and becomes effective on April 17, 2010. The project study area does not occur within critical habitat under these new rules; the closest critical habitat unit boundary lies approximately 0.5 mile to the west of the project study area.

Foothill Yellow-Legged Frog (*Rana boylii*). Foothill yellow-legged frog is a California Species of Special Concern. This species prefers to be in streams and rivers versus still ponds and prefers flowing water that has rocky substrate and sunny banks (Stebbins 1985, CDFG 2009b). In the spring, adult frogs congregate along gravel/cobble bar areas of the river where breeding occurs. Breeding occurs from late March through May with oviposition for any single population being concentrated to a two week period (Storer 1925, Zweifel 1955). While most oviposition occurs in May and early June, breeding is not limited to a two week period per breeding site. Oviposition may be delayed by the occurrence of rain during the breeding period (Kupferberg 1996a). This delay may be an adaptive response to life in a lotic system where *R. boylii* are exposed to the threat of late seasonal flooding (Lind et al. 1996). Oviposition usually occurs in the stream margin, at a depth of less than 1.5 feet. Cobbles and pebbles are the preferred substrate for egg mass attachment, but egg masses have been found attached to aquatic vegetation, woody debris, and gravel (Fuller and Lind 1992).

Eggs hatch in 5 to 30 days or more (Zweifel 1955). In the absence of disturbance, the tadpoles will remain associated with the egg mass for several days after hatching. Metamorphosis generally occurs in three to four months (Stebbins 1985). The first breeding activity usually occurs in the second postmetamorphic year (Zweifel 1955), although some individuals may reproduce as early as six months after metamorphosis (Jennings 1988).

This species is known and documented to occur in San Geronimo Creek near Shafter Bridge to the east of the project study area (CDFG 2009a), but was not observed during field surveys. Breeding, foraging, and aestivation habitat was observed in the project study area within Lagunitas Creek, as well as other streams in the project study area that contain appropriate habitat.

Yellow Warbler (*Dendroica petechia brewsteri*). Yellow warbler is a California Species of Special Concern. Migratory populations breed from northern Alaska and Canada southward to middle United States, and in the west into Mexico. Non-migratory populations primarily breed from southern Florida, throughout the Caribbean and Central American coasts, to northern South America. This species winters from southern Mexico into northern South America. This species nests and forages primarily in riparian plant communities and uses mixed evergreen and open conifer plant communities for foraging and nesting activities (CDFG 2009b).

Yellow warbler nests consist of an open, deep cup of grass fibers lined with fur and/or fine plant fibers placed in an upright fork of a shrub or tree. Clutch size is three to six eggs, incubation takes 11-12 days, and fledging occurs in 9-12 days (CDFG 2009b).

This species has not been documented within the project study area or project vicinity and was not observed during field surveys. No active or potential nest sites were observed during surveys; however, suitable breeding, foraging, and nesting habitat was observed in Lagunitas Creek and in other streams in the project study area with riparian vegetation and in mixed evergreen and redwood plant communities in the vicinity of stream courses.

Osprey (*Pandion haliaetus*). The osprey is a California Species of Special Concern. Ospreys were historically common and widespread along the coast and coastal ranges of California. In winter, small numbers of ospreys occur in the northern half of California. Nesting grounds in the San Francisco Bay Area are restricted to rivers and reservoirs in Sonoma and Marin Counties with a small number of nests located along the San Pablo Bay shoreline. In the San Francisco Bay region, nesting activity typically extends from early March through mid-June. Osprey winter in South America, although some stay in the southernmost U.S. states such as Florida and California (CDFG 2009b).

Ospreys breed in the vicinity of freshwater lakes, rivers, and sometimes on coastal brackish waters. The nest is a large heap of sticks, driftwood, and seaweed built in forks of trees, rocky outcrops, utility poles, artificial platforms, or offshore islets. Generally, ospreys reach sexual maturity and begin breeding around the age of three to four years, though in some regions with high osprey densities they may not start breeding until five to seven years old, and there may be a shortage of suitable tall structures. If there are no nesting sites available, young Ospreys may be forced to delay breeding. Ospreys usually mate for life. In spring the pair begins a five-month period of partnership to raise their young. The female lays two to four eggs within a month and relies on the size of the nest to conserve heat. The eggs are incubated for about five weeks to hatching. The average time between hatching and fledging is 69 days (CDFG 2009b).

This species has not been documented within the project study area or project vicinity and was not observed during field surveys. No active or potential nest sites were observed during surveys; however, suitable breeding, foraging, and nesting habitat was observed in the project study area both north and south of the project site.

Marbled Murrelet (*Brachyramphus marmoratus*). The marbled murrelet is federally listed as Threatened and State listed as Endangered. This species is a small, robin-sized, diving seabird that feeds primarily on fish and invertebrates in near-shore marine waters. It spends the majority of its time on the ocean, roosting and feeding, but comes inland up to 50 miles to nest in forest stands with old growth forest characteristics. These dense shady forests are generally characterized by large trees with large branches or deformities for use as nest platforms. Murrelets nest in stands varying in size from several acres to thousands of acres. However, larger, unfragmented stands of old growth appear to be the highest quality habitat for marbled murrelet nesting. Nesting stands are dominated by Douglas fir in Oregon and Washington and by old-growth redwoods in California (USFWS 1997b).

Marbled murrelets nest from mid-April to late September. The sexually mature adult murrelet (at age 2 or 3 of an average 15-year lifespan) generally lays a single egg on a mossy limb of an old-growth conifer tree. Both sexes incubate the egg in alternating 24-hour shifts for 30 days. The adults feed hatched chicks at least once per day, flying in (primarily at dawn and dusk) from feeding on the ocean, carrying one fish at a time. The young fledge from the nest in about 28 days and appear to fly directly to the sea upon leaving the nest. Marbled murrelets have a naturally low reproductive rate because they lay only one egg per nest and not all adults nest every year (USFWS 1997b).

This species is not known to nest in Marin County despite intensive past survey efforts (Shuford, 1993; Nelson 1997). It was also not observed within the project study area during field surveys. Potentially suitable nesting habitat, however, appears to be present in the project vicinity. No federal critical habitat for this species has been designated within the project study area (USFWS 2009).

Northern Spotted Owl (*Strix occidentalis caurina*). Northern spotted owl is federally listed as Threatened. This species generally inhabits older forested habitats because they contain the structural characteristics required for nesting, roosting, and foraging. Specifically, northern spotted owls require a multi-layered, multi-species canopy with moderate to high canopy closure. The stands typically contain a high incidence of trees with large cavities and other types of deformities; large snags (standing dead trees); an abundance of large, dead wood on the ground; and open space within and below the upper canopy for spotted owls to fly. Recent landscape-level analyses suggest that in some parts of the subspecies' range a mosaic of older forest habitat interspersed with other vegetation types may benefit northern spotted owls more than large, homogeneous expanses of older forests. In redwood forests along the coast range of California, northern spotted owls may be found in younger forest stands that contain structural characteristics of older forests (USFWS 2008).

Spotted owls are mostly nocturnal, but they may forage opportunistically during the day. Northern flying squirrels (*Glaucomys sabrinus*) and woodrats (*Neotoma* spp.) are usually their predominant prey. Other prey species, such as the red tree vole (*Arborimus longicaudus),* western red-backed vole (*Clethrionomys californicus),* mice, rabbits and hares, birds, and insects, may be seasonally or locally important (USFWS 2008).

Spotted owls do not typically reach sexual maturity until after two years of age. When they pair, they are monogamous. Spotted owls breed March through June. Adult females lay an average of two eggs per clutch with a range of one to four eggs. Spotted owl pairs do not typically nest every year, nor are nesting pairs successful every year (USFWS 2008). Nests are not constructed by this species, instead they lay their eggs in broken tree tops, tree cavities, mistletoe brooms, or platforms such as raptor or squirrel nests. Females incubate the eggs and brood the young, while the male feeds the female and young. Eggs are incubated for 30 days and young fledge about 34–36 days after hatching. The breeding period extends from March or April to the end of August.

The spotted owl is a relatively long-lived bird; produces few, but large young; invests significantly in parental care; experiences later or delayed maturity; and exhibits high adult survivorship. Spotted owls are territorial however home ranges of adjacent pairs can overlap. Home range size varies by province and generally increases from south to north (USFWS 2008).

Four breeding territories of this species have been identified in Samuel P. Taylor State Park and Golden Gate National Recreation Area south of the project study area by the CNNDB (CDFG 2009a). No individual spotted owls were observed or heard during field surveys, however, potentially suitable breeding, foraging, and nesting habitat was observed in the project study area both north and south of the project site. No federal critical habitat for this species has been designated within the project study area (USFWS 2009).

Pallid Bat (*Antrozous pallidus*). The pallid bat is a California Species of Special Concern. Pallid bats are found in deserts, grasslands, shrublands, woodlands, and forests. It is most commonly found in dry habitats with rocky areas for roosting. They primarily sleep in rock crevices and buildings. Pallid bats are skilled at climbing and crawling (Orr 1954, Ball 1998).

Pallid bats have larger eyes than most other species of bats in North America and have pale, long, and wide ears. Their fur is generally lightly colored. Pallid bats are insectivores so they feed on insects such as crickets and scorpions, and are capable of consuming up to half their weight in insects every night. Although they normally catch their prey on the ground, they usually transport their prey to their night roost to eat it. Their large ears allow them to hear the footsteps of insects on the ground and they use their voices to make ultrasonic sounds that bounce back to their ears. The reflected sound waves let them sense flying insects and know the environment they are flying through (Orr 1954, Ball 1998).

Pallid bats are a unique type of bat because they are both heterothermic and homoeothermic. They have the ability to control their body temperature and equilibrate it with the environment during winter hibernation and whenever they rest (Orr 1954, Ball 1998).

The mating season ranges from October to February. Female bats give birth to twins during early June. In four or five weeks they are capable of making short flights. They do not attain adult size until about eight weeks of age and do not become sexually mature until after approximately two years (Orr 1954, Ball 1998).

This species has been documented at the western end of the project site near the intersection of SFDB and Platform Bridge Road (CDFG 2009a), but was not observed during field surveys. Suitable foraging, nesting, roosting, and breeding habitat was observed within the project study area.

Point Reyes Mountain Beaver (*Aplodontia rufa phaia*). The Point Reyes mountain beaver is a California Species of Special Concern. This species utilizes sheltered gulches on steep, north-facing slopes under dense stands of vegetation where soil conditions and drainage aid burrowing. Coastal scrub dominated by salmonberry, coyote bush, poison oak, and cow parsnip is a common habitat used by this species. It utilizes habitat that is located adjacent to a perennial stream that supports riparian vegetation (CDFG 2009b).

This species historically occurred in the project study area as indicated by two museum specimens, one of which is recorded in CNDDB (CDFG 2009a). The CNDDB occurrence was recorded east of the project site near Shafter Bridge in 1898. Exact locations for the museum collections are unknown. No populations have been found in the area during surveys in the project vicinity in more recent years and this species was not observed during field surveys.

No occurrences of mountain beaver have been recorded in the project vicinity since 1898 and no evidence of mountain beaver activity was found in the project study area during field surveys. Therefore, this species is presumed to be absent from the project study area and project vicinity.

Townsend's Big-Eared Bat (*Corynorhinus townsendii*). Townsend's big-eared bat is a California Species of Special Concern. This bat species inhabits a wide variety of habitats. It roosts in the open, hanging from walls and ceilings of buildings and structures. This species hibernates during the winter, often when temperatures are around 32° to 53°F. Hibernation occurs in tightly packed clusters, which could possibly help stabilize body temperature against the cold. Males often hibernate in warmer places than females and are more easily aroused and active in winter than females. The bats are often interrupted from their sleep because they tend to wake up frequently and move around in the cave or move from one cave to another. During summer, males and females occupy separate roosting sites. Males live a solitary lifestyle away from females. Females and their pups form maternity colonies, which often number from around 12 to 200 (CDFG 2009b).

The mating season for Townsend's big-eared bats takes place in late fall. Courtship rituals are done by the male. Until spring, when ovulation and fertilization begin, the female stores the male's sperm in her reproductive tract. Gestation lasts from 50 to 60 days. When the pup is born, it is pink, naked, and helpless. Only one pup is birthed per female, although 90 percent of females give birth (CDFG 2009b).

This species has been documented at the western end of the project site near the intersection of SFDB and Platform Bridge Road (CDFG 2009a), but was not observed during field surveys. Suitable foraging, nesting, roosting, and breeding habitat was observed within the project study area.

American Badger (*Taxidea taxus*). The American badger is a California Species of Special Concern. This species was once fairly widespread throughout the open grassland habitats of California. Badgers are now an uncommon, permanent resident found throughout most of the state, with the exception of the northern North Coast area. They are most abundant in the drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Badgers are generally associated with treeless regions, prairies, parklands, and cold desert areas. Cultivated lands have been reported to provide little usable habitat for this species (CDFG 2009b).

Badgers are solitary, nocturnal creatures, foraging at night and then remaining underground during the daylight hours. Badgers dig burrows with 8-12" elliptical (wider than tall) entrances in friable soils for cover. These burrows generally have a single entrance. This animal frequently reuses old burrows, although some have been known to dig a new den each night, especially in summer. Soil excavated during formation of the den is piled at the entrance. Often when a den is occupied in cold weather, the tunnel is partially plugged (CDFG 2009b).

The badger is a highly specialized fossorial carnivore that feeds mainly on small mammals, especially ground squirrels, pocket gophers, rats, mice, and chipmunks. Badgers capture their prey by digging out animal burrows but also capture some prey by above-ground foraging on birds, eggs, reptiles, and invertebrates. Badgers may also feed on carrion. The badger’s diet will shift seasonally and yearly depending upon prey availability and the surplus buried food (CDFG 2009b).

One to five young are born in an extensive burrow system. Mating occurs in late summer or early autumn and is followed by delayed implantation. Implantation then occurs in February with the young born in March or April. At birth the young are furred but blind; they become independent by August (CDFG 2009b).

This species has not been documented within the project study area or project vicinity and was not observed during field surveys. No appropriate nesting dens were observed nor was any evidence of badger digs found. However, suitable habitat for this species was observed within the project study area.

Marin Elfin Butterfly (*Callophrys mossii marinensis*). The Marin elfin butterfly may meet the definition of “rare” under Section 15380 of the CEQA guidelines, based on its limited area of occurrence. This butterfly is associated with redwood forest areas of Marin County. It uses spoon-leaved stonecrop as a host plant and has a flight period that typically occurs annually in April (CDFG 2009a).

This species has been documented within the project study area in the vicinity of Shafter Bridge at the eastern end of the project site (CDFG 2009), but was not observed during field surveys. Suitable habitat for this species was observed within the project study area; its host plant (spoon-leaved stonecrop) was observed during field surveys.

San Francisco Forktail Damselfly (*Ischnura gemina*). The fork-tailed damselfly may meet the definition of “rare” under Section 15380 of the CEQA guidelines, based on its relatively limited area of occurrence from Marin to Santa Cruz County. This species is associated with seepages, shallow ponds and backwaters in streams. Adults are found perched in sunlit areas on low emergent vegetation or nearby upland grasses. The larval stage of the fork-tailed damselfly is aquatic. Adults breed continuously through the breeding season at permanent breeding sites; while possibly producing only one generation at seasonal sites. The flight period for this species extends from early March to mid-November (Garrison 1981).

This species has not been documented within the project study area or project vicinity and was not observed during field surveys in the project study area. However, suitable habitat for this species was observed within the project study area.

Myrtle’s Silverspot Butterfly (*Speyeria zerene myrtleae*). Myrtle's silverspot butterfly is federally listed as Endangered. Myrtle's silverspot butterfly is typically found in coastal dune or prairie habitat. Populations were formerly found in dunes and bluffs from San Mateo County north to the mouth of the Russian River in Sonoma County. The populations south of the Golden Gate apparently have been extirpated by urban development. Four populations are known to inhabit coastal terrace prairie, coastal bluff scrub, and associated non-native grassland habitats in western Marin, and southwestern Sonoma Counties, including the Point Reyes National Seashore. Adult butterflies are typically found in areas that are sheltered from the wind, below 820 feet elevation, and within three miles of the coast. Adult butterflies prefer areas protected from onshore winds, but can be observed in exposed areas when winds are calm (USFWS 1998b).

Habitat areas require the presence of the presumed larval host plant, western dog violet (*Viola adunca*). Adults feed on nectar from flowers including gumplant (*Grindelia rubicaulis*), yellow sand verbena (*Abronia latifolia*), mints (*Monardella* spp.), bull thistle (*Cirsium vulgare*), and seaside daisy (*Erigeron glaucus*) (USFWS 1998b).

Females are single-brooded and lay their eggs in the debris and dried stems of violets. Upon hatching, the caterpillars wander a short distance and spin a silk pad upon which they pass the winter. The caterpillars immediately seek out the food plant at the end of their diapause in the spring. After 7-10 weeks, the larvae form their pupa within a chamber of leaves drawn together with silk. Adults may emerge in about two weeks and can live for three weeks. The adult flight season may range from late June to early September (USFWS 1998b).

This species has not been documented within the project study area or project vicinity and was not observed during field surveys. Potentially suitable habitat for this species was observed within the project study area; however, its host plant (dog violet) was not identified during field surveys. No federal critical habitat for this species has been designated within the project study area (USFWS 2009).

California Freshwater Shrimp (*Syncaris pacifica*). The California freshwater shrimp is federally listed and state listed as Endangered. Historically, this species was probably common in low elevation, perennial freshwater streams in Marin, Sonoma, and Napa counties. Today, it is found in 16 stream segments within these counties. The distribution can be separated into the following four general geographic regions: (1) tributary streams in the lower Russian River drainage, which flows westward into the Pacific Ocean; (2) coastal streams flowing westward directly into the Pacific Ocean; (3) streams draining into Tomales Bay; and (4) streams flowing southward into northern San Pablo Bay. In 1997, Olema Creek, a tributary to Lagunitas Creek, was added to the list of streams supporting California freshwater shrimp. This range extension is probably not a new population. In late 1999, a new population of California freshwater shrimp was confirmed by DFG biologists in Franz Creek, a tributary to the Russian River in Sonoma County. This population is distant from the nearest previously known population and is located at an elevation of about 540 feet, considerably higher than any previously known population (USFWS 1998a).

The California freshwater shrimp is found in pool areas of low-elevation, low-gradient streams, among exposed live tree roots (e.g., willows and alders) of undercut banks, overhanging woody debris, or overhanging vegetation. These streams have low summer flows but may transport heavy runoff during the rainy season. Optimal habitats have a mixture of willow and alder trees. Most shrimp are found in areas that are one- to three-feet deep. For the most part, only the sides of the pools are utilized. Shrimp avoid the pool bottoms and are only found there after being disturbed, or when populations are especially high. Filamentous blackberry roots form an ideal refuge most of the year, but dense, beard-like willow roots, often extending more than a foot out into the water, are more dependable in heavy flows. Alders provide both short filamentous roots, and the coarser hard roots that support the stream banks (USFWS 1998a).

California freshwater shrimp breed in September and females retain the 50-120 fertilized eggs on their abdominal swimming legs throughout the winter. The shrimp must be about a year and a half old before they in turn are mature enough to breed. Individuals will live for as long as three years (USFWS 1998a).

This species has been documented within Lagunitas Creek within the project study area (CDFG 2009a), but was not observed during field surveys. No federal critical habitat for this species has been designated within the project study area (USFWS 2009).

Marin Hesperian (*Vespericola marinensis*). Marin Hesperian may meet the definition of “rare” under Section 15380 of the CEQA guidelines, based on its relatively limited area of occurrence. This species of terrestrial snail is found in moist spots in coastal brush fields and chaparral vegetation. The snail is found under leaves of cow parsnip, around spring seeps, in leaf mold along streams, and in mixed evergreen forest (CDFG 2009b).

This species has been documented within the project study area (CDFG 2009a), but was not observed during field surveys. Suitable habitat for this species was observed within the project study area.

Migratory Birds and Other Raptor Species. Various common migratory bird species potentially nest and forage within various habitat types within the project study area, several of which were observed flying and foraging within the project study area during field surveys. Migratory bird species are protected under the Federal Migratory Bird Treaty Act (MBTA) and under Sections 355 and 356 of the California Fish and Game Code. Impacts to actively nesting migratory bird species and their nests are considered significant impacts.

Several raptor species potentially nest and forage within various habitat types within the project study area. Red-tailed hawks were observed on the fly and foraging within the project study area during field surveys. It is the policy of CDFG’s Fish and Game Commission to recognize that raptors, including vultures, hawks, eagles, falcons, kites, ospreys, and owls, are integral to California’s native ecosystems; and have intrinsic, ecological, scientific, educational, economic, and recreational value. This policy also recognizes that raptor populations and their habitats should be identified, monitored, maintained, restored, and enhanced through research, management, and protection by CDFG, and ensures that the utilization of or impacts to any population of raptor species will not contribute to the species’ depletion in the wild. Under Section 3503.5 of the CDFG code, the State prohibits the removal of raptor nests.

3.7 SPECIAL-STATUS PLANTS; INVASIVE PLANT SPECIES

Twenty-nine special-status plant species are known or have the potential to occur within the project vicinity (Appendix H). As discussed previously in Section 2.0 (*Methods*), botanical surveys were conducted by Molly Boyes Botanical Consulting within the project study area between April 2007 and February 2008. Based on survey results (Appendix F), no special-status plant species were observed in the project study area. Although no special status plant species were found, the surveys did identify three plant species in the study area that have limited distributions in Marin County. These species are: California mistmaiden (*Romanzoffia californica*), bottlebrush grass (*Elymus californicus*) and coastal miterwort (*Mitella ovalis*). Based on the mapped locations of the observed populations of these three species, the proposed project should avoid impacts to them.

The botanical report (Appendix F) identified a number of non-native, invasive weedy plant species occurring in the project study area. Among these weedy species, the report noted panic veldt grass as particularly invasive. Panic veldt grass has been observed to spread rapidly in wildland areas, and is able to penetrate adjacent vegetation with decumbent stems and by going over it with ascending stems, as well as by spreading vegetatively. The dense turf that develops makes it difficult for seeds of other species to germinate.

4.0 POTENTIAL IMPACTS AND MITIGATION MEASURES

4.1 SIGNIFICANCE CRITERIA

The significance criteria identified below are based on the CEQA guidelines and interpretation of local plans and policies. Three principal components, and the interrelationship of these components, were used in determining the significance of the impact, including:

- Magnitude of the impact (e.g., substantial/not substantial)
- Uniqueness of the affected resource (rarity)
- Susceptibility of the affected resource to disturbance (sensitivity)

The evaluation of significance must consider the interrelationship of these three components. For example, a relatively small-magnitude impact (e.g., disturbing a nest) to a state or federally listed species would be considered significant because the species is at low population levels and is presumed to be susceptible to disturbance. Conversely, a common habitat such as non-native grassland is not necessarily rare or sensitive to disturbance. Therefore, a much larger magnitude of impact (e.g., removal of extensive vegetation) would be required for it to be considered a significant impact.

Based on these three components, the proposed project has the potential to produce two different types of project-related impacts to biological resources: direct and indirect impacts. Direct impacts may be short-term or long-term and occur when biological resources are altered, destroyed, or removed during the course of project construction. Such direct impacts include the following: (1) removal of vegetation by grading or filling, (2) loss of individuals due to habitat clearing and/or construction-related mortality, (3) loss of foraging, nesting or burrowing habitat for wildlife species, and (4) habitat disturbance which results in unfavorable substrate conditions to allow natural regeneration of the vegetation. Indirect impacts may also be short-term or long-term and occur when project-related activities affect, in an indirect manner, biological resources (e.g., increased noise, erosion, sedimentation, and dust).

California Environmental Quality Act (CEQA). Under CEQA, impacts resulting from any project are deemed to be significantly adverse if they:

- Substantially affect a rare or endangered species of animal or plant or the habitats of the species;
- Impact high quality or undisturbed biological communities, vegetation associations, and habitats that are restricted on a regional basis or serve as a wildlife corridor or buffer;
- Interfere substantially with the movement of any resident or migratory fish or wildlife species;
- Impact biological resources of scientific interest because they are at their physical or geographic limits or represent an unusual variation in a population or community; or

- Impact habitats that are key to the maintenance of localized plant and animal populations, even if these habitats are not biologically significant on a regional scale (i.e., impacts would be locally, but not regionally significant).

Impacts are deemed to be adverse but non-significant if they:

- Impact habitats and species which are common and widespread in the region and the state;
- Do not significantly change or stress the resources on a long-term basis as a result of construction, operation or maintenance of a proposed project; and
- Impact biological resources that are already disturbed or lack importance in the preservation of local or regional native biological diversity and productivity.

CEQA Guidelines Sections 15206 and 15380 were also used to determine impact significance. Impacts are generally considered less than significant if the habitats and species affected are common and widespread in the region and the state.

A species may be treated as rare or endangered even if it has not been listed under CESA or FESA. Species are designated endangered when survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, disease, or other factors.

4.2 PROJECT IMPACTS AND MITIGATION

Impact 4.2.1 - Special-status Plant Species Potentially Present within the Project Site

Based on the results of CDFG protocol-level plant surveys, no special-status plants have been observed within the project study area. However, special-status plants are known to occur in the project vicinity (e.g., Napa false indigo, Tiburon Indian paintbrush – see Appendix F). If construction does not start until 2010 or later, there would be a potential for new populations of special-status plants from the vicinity to colonize the project study area and/or for previously undetected populations of special-status plants to re-appear. Direct impacts to such populations could potentially occur from grading activities for shoulder widening, installation of bioswales and retaining walls, drainage improvements, decommissioning and creation of vehicle pullouts and during slide repair activities at Station #270+25. Impacts could also occur from the movement of construction equipment in the work zones. Impacts to future populations of special-status plants, if they were to occur, would be considered significant. However, with implementation of the following mitigation measures, such project impacts would be reduced to a level of less than significant.

Mitigation Measures

If construction does not start until 2010 or later, a qualified botanist shall conduct additional CDFG protocol-level plant surveys within and immediately adjacent to the zones that will be disturbed by construction work. The surveys shall be conducted in the year within which construction is to commence. To the extent allowed under the construction schedule, these surveys shall be conducted during the flowering period of the special-status plants that have a high potential to occur within the project study area (January - August; see Appendix F). If any special-status plant species are observed within or adjacent to the disturbance zones, the DPW shall implement the following measures:

1. A qualified botanist shall delineate the locations of any special-status plant population adjacent to the disturbance zones, and shall supervise the installation of temporary protective construction fencing between the disturbance zones and the plant population. The fencing shall remain in place until construction is completed and all construction equipment removed from the vicinity of the plant population.

2. If any special-status plant population is identified within the construction disturbance zones, DPW shall consult with CDFG and CNPS to determine appropriate avoidance and/or mitigation measures for impacts to the population. If the special-status plant is federally listed as Threatened or Endangered, DPW shall also consult with USFWS. At a minimum, avoidance and mitigation measures shall entail the following:

    - DPW shall adjust the boundaries of the disturbance zones, where feasible, to avoid impacts to the plant population.
    - Where avoidance is not feasible, DPW shall implement one or more of the following measures, based on the prior consultation with CDFG and CNPS: (1) transplant affected plants to suitable habitat areas outside the disturbance zones; (2) collect and properly store seeds of affected plants; subsequently re-seed suitable habitat areas outside the disturbance zones; and (3) prepare and implement a long-term management/enhancement plan for existing off-site populations of the affected plant species.

Impact 4.2.2 - Bird Species Protected under the Federal and State Endangered Species Act

Northern spotted owls (federally listed as Threatened) have a high potential to occur in the project study area, based on the documented presence of this species in the vicinity and the presence of suitable habitat in the project study area both north and south of the project site. Marbled murrelets (federally listed as Threatened; state listed as Endangered) are not known to nest in Marin County and they are not expected to occur in or near the project study area; the proposed project will therefore not adversely affect this species.

Potential effects to northern spotted owl could include: (1) tree removal associated with the slope repair/retaining wall at 270+25 could potentially impact nesting sites; (2) tree removal associated with road or shoulder widening under Option A could potentially impact nesting sites; and (3) disturbance (harassment) of nesting birds in the vicinity of the project site due to noise from construction activities.

The approximate distance that project-generated noise and/or visual disturbance could lead to harassment of nesting spotted owls can be addressed using the methodology developed by the USFWS (USFWS 2006). This method involves comparing the existing ambient sound levels in the project area with the anticipated project-generated sound levels. With this method, field recordings of actual sound levels are not required. Instead, ambient and anticipated project generated sound levels are based on "standardized" measured values of natural environments and/ or various human activities and equipment (USFWS 2006). Various natural and human generated sounds are ranked in relative sound levels from natural ambient (<50dB), very low (50-60 dB), low (61-70 dB), moderate (71-80 dB), high (81-91dB), very high (91-100dB), to extreme (101-

110 dB) (USFWS 2006). Based on this ranking scheme, the existing relative sound levels in the project area likely range from ambient (e.g., forest habitat) during the night and in the early morning hours (e.g., 0100 to 0300 hours) to high (e.g., trucks, highway traffic) during peak traffic conditions in the day. Based on the Federal Highways Administration (FHWA) Traffic Noise Prediction Model, sound levels within the project site are expected to range from 58 – 61 dB based on a weighted day-night average (LSA 2010). Project-generated sound levels associated with general construction equipment, dump truck, front-end loader, etc., are anticipated to reach a relative sound level of high (91 dB) (LSA 2010).

Under the USFWS methodology for estimating potential harassment distance from a given project, the potential harassment distance for the project site is 50 meters (165 feet), based on a project generated sound level of high compared to an existing (ambient) sound level ranging from low to high during construction hours. Therefore, the area of potential harassment to northern spotted owls from the proposed project is 165 feet from the edge of the project disturbance zone.

With implementation of the following mitigation measures, project impacts upon federal and state listed bird species will be reduced to a level of less than significant.

Mitigation Measures

1. Prior to initiation of construction activities (in April or May of the construction year) the Point Reyes Bird Observatory (PRBO) shall be contacted to obtain the results of any new spotted owl surveys that were conducted in the project vicinity. If such surveys indicate that spotted owls nest within 165 feet of the construction area, the USFWS and CDFG shall be consulted regarding additional avoidance and minimization measures.
2. Due to the potential for harassment to northern spotted owls from the proposed project, consultation with the USFWS will likely be required prior to the start of work.
3. If construction work is scheduled during the breeding season (March 1 through August 30), a qualified wildlife biologist shall conduct preconstruction surveys of all suitable nesting trees in the project disturbance zone and within 165 feet of the disturbance zone to determine if nesting birds of either species are present. (Preconstruction surveys will not be required for construction work carried out in the non-breeding season, August 30 through February 28/29.) The preconstruction surveys shall be conducted within 15 days prior to the start of work from March 1 through May 31 (since there is higher potential for birds to initiate nesting during this period), and within 30 days prior to the start of work from June 1 through August 30. All suitable nesting trees within 165 feet of the construction disturbance zone shall be surveyed.

   If active nests of either species are found in the work area, the USFWS and CDFG shall be consulted as to appropriate avoidance and minimization measures prior to the initiation of work. At a minimum, the following avoidance and minimization measures shall be implemented:

   - In order to avoid and minimize impacts on nesting northern spotted owls during project implementation, a 165-foot buffer shall be established around active nesting sites. No project construction activities shall be allowed to occur within this zone until a qualified biologist has determined that all juveniles have fledged from occupied nests.

- The buffer zone shall be clearly delimited using construction fencing or other suitable barrier material to the extent feasible based on site conditions.
- Construction activity, site access by equipment and vehicles, and operations at the staging areas shall be limited to daytime hours. No nighttime work shall be allowed on the project. Activity shall begin no earlier than one-half hour after sunrise and shall end no later than one-half hour before sunset.
- Any required tree trimming of trees to be avoided shall be done according to arborist guidelines to minimize the effects to trees. Trimming of trees must not jeopardize the survival of trees.
- A report documenting the results of preconstruction surveys and nest protection and monitoring shall be provided to USFWS and CDFG within four weeks of completion of work in the vicinity of active nests.

Impact 4.2.3 - Special-Status Bird Species and Bird Species Protected under the MBTA Potentially Nesting within the Project Disturbance Zone and Areas adjacent to the Disturbance Zone

Implementation of the proposed project could potentially result in impacts on nesting special-status bird species (as identified in Appendix H and described in Section 3.0 above) located in the proposed project disturbance zone and adjacent areas. Implementation of the project could also impact common nesting bird species protected under the MBTA and under Sections 355 and 356 of the California Fish and Game Code (including migratory birds and raptor species).

Direct impacts to special-status, migratory, and raptor bird nests could occur during removal of vegetation within the project disturbance zone. Removal of eight trees under the proposed project and nine additional trees under Option A could also lead to the direct removal and destruction of bird nests and nesting habitat. Indirect impacts to nesting bird species could also occur if bird species abandon active nest sites due to noise generated by construction activities, or due to visual disturbance due to the increased presence of construction workers and equipment in the project study area.

No special-status bird species were observed nesting in the project study area during field surveys, however, they could establish active nest sites prior to implementation of the proposed project. Additionally, a number of active and inactive nest sites of other bird species were observed during field surveys. Impacts to active nest sites could be a potential violation of the MBTA Sections 355 and 356 of the California Fish and Game Code, and therefore a significant impact. However, with the implementation of the following mitigation measures, project impacts to special-status and other protected bird species would be reduced to a level of less than significant.

Mitigation Measures

1. If construction work is scheduled during the breeding season (March 1 through August 30), a qualified wildlife biologist shall conduct preconstruction surveys within and adjacent to the project disturbance zone to determine if nesting birds are present. Preconstruction surveys will not be required for construction work carried out in the non-breeding season (August 30 through February 28/29). The preconstruction surveys shall be conducted within 15 days prior to the start of work from March 1 through May 31 (since there is higher potential for

birds to initiate nesting during this period), and within 30 days prior to the start of work from June 1 through August 30.

2. If active nests are found in the work area, the biologist shall determine an appropriately-sized buffer around the nest in which no work shall be allowed until the young have successfully fledged. The size of the nest buffer shall be determined by the biologist in consultation with the CDFG and shall be based on the following three criteria: (1) the nesting species; (2) the context of the nest site in relation to existing human activity and its sensitivity to disturbance; and (3) the expected types of disturbance. No project construction activities shall be allowed to occur within this zone until a qualified biologist has determined that all juveniles have fledged from occupied nests. At a minimum, the following buffer zones shall be implemented:

    - **Herons and Egrets.** Nesting herons and egrets typically nest and rear young from late February through August. In order to avoid and minimize impacts on nesting herons and egrets, a 100- to 400-foot buffer shall be established around active nesting sites when project activities will occur during their breeding period. No project activities shall be allowed to occur within this zone. The buffer area can be removed prior to August if a qualified biologist determines that all juveniles have fledged from occupied nests.
    - **Yellow Warbler.** Yellow warblers typically nest and rear young from April through July. In order to avoid and minimize impacts on nesting yellow warblers during project implementation, a 25- to 50-foot buffer shall be established around active nesting sites when project activities shall occur during their breeding and nesting period. No project activities shall be allowed to occur within this zone. The buffer area can be removed prior to July if a qualified biologist determines that all juveniles have fledged from occupied nests.
    - **Osprey.** Osprey typically nest and rear young from March through September. In order to avoid and minimize impacts on nesting osprey during project implementation, a 200-foot buffer shall be established around active nesting sites when project activities will occur during their breeding and nesting period. No project activities shall be allowed to occur within this zone. The buffer area can be removed prior to September if a qualified biologist determines that all juveniles have fledged from occupied nests.
    - **Other Raptor Species.** Other raptor species typically nest and rear young from early April through August. If these species are found to be nesting, impacts shall be avoided and minimized by establishing a 200-foot buffer around active nest sites. No project-related activities would be allowed to occur within this buffer until young have fledged or the species are no longer attempting to nest. The buffer area can be removed prior to August if a qualified biologist determines that all juveniles have fledged from occupied nests.
    - **Other Migratory Birds.** Migratory bird species typically nest and rear young from February through August. In order to avoid and minimize impacts on migratory bird species, a 25- to 200-foot buffer shall be established around active nesting sites when construction activities shall occur during their active nesting period. No project-related activities shall occur within this zone. The buffer area can be removed prior to August if a qualified biologist determines that all juveniles have fledged from occupied nests.

A report documenting the results of preconstruction surveys and nest protection and monitoring shall be provided to CDFG within four weeks of completion of work in the vicinity of active nests.

Impact 4.2.4 - Special-status Mammal Species Potentially Present within the Project Disturbance Zone and Adjacent Areas

Pallid, Townsend's Big-Eared, and Western Red Bat. Implementation of the proposed project, including tree removal for the slope repair, could potentially result in impacts on roosting and maternity sites used by pallid, Townsend's big-eared, and western red bats. Removal of redwood and oak trees under Option A of the proposed project could result in the removal of potential roosting and maternity sites. The removal of active roosting or maternity sites would be considered a significant impact, however, with implementation of the following mitigation measures, these impacts would be reduced to a level of less than significant.

Mitigation Measures

1. All trees to be removed within the project area shall be surveyed for the presence of bat roosts by a qualified biologist. Surveys may entail direct inspection of the trees or nocturnal surveys. The survey shall occur no more than two weeks prior to the initiation of vegetation removal and ground disturbing activities. The survey shall be conducted prior to the commencement of the bat maternity season (approximately April 15-August 15). If no roosting habitat is present, then the tree shall be removed within one week following the survey.
2. If roosting habitat is present and occupied, then a qualified biologist shall determine the species of bats present and the type of roost (i.e., day roost, night roost, maternity roost).
3. If it is determined that the bats are not a special-status species, and that the roost is not being used as a maternity roost, then the bats may be evicted from the roost using methods developed by a biologist experienced in developing and implementing bat mitigation and exclusion plans.
4. If special-status bat species are found to be present or if the roost is determined to be a maternity roost for any species of bat, then a qualified biologist experienced in developing bat mitigation and exclusion plans shall develop a mitigation plan to compensate for the lost roost site. Removal of the roost shall only occur when the mitigation plan has been approved by CDFG and only when bats are not present in the roost.

   The mitigation plan shall detail the methods of excluding bats from the roost and the plans for a replacement roost in the vicinity of the project site. One replacement roost shall be provided for each roost impacted. The mitigation plan shall be submitted to CDFG for approval prior to implementation. The plan shall include the following: (1) a description of the species targeted for mitigation; (2) a description of the existing roost or roost sites; (3) methods to be used to exclude the bats if necessary; (4) methods to be used to secure the existing roost site to prevent its reuse prior to removal; (5) the location for a replacement roost structure; (6) design details for the construction of the replacement roost; (7) monitoring protocols for assessing replacement roost use; (8) a schedule for excluding bats, demolishing of the existing roost, and constructing the replacement roost; and (9) implementing contingency measures if the replacement roosts do not function as designed.

5. Roosts shall only be removed during seasons when bats are active and young are able to fly (March 1–April 15, and August 1–October 15).
6. Removal of trees surrounding roost trees must occur without falling on or otherwise damaging the roost tree.
7. No diesel or gas-powered equipment shall be stored or operated directly beneath a roost site.
8. Under supervision of a qualified bat expert, roost trees shall be removed in two steps, over two successive days:
    - Branches and limbs identified by the bat expert should be removed on Day 1 (Disturbance).
    - The remainder of the tree should be removed on Day 2 (Removal).
9. All construction activity in the vicinity of an active roost shall be limited to daylight hours.

American Badger. Implementation of the proposed project could potentially result in impacts on individual American badgers or their dens if they are present within the project disturbance zone and areas immediately adjacent to the disturbance zone. Direct impacts (mortality of individual badgers, crushing of potential or occupied dens) to American badgers could result during the following: (1) grading activities related to shoulder widening; (2) installation of bioswales; (3) installation of retaining walls; (4) drainage improvements; (5) decommissioning and creation of pullouts for cars; and (6) during slide repair activities at Station #270+25. Direct impacts could also result if construction equipment travels outside of defined construction work zones.

Indirect impacts could result if potential or known dens are located in areas adjacent to the disturbance zone. Noise and the presence of construction equipment and personnel could cause the abandonment of active dens should they be present adjacent to the disturbance zone. It should be noted that no American badgers or potential dens were identified in the project disturbance zone of the project during field surveys. However, the potential exists that American badgers could become established within or adjacent to the project disturbance zone prior to project implementation. Impacts to individual American badgers or active /potentially active den sites would be considered a significant impact. However, with the implementation of mitigation measures, project impacts would be reduced to a less than significant impact.

Mitigation Measures

DPW shall implement the following mitigation measures to avoid significant impacts to American badgers:

Badgers dig their own dens; therefore, the dens are a limited resource that cannot be reconstructed. Avoidance of natal dens must be included in the mitigation (as described below).

1. A preconstruction survey of the project area and the area within 100 feet of the project areas shall be conducted for the presence of the badger dens and signs of badger occupancy. The survey shall be completed no more than seven days prior to the initiation of vegetation removal and ground disturbing activities. If no dens are observed, a second survey shall be conducted within 24 hours of vegetation removal and ground disturbing activities to ensure that no badgers have entered the area since the first survey. Preconstruction surveys shall be

repeated as necessary if vegetation removal and ground disturbing activities are delayed or postponed.

2. If potential dens are observed within the project area or 100-foot buffer area, then the project shall implement a monitoring program to determine if the dens are active. Monitoring shall be done using remote triggered cameras or tracking mediums placed at the den entrance. Cameras or tracking mediums shall be operated for a minimum of three nights. If no activity is observed at the den during the monitoring period, the den shall be excavated by hand on the morning following the third night of monitoring. The den shall be backfilled to prevent reuse. All den excavations shall be coordinated with the CDFG.
3. If a den is determined to be active, the den shall be monitored for an additional 3 nights to determine if the badgers are using the den continually. Special care shall be taken during the period of March through July when badger cubs may be present in the den. Excavation of natal dens shall not be allowed until it is determined by a qualified biologist that the young have left the den and are able to forage independently. The presence of a natal den within the project area or buffer area shall be reported to CDFG within 24 hours.
4. During the entire year, no excavation of the dens shall be allowed until monitoring results demonstrate that the den has been unoccupied for at least three nights. Once the den has been determined to be unoccupied for a period of at least three nights, the den may be excavated by hand and backfilled.
5. Outside of the period when young may be present in the den (August through February), measures may be taken to discourage the use of continually occupied dens. This may include blocking the entrance to the den or other methods approved by CDFG. The den must be continually monitored during this period to ensure that badgers are not occupying the den. Excavation and backfilling may occur once the den is determined to be unoccupied for at least three nights.
6. A report documenting the results of preconstruction surveys and den monitoring shall be reported to CDFG within two weeks of completion of the den excavations and initiation of vegetation removal and ground disturbance activities.

Impact 4.2.5 - Common Vegetative Communities, Wildlife Habitat, and Wildlife Species Present within the Project Disturbance Zone and Adjacent Areas

Implementation of the proposed project would disturb common vegetative communities/wildlife habitats (i.e., ruderal, annual grasslands, coastal oak woodland, coastal scrub, mixed evergreen forest, and redwood forest) within the project disturbance zone. The proposed project would mainly disturb herbaceous vegetation and bushes, and eight redwood and California bay trees would be removed for construction of the slope repair retaining wall at Station #270+25. In the case of Option A, the proposed project would remove an additional nine oak and redwood trees. Impacts to redwood and oak trees are described further under Impact 4.2.6 below, and are not considered further in this impact analysis.

The majority of the project disturbance zone is currently covered by cement and asphalt as the project site is currently used as a transportation corridor. Vegetation removal will primarily occur along the edge of the existing roadway, and much of this vegetation consists of the ruderal vegetative community with smaller quantities of annual grassland and other common vegetative communities/wildlife habitats. Due to elevation constraints along the edge of much of the project alignment and the prevalence of trees along the roadway, the disturbance zone of the project is quite limited. As these vegetative communities are locally common, and very small amounts of habitat will be disturbed during project implementation, impacts are considered less than significant and no mitigation is required.

Implementation of the proposed project would also temporarily disturb common wildlife species found within the project study area. Direct impacts (mortality of individual animals) to wildlife could result during the following: (1) grading activities related to shoulder widening; (2) installation of bioswales; (3) installation of retaining walls; (4) drainage improvements; (5) decommissioning and creation of pullouts for vehicles; and (6) during slide repair activities at Station #270+25. Direct impacts could also result if construction equipment travels outside of defined construction work zones. Indirect impacts could result to wildlife species outside of the project disturbance zone due to noise generated by construction activities and the presence of construction equipment and personnel should they be present adjacent to the disturbance zone. As the project is short-term in duration (approximately 200 working days), most wildlife species are expected to use adjacent habitat areas during project activities. Additionally, common wildlife species found in the project site and area have likely become accustomed to traffic noise along SFDB, and to the presence of recreational users in Samuel P. Taylor State Park and Golden Gate National Recreation Area. As these wildlife species are locally and regionally common, impacts are considered less than significant and no mitigation is required.

Impacts 4.2.6 - Native Trees Protected by the Marin County Tree Preservation Ordinance

The proposed slope stabilization work at Station #270+25 will require the removal of eight native trees (5 California bays, 3 coast redwoods) that are protected under the County Tree Protection Ordinance (Marin County Code Chapter 22.27), as described in Section 1.4.2. Four of these trees (2 bays, 2 redwoods) are relatively mature with subcanopy heights of 50 to 60 feet; the others are smaller subcanopy trees with heights in the 15 to 30 foot range (Table A). Additionally, under Option A, the proposed project would require the removal of nine native trees (8 redwoods and 1 coast live oak – see Table B). Eight of these trees (all redwoods) are relatively mature with canopy heights ranging from 70 to 120 feet.

Marin County Code Chapter 22.27 provides protection for native trees (including oaks, bays and redwoods) that have specified minimum diameters. All but one of the trees that would be removed under the proposed project and Option A exceed the minimum diameters under the Code and are therefore protected.

Tree removal at Station #270+25 and under Option A would have several potential biological impacts:

1. **Bird habitat impacts.** All of the affected trees are of sufficient size to provide suitable nesting habitat for birds protected under the MBTA, as well as roosting and foraging habitat for a variety of native bird species that use the Lagunitas Creek corridor.
2. **Stream shading impacts.** Tree removal could result in reduced shading of the aquatic environment in the creek, which could adversely affect water temperatures and the related suitability for salmon and steelhead spawning, rearing, and emergence. Four of the trees that would be removed at Station 270+25 (Trees 1, 2, 7, and 8 in Table A) and three of the trees that would be removed under Option A (Trees 7, 8, and 9 in Table B) are canopy-size trees situated so that they are likely to provide shading of Lagunitas Creek for at least part of the

day. However, given the limited amount of shade effects of these trees and the proximity of other large canopy trees in these locations, the shading impacts are unlikely to be significant.

3. **Ground shading impacts.** The loss of ground shading from all affected trees would also open up areas of the upper stream bank to colonization by invasive exotic plant species.
4. **Large woody debris impacts.** The trees to be removed at Station #270+25, and five of the trees to be removed under Option A, are located on the Lagunitas Creek side of SFDB and therefore, have the potential to provide beneficial woody debris to the creek system.

Relative to the large number of trees occurring along the SFDB corridor (1,368 trees with diameters of six inches or greater were surveyed within 20 feet of the pavement), and the vastly greater number of trees occurring in the adjacent woodland and forest communities on either side of SFDB, the loss of nine trees under Option A and eight trees at Station #270+25 would not likely result in any of the above impacts being biologically significant on a watershed basis. Nevertheless, these impacts could be locally significant and also require compensatory mitigation actions under the County Tree Protection Ordinance. Therefore, with implementation of the following mitigation measures, the impacts of tree removal would be reduced to a level of less than significant.

Mitigation Measures

1. **Tree Replacement.** The DPW shall comply with the requirements of the Marin County Tree Protection Ordinance for any tree loss under the proposed project including retaining wall work at Station #270+25 and all tree removal under Option A. Consistent with the ordinance, trees of the same species as those impacted shall be replanted at a 3:1 replacement ratio. The replacement trees shall be 15-gallon specimens unless a certified arborist or a representative from the Marin Municipal Water District (MMWD) determines otherwise. Planted trees shall be maintained with browse protection and weed cloth around the root zones as needed, and regularly watered during the dry season until such time that a certified arborist has determined that they are sufficiently established to not require further maintenance or watering.

   Replanted trees shall be planted within the Lagunitas Creek watershed if possible. One suitable location for tree replanting is the stream bank below the drilled-pier retaining wall structure located immediately downstream from the Peters Dam plunge pool (Appendix I). MMWD constructed this wall to protect a pipeline and unpaved roadway that was endangered by a landslide along a 160-foot section of stream bank in 2005. MMWD would like to replant the stream bank below the retaining wall with native trees and shrubs, including redwood trees. The area to be planted would qualify as mitigation if Marin DPW paid for or performed the planting. Prior to the start of construction, DPW shall identify the final planting location(s) and receive approval from MMWD if necessary. If suitable replanting location(s) cannot be found and agreed to by the affected public agency property owners, then DPW may contribute the required monetary amount into the Marin County Tree Preservation Fund, as specified under the tree protection ordinance.

2. **Additional Habitat Mitigation.** In order to compensate for the potential habitat impacts from tree removal along Lagunitas Creek, DPW shall provide the following additional mitigation measures:

- **Lagunitas Creek Watershed Habitat Enhancement.** The DPW shall provide a financial contribution to the Marin Municipal Water District (MMWD) for support of habitat enhancement along Lagunitas Creek under the MMWD *Mount Tamalpais Watershed Gateway Project.* The appropriate amount of the contribution shall be directly related to the degree of removed habitat and shall be determined by Marin DPW in consultation with MMWD and shall be specifically dedicated to either invasive exotic vegetation management and/or native plant revegetation efforts along the creek.
- **Woody Debris Contribution.** Marin DPW shall make available suitable cuttings from the tree removal work for use as woody debris and in bio-engineered structures along Lagunitas Creek in order to enhance salmonid habitat. The Marin DPW shall notify the signatories to the February 7, 2007 *Memorandum of Understanding for Woody Debris Management in Riparian Areas of the Lagunitas Creek Watershed* (Marin Municipal Water District, Marin County Open Space District, California Department of Parks and Recreation, National Park Service, and the Marin County Resource Conservation District – see Appendix J) of the availability of the wood, and the signatories shall notify Marin DPW if they have use for the woody debris and when they will collect the material. If the signatory agencies have not responded within 14 days Marin DPW shall dispose of the material in a legal manner.

Impact 4.2.7 - Damage to Roots of Redwoods and Other Native Trees

The proposed project could cause indirect impacts to native trees that occur along the edge of the SFDB project work zone. These impacts could include root zone damage from soil compaction, soil excavation, root pruning, adding fill or concrete directly on roots, and altering drainage patterns. Native trees occurring along SFDB that could be potentially affected by these work activities include coast redwood, coast live oak, tanbark oak, California bay, buckeye, big leaf maple, Douglas fir and white alder.

The majority of trees potentially affected by the project are coast redwoods. This tree species has a unique root system which lacks a tap root system but rather has a shallow network of lateral roots that extend from the base of the trunk (Barbour et al., 2001). Coast redwood lateral roots give rise to terminal, fibrous roots that can form dense mats in the top 3 feet of soil. Besides conducting water and nutrients, coast redwood roots also provide structural support. The roots can extend over 50 feet away from the trunk and can also interlock with neighboring trees root systems, thus increasing a tree’s stability (Barbour et al., 2001). Larger roots may bear a greater structural load than smaller roots but the entire root system is important for keeping trees upright.

The coast redwood’s root system provides this species with a relatively high level of resiliency from disturbances such as fire and burying by sediments (Stone and Vasey 1968, Griffith 1992). Younger trees may be less resilient than older trees (>400 years) from damage and disturbance to the root system (Powers and Wiant 1970). The extent to which this resiliency from natural disturbances may translate to potential resiliency from indirect project impacts is not known, however, it should be noted that the majority of redwoods along SFDB are second growth, no older than 150 years (Synthesis Environmental 2008).

Regardless of the level of resiliency of coast redwoods, cumulative effects from multiple disturbances could be problematic for trees along the project work zone. Impacts may be greater to trees whose roots have not been previously disturbed rather than to those trees that are closer to the existing road where a long history of perturbations have occurred. Project disturbance effects to redwoods would not necessarily be apparent in the immediate aftermath of construction work, but rather could take five to ten years or longer before they are observable (Evans 2000). Symptoms of these impacts could include stunted growth, increased susceptibility to disease, die back, and felling, among others (Coder 2000, Evans 2000). Based on all these considerations, damage to roots of all trees including coast redwoods along the SFDB project work zone should be minimized to the maximum extent practicable.

Potential indirect tree impacts are described in more detail below:

- **Soil compaction.** Compacting soil increases bulk density and reduces pore space. As a consequence, less oxygen, water, and mineral exchange occurs in compacted soils, which can lead to root death. Root death, if extensive enough, can lead to canopy die-back and/or structural failure (Coder 2000, Watson and Kelsey 2006). In addition, seedlings are less likely to recruit in compacted soils (Coder 2000).

  Project activities that may result in soil compaction include the following: (1) “crack and seat” work along SFDB Segment 1 that will compress and interlock broken-up concrete panels into the subgrade; (2) grinding and compaction of concrete and asphalt along Segments 2 and 3; and (3) movement of heavy earthmoving equipment, construction vehicles and other heavy machinery in and adjacent to the work zones.

- **Soil excavation and root pruning.** Damage to roots from soil excavation or root pruning can have various impacts. Pruning of fine roots will decrease a tree’s water and nutrient absorption capacity; however, this impact is not likely to be significant because annual root growth ensures that this loss, if only to a small portion of a tree’s root system, may be minor and temporary. Damage to larger roots, especially those 1-inch in diameter or greater, risk causing structural failure that increases the chance of felling, especially during strong winds. Damage to larger roots also has a greater impact on water and nutrient physiology that will likely lead to canopy die-back since, in general, the larger a root, the greater amount of fine roots that are connected to it. Indirect effects to physical root damage from excavation include heightened susceptibility to disease (Evans 2000).

  Project activities that may result in root damage from soil excavation and root pruning include the following: (1) the grinding and removal of the old asphalt layer along SFDB Segments 2 and 3; (2) soil excavation incidental to culvert replacement work; and (3) soil excavation for retaining wall construction.

- **Concrete and fill placement atop root zones.** Pouring concrete and other foreign materials on roots can change soil drainage patterns and restrict access to soil resources (e.g., minerals, water, and oxygen) that could lead to root death (McPherson et al., 2004). Replacing natural soil with fill also dramatically alters the environment around the affected root. Impacts of adding fill over roots are similar to those associated with soil compaction and pouring concrete on roots and will vary depending on the type of fill used.

  Project activities that may result in concrete and other fill placement over root zones include the following: (1) backfilling of asphalt removal areas with an aggregate base; (2) paving of currently unpaved road shoulders and pullouts with asphalt or rubberized asphalt concrete material; and (3) temporary storage of fill materials in project staging areas.

- **Alteration of drainage patterns.** Major alteration of drainage patterns from construction can detrimentally affect tree health. Where resources are spatially patchy, plant roots typically forage within the soil profile where optimal nutrient and water resources exist (Mou 1997).

Sudden lack of resources (e.g., water) from altering existing drainage patterns could result in root stress. In addition, changes that increase pooling of water in the otherwise well-drained soils of the project area also risk causing root failure due to formation of anoxic conditions.

Project activities that may result in alterations of drainage patterns in the vicinity of tree roots include the following: (1) the construction of subdrain bioswales along road shoulders; and (2) the filling of roadside swale and drainage ditches for roadway alignment and width improvements.

Mitigation Measures[2]

1. An arborist certified by the International Society of Arboriculture (ISA) shall be present for any ground disturbing construction activities within a 50-foot radius of any redwood tree and within the dripline of other native trees.
2. All excavation work below the finished grade within a 50-foot radius of any redwood tree shall be done with hand tools or with light mechanized equipment (e.g., mini or light excavator or backhoe) to minimize disturbance or damage to roots.
3. The contractor shall use an air spade while excavating the soil within the structural root zone of native trees to minimize physical injury to the tree roots. The contractor may propose alternative excavation methods that would minimize root damage, subject to the approval of the certified arborist and DPW.
4. Smaller roots less than 2 inches in diameter that require cutting shall be cut cleanly with a sharp instrument in order to promote healing.
5. The structural section for new pavement shall consist of Cement Treated Permeable Base (CTPB) or the equivalent to minimize the thickness of the structural section, minimize compaction of roots, and minimize thermal exposure to roots.
6. In areas where soil is to be excavated through the roots of native trees for culvert replacement, retaining wall construction or other purposes, the following measures shall be used to protect roots and promote air circulation:
    - The existing vegetation needing removal shall be cut flush with the ground and stumps left in place.
    - Any duff layer shall be hand-raked off the area within the clearing limits, stored, and replaced as erosion control.
    - A 0.75-foot thick layer of Class 1, Type A permeable material shall be placed and compacted as the first lift of the fill to increase water infiltration and air circulation. A layer of filter fabric shall then be applied prior to placing the remaining fill required for the embankment.
7. Equipment staging/storage areas shall be located on existing paved areas, or on existing areas of compacted, gravel surface not located within 50 feet of redwood trees.
8. No heavy equipment shall be staged or parked within the dripline of mature trees in unpaved areas. Fill, gravel, or other construction materials shall not be stockpiled within 50 feet of redwood trees or beneath the driplines of any other trees.

---

[2] Adapted from Caltrans (2008).

9. In order to avoid adversely altering surface drainage patterns over redwood root zones, bioswales and other drainage swale features shall be located on the upslope side of SFDB (opposite side from Lagunitas Creek) wherever feasible.

Impact 4.2.8 - Seasonal Wetlands and Other Waters

The project will result in direct, permanent impact to approximately 0.24 acre of roadside swale seasonal wetlands that will be filled as a result of road widening, shoulder improvements and bioswale construction in the locations shown in Appendix F. On a seasonal basis when extended periods of inundations occur, these wetlands may provide suitable habitat for aquatic invertebrates and amphibians, and feeding and foraging habitat for common wildlife species. However, the feeding and foraging value of this habitat is probably diminished by the physical narrowness of the swales and the very close proximity of SFDB and associated vehicular traffic. In the absence of mitigation measures, this loss of the habitat would be a significant impact.

These wetlands may also provide water quality functions by detaining runoff and absorbing or uptaking pollutants. However, the value of this function is limited since the swales were not designed for this purpose (e.g., substrates not suitable, not physically designed to optimize detention). This function will be replaced and improved under the project by the construction of roadside bioswales specifically designed for water quality treatment.

Culvert replacement work will temporarily impact 2,308 linear feet of culverted stream channels. These temporary impacts will be limited to the culvert replacement work beneath the roadbed and road embankment and will not affect any natural stream channel bed or bank below the OHWL.

The project will also temporarily disturb stream bank areas above the OHWL in locations where the culvert replacement work includes the placement of rock riprap or erosion fabric below culvert outlets for erosion prevention purposes. An estimated 4,500 square feet (280 linear feet) of stream bank will be temporarily disturbed in this manner. The project will also temporarily disturb 1,800 square feet (60 linear feet) of stream bank above the OHW at Station #270+25 where the slope repair retaining wall will be constructed.

Implementation of the project could also lead to the release of silt and sediment, turbidity, and other construction related pollutants into areas adjacent to the construction zone, which could in turn drain into wetlands and streams, thus, indirectly impacting water quality and biota in wetlands and streams (see Section 4.2.10 for discussion of biological impacts and mitigation measures).

Permanent and temporary impacts to wetland and stream resources would be considered a significant impact. However, with the implementation of the mitigation measures described below, impacts would be reduced to a less than significant level.

Mitigation Measures

- Prior to project implementation, DPW shall obtain all required regulatory permits to conduct work activities in wetlands and streams. Permits required to conduct these activities would include a Section 401 Water Quality Certification from the Regional Water Quality Control Board (RWQCB), a Section 404 permit from the USACE, and a Lake and Streambed Alteration Agreement from CDFG.

- DPW shall compensate for the loss of 0.24 acre of seasonal wetlands associated with the filling of roadside swales by establishing new seasonal wetlands at a 2:1 on-site replacement ratio within the Lagunitas Creek watershed in the vicinity of the SFDB project. One possible mechanism for accomplishing this may be for the DPW to fund the establishment of at least 0.48 acre of new floodplain wetland habitat along Lagunitas Creek in association with the MMWD *Lagunitas Creek Salmon Winter Habitat Enhancement program* (Appendix I). This program seeks to address a possible limiting factor to the survival of juvenile coho salmon—a lack of suitable winter habitat along the creek—by establishing new side channels and backwater wetlands on selected reaches of the floodplain.
- Wetland filling work shall not start until a suitable wetland mitigation site has been selected and a Wetland Mitigation and Monitoring Plan for the site has been prepared and approved by the Corps, RWQCB, and CDFG. Mitigation construction work under the plan shall be completed in accordance with a timetable agreed to by these three agencies.
- DPW shall minimize temporary disturbances to streambanks to the smallest amount feasible needed to accomplish culvert replacement, bank stabilization, and slope repair work. DPW shall restore disturbed areas to predisturbance conditions after temporary project activities are complete. Seed mixes for stabilization of disturbed areas shall consist of species native to Marin County. Fertilizers shall not be applied with any seeding or as part of hydroseed mixes.
- Disturbance of stream channels in the project site shall be limited to the minimum necessary to complete proposed drainage improvement activities. Riparian vegetation shall be trimmed (and not removed) where feasible, and where removal is necessary, should be at the minimum necessary to complete work. Stream channels shall be revegetated with appropriate riparian vegetation after work activities are completed. All revegetation activities shall be approved by CDFG prior to restoration activities being completed.
- A qualified biologist shall be present during any work occurring within wetlands or streams.
- DPW shall implement all water quality protection measures contained in the SWPPP (BKF 2009) to prevent the direct and indirect release of soil and other construction materials into wetlands and streams.

Impact 4.2.9 - Implementation of the Proposed Project Could Impact Special-status Invertebrate Species Potentially Present within the Project Disturbance Zone

Marin Elfin Butterfly. Construction activities would potentially disturb populations of the species host plant, spoon-leaved stonecrop. No populations of their host plant were identified in the project disturbance zone during field surveys. However, populations were found adjacent to the disturbance zone and could become established within the disturbance zone. Impacts to populations of the host plant, if present during project implementation, could occur during grading activities along the edge of SFDB. Removal of populations of the host plant could significantly affect population numbers of this species. These impacts would be considered significant; however, with the implementation of the mitigation measures described below, impacts would be reduced to a less than significant level.

San Francisco Foxtail Damselfly. Implementation of the proposed project would not lead to direct impacts to San Francisco foxtail damselflies. This species breeds in shallow pond areas in stream channels that will not be directly affected by the project. The project could cause indirect impacts to this species as a result of grading and earthmoving activities which have the potential to release sediment and other pollutants that could eventually reach Lagunitas Creek and degrade aquatic habitat. However, the project's SWPPP includes a range of erosion control and water quality BMPs to be implemented during and after construction in accordance with RWQCB and Marin County standards. Implementation of these BMP measures would prevent the release of sediment and pollutants into Lagunitas Creek. Therefore, no impacts to this species are anticipated as a result of project implementation.

Myrtle's Silverspot Butterfly. Construction activities would potentially disturb populations of the species host plant, western dog violet. No populations of their host plant were identified in the project disturbance zone during field surveys, however, populations were found adjacent to the disturbance zone and could become established within the disturbance zone. Impacts to populations of the host plant, if present during project implementation, could occur during grading activities along the edge of SFDB. Removal of populations of the host plant could significantly affect population numbers of this species. These impacts would be considered significant. However, with the implementation of the mitigation measures described below, impacts would be reduced to a less than significant level.

California Freshwater Shrimp. No construction activities are proposed directly in habitat for the California freshwater shrimp (Lagunitas Creek). The project could cause indirect impacts to this species as a result of grading and earthmoving activities which have the potential to release sediment and other pollutants that could eventually reach Lagunitas Creek and degrade aquatic habitat. However, the project's SWPPP includes a range of erosion control and water quality BMPs to be implemented during and after construction in accordance with RWQCB and Marin County standards. Implementation of these BMP measures would prevent the release of sediment and pollutants into Lagunitas Creek. Therefore, no impacts to this species are anticipated as a result of project implementation.

Mitigation Measures

DPW shall implement the following mitigation measures to reduce impacts to special-status butterfly species to a less than significant impact:

- A qualified botanist shall conduct preconstruction surveys of the project site for the host plants of the Marin elfin butterfly and Mrytle's silverspot butterfly prior to project implementation. Identified plant populations shall be marked prior to project construction for avoidance during project construction. If a plant population(s) cannot be feasibly avoided, individual plants shall be relocated by a qualified botanist to a location adjacent to the project disturbance zone.

Impact 4.2.10 - Implementation of the Proposed Project Could Impact Special-status Amphibian and Reptile Species Potentially Present within the Project Disturbance Zone

Implementation of the proposed project could potentially impact individual northwestern pond turtles, California red-legged frogs, and foothill yellow-legged frogs if present within stream channels during drainage improvements. No proposed construction activities are proposed directly within Lagunitas Creek, which is identified as habitat for these species. However, grading and earthmoving activities associated with work activities have the potential to release sediment and construction materials that could eventually reach Lagunitas Creek. DPW has committed to implement standard construction best management practices as part of the proposed project, including conducting project activities during the summer non-rainy season, and using standard erosion control measures. Implementation of these measures would prevent the release of sediment and construction materials into Lagunitas Creek. These species could be present in larger streams tributary to Lagunitas Creek, and direct mortality of individual or small populations of these species could occur during project activities. Impacts to these species would constitute a significant impact. However, with the implementation of the mitigation measures described below, impacts would be reduced to a less than significant level.

Mitigation Measures

- Prior to work beginning in any areas containing suitable habitat for northwestern pond turtle or foothill yellow-legged frog, a qualified biologist shall conduct focused preconstruction surveys for northwestern pond turtles and foothill yellow-legged frog.
- Preconstruction surveys for California red-legged frog shall be completed within 48 hours prior to commencement of any earth-moving activity, construction, or vegetation removal, whichever comes first. The preconstruction survey shall include two nights of nocturnal surveys in areas of suitable habitat. The biologist performing the preconstruction survey must hold a federal 10(a)(1)(A) permit for California red-legged frog or be considered by USFWS to be a “Service-approved” biologist.
- If any of the above special-status amphibian and reptile species are encountered during the surveys, all work in the work area shall be placed on hold while the findings are reported to the CDFG and USFWS and it is determined what, if any, further actions must be followed to prevent possible take of this species.
- Where construction will occur in habitats where red-legged frogs, foothill yellow-legged frogs, and northwestern pond turtles are potentially present, work areas shall be fenced in a manner that prevents equipment and vehicles from straying from the designated work area into adjacent habitat areas. An authorized biologist shall assist in determining the boundaries of the area to be fenced in consultation with the DPW, USFWS, and CDFG. All workers shall be advised that equipment and vehicles must remain within the fenced work areas.
- The authorized biologist shall direct the installation of the fence and shall conduct biological surveys to move any individuals of these species from within the fenced area to suitable habitat outside of the fence.
- Exclusion fencing shall be at least 24 inches in height. The type of fencing must be approved by the authorized biologist, the USFWS, and CDFG.
- If at any time individuals of these species are found within an area that has been fenced to exclude these species, activities shall cease until the authorized biologist moves the individuals.
- If any of these species are found in a construction area where fencing was deemed unnecessary, work shall cease until the authorized biologist moves the individuals. The authorized biologist in consultation with USFWS and CDFG shall then determine whether additional surveys or fencing are needed. Work may resume while this determination is being made, if deemed appropriate by the authorized biologist.
- Clearance surveys shall occur on a daily basis in the work area. Any individuals of these species found during clearance surveys or otherwise removed from work areas shall be placed in nearby suitable, undisturbed habitat. The authorized biologist shall determine the best

location for their release, based on the condition of the vegetation, soil, and other habitat features and the proximity to human activities.

- The authorized biologist shall have the authority to stop all activities until appropriate corrective measures have been completed.
- To ensure that diseases are not conveyed between work sites by the authorized biologist or his or her assistants, the fieldwork code of practice developed by the Declining Amphibian Populations Task Force[3] shall be followed at all times. Project activities shall be limited to daylight hours, except during an emergency, in order to avoid nighttime activities when red-legged frogs may be present.
- Traffic speed should be maintained at 15 miles per hour or less in the work area.
- BMPs and erosion control methods, as outlined in the Project's SWPPP, shall be implemented. These BMPs include revegetation of all bare soil prior to the rainy season to prevent an increase in sediment entering waterways. The Project's SWPPP shall be subject to the review and approval of the USFWS and CDFG.

Impact 4.2.11 - Implementation of the Proposed Project Could Impact Special-status Fish Species

The proposed project would not directly impact salmonids in Lagunitas Creek since no work is proposed in the creek channel. The project could potentially cause direct impacts to salmonids in tributaries to Lagunitas Creek where existing culverts beneath SFDB would be removed and replaced with upgraded culverts. However, none of the tributaries with culverts that currently allow relatively unimpeded passage by all age classes of salmonids would be affected by this work (i.e., the Cheda Creek, McIssac Creek, and Devil's Gulch tributaries). Culvert replacement work would be limited to other ephemeral and intermittent tributaries with small culverts that do not allow salmonid passage or that may allow very limited opportunities for passage in the winter and spring. Based on the time period for the proposed work (late spring - fall) the culvert replacement would occur when there is typically little or no flow in the ephemeral and intermittent tributaries. However, in a wetter than normal rainfall year or following a significant late season storm or series of storms, flow could occur in the tributaries resulting in the potential for salmonid take. Therefore, the culvert replacement work in the tributaries could cause a significant direct impact to salmonids.

The proposed project has the potential to affect water quality in Lagunitas Creek as a result of grading, earthmoving, tree removal, and culvert replacement work. The potential effects are of particular concern given the presence of the three federally listed salmonid species in the creek. Project construction has the potential to increase silt and sediment in the creek, cause turbidity, and release other contaminants (oil and grease, hydrocarbons, metals) that could adversely affect the water quality of the spawning and rearing habitats downstream, which may impair salmonid egg incubation, feeding, respiration, or behavior. Inadvertent releases of pollutants during construction, including fuels and other petroleum-based products and wet or uncured cement/concrete, can be toxic to salmonids and other aquatic organisms. Conversely, post-project design improvements have the potential to improve SFDB's effects upon water quality in Lagunitas Creek and therefore, be beneficial to salmonids. These design improvements are

---

[3] www.fws.gov/ventura/speciesinfo/protocols/docs/DAFTA.pdf

expected to reduce the volume of sediment and provide for improved uptake of oil and grease, hydrocarbon, metals, and other toxins from road runoff.

Indirect Impacts to Salmonids during Construction. The proposed project could have the potential to cause indirect impacts to salmonids as a result of the following construction-related activities: (1) grading and other earthmoving equipment; (2) slope repair along the upper stream bank of Lagunitas Creek at Station #270+25; (3) tree removal; (4) culvert replacement work; (5) construction equipment operation, maintenance and storage; and (6) fuel and other materials storage. Each of the potential impacts to salmonids from these construction activities is discussed below:

1. **Impacts to salmonids due to temporary changes in the volume and timing of storm water runoff into Lagunitas Creek during construction.** During the construction period, the locations and volume of runoff from the construction zone could be altered due to flow across temporarily altered grading zones and across areas where fill and other construction materials are stored. Temporary alterations of the road surface and adjacent grading zones could also modify runoff patterns. During the construction period (late spring – early fall), salmonids in Lagunitas Creek are in the juvenile rearing and out-migration phases of their life cycles and are dependent on the maintenance of adequate baseflows in the creek.

   Construction work under the proposed project is unlikely to affect Lagunitas Creek baseflows because the work will be occur in the dry season when rainfall is minimal. Changes to surface runoff from the project site during this period would be insufficient to appreciably influence stream flows. Therefore, the project’s effects on the volume and timing of storm water runoff during the construction period would have a less-than-significant impact on salmonids in Lagunitas Creek.

2. **Impacts to salmonids due to temporary water quality degradation in Lagunitas Creek during the construction period.** During construction, the proposed project would have the potential to cause significant adverse impacts to salmonids due to runoff and/or direct discharges of contaminated water from the construction site. Project construction would have the potential to discharge silt and sediment into Lagunitas Creek, and to cause high levels of turbidity. Project construction work could also result in the release of oil and grease, hydrocarbons and metals. All these contaminants could adversely affect the water quality of spawning, rearing, feeding, and migration habitats downstream, which may impair salmonid egg incubation, rearing, feeding, respiration, or behavior (Table C). Inadvertent releases of fuels and other petroleum-based products and wet or uncured cement/concrete, could be toxic to salmonids and other aquatic organisms (Table C).[4]

   The SGVSEP recognizes protection of salmonid habitat from increases in fine sediments, turbidity, metals and other runoff-associated pollutants as a high priority management goal for San Geronimo Creek. This recommendation would also be highly relevant to Lagunitas Creek due to the presence of the same salmonid habitat concerns.

---

[4] Conversely, post-project design improvements have the potential to improve SFDB’s effects upon water quality in Lagunitas Creek and, therefore, be beneficial to salmonids (see discussion on pg. 59).

Table C: Summary of Potential Water Quality Concerns for Salmonids

Parameter:	Fine Sediment & Turbidity	Water Temperature Increase
Effects on salmonids	High concentrations can injure or kill salmonids by the following effects: • clogging and abraiding gills; • adhering to egg chorion - suffocating eggs and alevin; entomb different life stages; • preventing invertebrate larval development and emergence; and • altering water chemistry by absorption of chemicals and increasing toxicity levels. High concentrations can adversely affect salmonid reproduction and populations by the following effects: • reducing photosynthesis, primary production and associated higher trophic level food sources; • increasing bedloads - filling pools and riffles thereby reducing rearing habitat quality; • increasing scour, thereby reducing spawning gravel areas; • collecting sediment in interstitial spaces in spawning gravels, decreasing gravel stability, changing inter-gravel permeability thereby reducing water flow between gravels and decreasing DO levels; • adversely affecting emergence and rearing due to suffocation of eggs, blocking fry emergence, changes in timing of fry emergence; • increasing stream water temperature in gravels and pools due to loss of bottom reflectivity; • reducing the value of downstream estuarine habitat for juveniles; and • interfering in homing ability of adults.	Water temperature increases can adversely affect salmonids by the following effects: • increasing susceptibility of salmonids to diseases; • adversely affecting egg hatching timing; • increasing algal and phytoplankton production thereby decreasing dissolved oxygen levels which can be fatal to salmon; • changing ambient stream temperatures beyond the ranges suitable for salmonid migration, rearing and emergence; and • promoting dominance by warm water fish over salmonids.
Existing sources along SFDB	• Runoff from the road surface and unpaved road shoulders. • Road maintenance activities: pothole repairs, surface cleaning, shoulder maintenance, etc. • Runoff from unpaved roadside parking areas and pullouts. • On-going erosion along streambanks from: culvert outflows, banks beneath “shotgun” culverts,” bank erosion at Station 270+25. • Failure of existing degraded pavement leading to erosion and increase sedimentation. Fractured pavement is causing the discharge of asphalt binder and aggregate into the receiving watershed. • Debris plugging of culverts causing road bank failures.	None likely.

Parameter:	**Sediment & Turbidity**	**Water Temperature Increase**
Effects of the project on these existing sources	The project will reduce sedimentation from existing sources along SFDB as follows: • repaving of road and paving of shoulders; installation of a 2-inch permeable friction course overlay over the entire road surface; • installation of larger diameter culverts (many at 100-year storm capacity), thereby reducing frequency of flooding across the road surface, reducing influxes of sediments into Lagunitas Creek; • installation of a new inboard road swale/sand filter designed to trap sediment; • seeding/planting of a natural vegetative buffer where the road slopes toward the creek; stabilization of slopes; • closure of unpaved parking areas and pullouts; paving of remaining pullouts; • installation of riprap and erosion fabric/seeding beneath actively eroding culvert outlets; • installation of the retaining wall/bank stabilization at Station 270+25; and • retro-fitting “shotgun” culverts with downspouts and energy dissipaters.	No Effect.
Possible new sources during construction	• Exposed slopes and soils during grading and stockpiles; temporary slope destabilization. • Proposed tree removal at Station 270+25; proposed tree removal under Option A – disrupting root binding effect on soil and possible slope destabilization. • Runoff from equipment staging and storage areas. • Runoff from vehicle fueling and maintenance areas. • Dust emissions during construction. • Runoff from saw-cutting of the pavement. • Discharge of particulates during crack and seat and asphalt grinding. • Discharge of asphalt during repaving. • Temporary dewatering.	• Increased sedimentation can lead to increased water temperatures (see above).
Possible new sources following construction	None.	• Removal of 8 redwoods and bay trees for slope repair at Station 270+25 may decrease stream shading and cause localized temperature increases, depending on orientation of the individual trees with respect to Lagunitas Creek. However, this impact is not significant because: (1) only

Parameter:	**Sediment & Turbidity**	**Water Temperature Increase**
		4 of the affected trees are large enough to have possible canopy shade affects on the stream; (2) based on the orientation of the 4 trees relative to the creek, they are likely to provide appreciable shade only during mid-late afternoon periods. • Removal of 8 redwoods and on oak under Option A may also decrease stream shading. However, this impact is not significant because only 3 of the affected trees' orientation could have possible canopy shade affects on the stream and this effect is limited to the early-mid morning.
Mitigation measures for the new sources	• Storm Water Pollution Protection Plan (SWPPP) includes wide range of measures for controlling sediment and turbidity during construction. • Highly effective sediment removal for sand filtered bioswales; fine sediment removed through vegetative filtering and percolation-uptake through sand medium; course to medium sediments removed through detention effects and vegetative filtering. • Road maintenance activities to be conducted in accordance with SWMP performance standards and FishNet 4C Roads Manual.	• Mitigation for shade not needed since the effects are insignificant. Nevertheless, under Mitigation Measure Bio-8a (see below), native trees will be planted along the east side of Lagunitas Creek downstream from Peters Dam. As these trees mature, they will provide new shade benefits to the creek in this area.

Parameter:	**Pesticides, Herbicides & Fungicides**	**Fertilizers, Nutrients**	**Other Constituents: Hydrocarbons (gasoline and other petroleum products); Metals (e.g., Pb, Cu, Ca, Zn, Hg)**
Effects on Salmonids	• Toxins associated with these chemicals, in particular chlorpyrifos, diazinon and malathion, can be highly toxic to salmonids as well as the invertebrate organisms upon which they feed. Diazinon can disrupt antipredator and homing behaviors in chinook. • Malathion at sub-lethal levels can adversely affect swimming behavior and survival of salmonids.	• Influxes of fine organic sediment can have same affect as inorganic sediment – degrading spawning gravels and dissolved oxygen in the interstitial zones – decrease spawning success, increase egg and alevin mortality. • Nutrient enrichment can lead to reduced dissolved oxygen which can adversely affect redds, egg and alevin survival, and result in reduced size, viability and fitness of salmonid juveniles.	• PAH, PCB can bio-accumulate in sediment-dwelling invertebrates and then taken up by salmonids – can lead to changes in immune functions, increased disease, neurotoxic effects. • Metals at various concentrations can have lethal to sublethal effects on salmonid populations.

Parameter:	**Pesticides, Herbicides & Fungicides**	**Fertilizers, Nutrients**	**Other Constituents: Hydrocarbons (gasoline and other petroleum products); Metals (e.g., Pb, Cu, Ca, Zn, Hg)**
Existing sources and estimated/measured levels	None likely - roadside maintenance is conducted by DPW and is limited to mechanical methods.	• Fine organic debris and other nutrients on road surface will discharge to creek during storms. • Emergency hydroseeding of slopes following erosion events or wildfires could result in nutrient runoff into Lagunitas Creek if the hydroseed mix contains fertilizer.	• Oil, grease other hydrocarbons on the road surface – particularly those that accumulated over the dry season and get discharges in the first storm events of the season. • Exhaust emissions from vehicular traffic – metals and hydrocarbons. • Degradation of existing asphalt - fractured pavement is causing the discharge of asphalt binder and may be releasing toxic metals into the receiving watershed.
Effects of the project on these existing sources	No effect.	• Larger diameter culverts should reduce frequency of flooding across the road surface, reducing influxes of nutrients. • Effective removal of organics from sand filtered bioswales. • PFC is effective in reducing Total Kjeldahl nitrogen from road surfaces for short term following application but about the same as other road surfaces over the long-term.	• Repaving of road and paving of shoulders; installation of a 2-inch permeable friction course overlay over the entire road surface will eliminate fractured pavement effect. • Effective removal of oil and grease and metals from sand-filtered bioswales.
Possible new sources during construction	None.	• Hydro-seeding of exposed slopes could lead to nutrient runoff if hydroseed mix contains fertilizer.	• Construction equipment operation; fueling and fuel storage; solvents used during cleaning of equipment. • Discharge of particulates during crack and seat and asphalt grinding. • Discharge of asphalt during repaving. • Temporary dewatering. • Discharges from signing and striping activities.

Parameter:	**Pesticides, Herbicides & Fungicides**	**Fertilizers, Nutrients**	**Other Constituents: Hydrocarbons (gasoline and other petroleum products); Metals (e.g., Pb, Cu, Ca, Zn, Hg)**
Possible new sources following construction	• Roadside vegetation management. • If pressure-treated wood is used for the roadside retaining walls, there will be a potential for leaching of copper, chromium and arsenic into stormwater runoff.	None.	• If pressure-treated wood is used for the roadside retaining walls, there will be a potential for leaching of copper, chromium and arsenic into stormwater runoff. • Long-term degradation of new asphalt roadbed – leaching of hydrocarbons and toxic metals.
Mitigation measures for the new sources	• Perform roadside vegetation management in accordance with SWMP performance standards and BMP under the Fish Net 4C Roads Manual. • Use alternative materials to pressure treated wood for roadside retaining walls.	• Hydroseed mixes shall not contain fertilizer. No other fertilizers will be applied except in planting holes for initial tree re-plantings.	• Storm Water Pollution Protection Plan (SWPPP) includes wide range of measures for discharges of hydrocarbons during construction; also includes target metals associated with sediment runoff. • Perform road maintenance BMPs in accordance with performance standards in SWMP, and in accordance with Fish Net 4C Roads Manual. • Use of rubberized asphalt concrete (RAC) significantly reduces toxic metal leachates associated with asphalt; when used in combination with roadside treatment swales (as will occur under the proposed project), all toxicity can be eliminated through soil filtration (see Section 4.6 below). • Use alternative materials to pressure-treated wood for roadside retaining walls.

Complex relationships exist between various categories of water quality contaminants and salmonid life cycles. The particular relationships relevant to the proposed project are succinctly summarized in Table C. The tables analyze each category of contaminant with respect to the following:

- Potential effects on salmonids in Lagunitas Creek
- The probable existing sources of the contaminant along the SFDB corridor
- The potential effects of the proposed project on these existing sources
- The potential for the proposed project to create new sources of the contaminant during construction
- The potential for the proposed project to create new sources of the contaminant under post-construction conditions
- Suitable mitigation measures for avoiding and/or minimizing impacts from the contaminant

3. **Impacts to salmonids due to construction-related disturbance of riparian vegetation.** Although permanent removal of riparian vegetation is limited to eight trees under the proposed project and an additional nine trees under Option A, there is the potential for the additional loss of other riparian trees and shrubs due to inadvertent damage during construction. Such additional loss or damage to riparian vegetation could cause significant adverse impacts to salmonids by resulting in the following: (1) new streamside erosion and associated sedimentation in the Lagunitas Creek; (2) loss of stream shading and associated water temperature increases in the creek; and (3) reduction in large woody debris in the creek.

Post-project Impacts to Salmonids. The proposed project could have the potential to result in indirect impacts to salmonids following completion of the work as a result of changes in the quality, quantity, and pattern of stormwater runoff, as well as changes in riparian vegetation. The potential for each of these impacts to occur is summarized below:

1. **Impacts to salmonids due to post-project hydromodification of Lagunitas Creek.** The proposed project could have the potential to cause hydromodification of Lagunitas Creek (i.e., changes in the volume, velocity, and duration of runoff that could cause adverse changes in aquatic ecosystems, streambank erosion, and other physical modifications to the creek). Hydromodification under the proposed project could result from an increase in the total impervious surface area (TIA) and/or an increase in the effective (connected) impervious area (EIA) in and along SFDB. Such hydromodification could adversely impact salmonids by causing the following effects: (1) channel downcutting and incision resulting in a separation of the channel from important feeding habitat and juvenile rearing habitat on the adjacent floodplain and off-channel areas; (2) reductions in large woody debris recruitment; (3) loss of riparian vegetation and associated food sources; (4) scouring and/or fine sediment deposition of salmonid redds thereby destroying incubating eggs and alevins (larvae); and (5) loss of habitat suitability within the main channel due to excessive flow velocities (Stillwater Sciences 2009).

   Based on runoff calculations by project engineers, the proposed project will not result in hydromodification of Lagunitas Creek.[5] The total impervious area (TIA) under the proposed

---

[5] Runoff volume analysis provided by BKF Engineers and Baseline Environmental Consulting, March 2010.

project would increase by approximately 7 percent from approximately 655,000 square feet to 703,000 square feet, primarily due to paving of unpaved pullouts. Option A would add an additional 8,540 square feet of paved shoulder. The paved pullouts would be designed to avoid direct connection to Lagunitas Creek. Stormwater falling on the pullouts would percolate through the asphalt, a porous base, and be collected in a perforated pipe for discharge to the nearest culvert which may include a weir or orifice structure to reduce the discharge rate. Therefore, much of the additional impervious area under the project would probably not be considered as part of the EIA.

As a result of the increased impervious surface, the runoff volume generated from the 2-year, 24-hour storm would increase slightly from 331,000 cubic feet in the existing condition to 333,500 cubic feet for the project (an increase of 2,500 cubic feet). Two-year peak flows changes from individual culverts will range from -0.56 percent (i.e., a reduction in peak flow) to 0.58 percent. For 10-year peak flows, the calculated range is -0.90 percent to 0.93 percent. None of these changes are hydrologically significant.

2. **Impacts to salmonids due to post-project changes in the quality of storm water runoff into Lagunitas Creek.** As summarized in Table C, the proposed project could potentially cause a wide range of water quality impacts due to roadway and road shoulder runoff containing pollutants associated with vehicular traffic on the road, road maintenance activities, and leachates from roadway asphalt and retaining walls (if the walls were to be constructed of treated wood). The major categories of pollutants from these sources are: fine sediments and turbidity - pesticides, herbicides and fungicides; fertilizers and nutrients; hydrocarbons and metals. All these pollutants could adversely affect the water quality of spawning, rearing, feeding, and migration habitats downstream, which may impair salmonid egg incubation, rearing, feeding, respiration, or behavior (Table C). Inadvertent releases of fuels and other petroleum-based products and wet or uncured cement/concrete, could be toxic to salmonids and other aquatic organisms (Table C).

   A potential new source of water quality pollutants that the project could generate would be from the roadway retaining walls or the bank retaining wall at Station #270+25 if these walls were to be constructed with pressure treated wood. Pressure treated wood could be a source of copper, chromium, and arsenic leachates that could enter Lagunitas Creek. These metals at various concentrations can have lethal to sublethal effects on salmonid populations. However, under the proposed project both types of retaining walls will be constructed using concrete. Therefore, the retaining walls will not be a source of metal leachates.

   Major design elements of the proposed project have the potential to improve the quality of runoff from SFDB for several of the categories of pollutants cited above. Based on these design elements, the project should be beneficial to salmonids in Lagunitas Creek from a water quality perspective, as summarized below:

   - Degraded roadway and shoulders. The repaving of existing degraded road and paving of unpaved shoulders should reduce these existing sources of fine sediment, nutrients, metals, and hydrocarbons. PFC is particularly effective in reducing in Total Kjeldahl nitrogen[6] from road surfaces for the short-term following application. The use of impervious rubberized asphalt concrete (RAC) significantly reduces toxic metal leachates associated with asphalt; when used in combination with roadside treatment swales (as

---

[6] "Kjeldahl nitrogen" is all organic nitrogen in the water - i.e., the sum of ammonia (NH_3) and ammonium (NH_4^+).

will occur under the proposed project), toxicity could potentially be eliminated through soil filtration.

- Road surface flooding. The installation of larger diameter culverts (many at 100-year storm capacity) should reduce the frequency of flooding across the road surface, reducing influxes of sediments, nutrients, metals, and hydrocarbons into Lagunitas Creek.[7] Additionally, the installation of new inboard road sand filter bio-swales should reduce the volume of sediment and nutrients that currently discharges across the roadbed and shoulders directly into Lagunitas Creek.
- Unstable slopes. The establishment of a natural vegetative buffer where the road slopes toward the creek, and the stabilization of other slopes along the road should reduce the sediment generated from these active erosion zones.
- Parking areas and turnouts. The closure of unpaved parking areas and pullouts, and the paving of remaining pullouts with porous asphalt, should reduce these existing sources of sediment.
- Culvert outlets along the upper bank of Lagunitas Creek. The installation of riprap and erosion fabric/seeding beneath actively eroding culvert outlets, and the retrofitting of existing “shotgun” culverts with downspouts and energy dissipaters, should reduce these existing sources of fine sediment.
- Eroding bank at Station #270+25. The installation of the retaining wall and bank stabilization at this location, should reduce this source of direct discharge of fine sediment.

The design elements listed above should all contribute to a general improvement of the quality of stormwater discharge from SFDB. However, over time, the effectiveness of these design elements could decline in the absence of proper long-term maintenance. Suitable long-term maintenance guidelines are provided in The FishNet 4C Program, a County-based salmonid protection and restoration program of the six Central California Coastal Counties (4C) of Mendocino, Sonoma, Marin, San Mateo, Santa Cruz, and Monterey. The FishNet 4C Program provides BMPs relating to protecting water quality, aquatic habitat, and salmonid fisheries during maintenance activities, and incorporating aquatic habitat protections into land use regulations and policies. The program has developed specific county road maintenance guidelines for protecting salmonid habitat (FishNet 4C et al. 2004). In the absence of a proper long-term maintenance program as recommended under the FishNet 4C Program, the proposed project could cause a significant adverse impact to salmonids in Lagunitas Creek due to a gradual decline in runoff water quality under post-project conditions.

3. **Impacts to salmonids due to post-project changes in riparian habitat along Lagunitas Creek.** Under the proposed project, eight redwood and bay trees would be removed for the bank stabilization work at Station #270+25. An additional eight redwood trees and one oak tree would be removed under Option A. All these trees occur along the upper bank of the creek or along the SFDB roadside and can be considered a part of the riparian corridor. As such, their loss could cause adverse impacts to salmonids by resulting in the following: (1) new streamside erosion and associated sedimentation in the Lagunitas Creek; (2) loss of stream shading and associated water temperature increases in the creek (reducing habitat

---

[7] An ancillary benefit of the culvert upgrading is a potential improvement in the ability of tributaries to supply gravel, cobble and woody debris to Lagunitas Creek.

suitability for salmonid spawning, rearing and emergence); and (3) reduction in large woody debris in the creek (reducing feeding and rearing habitat suitability). Each of these potential impacts is examined below:

- **Erosion.** The tree removal work at Station #270+25 would have a less-than-significant impact on salmonids with respect to erosion and sedimentation. This location is characterized by an actively eroding bank that is threatening SFDB; the purpose of the work is to remedy this erosion problem by constructing a bank stabilizing retaining wall. In the case of the Option A work, all the trees that would be removed are located along the roadside rather than below the top of bank. Although the affected trees are all large enough that their root systems likely extend well below the tops of banks, the removal work is, nevertheless, not expected to generate new sources of erosion and sedimentation. The remnant root systems below the tops of bank should continue to serve in a bank holding capacity for several decades as redwood roots are very resistant to decay.
- **Loss of stream shading.** Only four of the affected trees under the proposed project are large enough to have possible canopy shade affects on the stream. Moreover, based on the orientation of the four trees relative to the creek, they are likely to provide appreciable shade only during mid-late afternoon periods. Only three of the affected trees under Option A are oriented to provide possible canopy shade affects on the stream and this effect is limited to the early-mid morning. Therefore, this impact is less-than-significant.
- **Loss Large Woody Debris.** The majority of the trees that would be removed under the proposed project and under Option A are large enough that they could occasionally be a source for the recruitment of large woody debris into Lagunitas Creek. Large woody debris is recognized as a limiting factor for over-winter rearing of juvenile salmonids in Lagunitas Creek (Stillwater Sciences 2008). Therefore, the loss of any existing sources may be considered a significant adverse impact to salmonids.

Mitigation Measures

1. A Storm Water Pollution Protection Plan (SWPPP), in accordance with the State Water Resources Control Board, National Pollution Discharge Elimination System (NPDES) Construction General Permit, shall be prepared and implemented. The SWPPP shall include a wide range of Best Management Practices (BMPs) for controlling sediment and turbidity during construction. These BMPs should include the following measures to avoid impacts to salmonids:

    - Work below the tops of the creek bank, including culvert replacement work in the tributaries and bank repair along Lagunitas Creek, shall be allowed only during the period from June 15 to October 15 during low flow conditions. Culvert replacement work in a tributary shall occur only when there is no flow in the tributary or when in the opinion of the project biologist the flow is too low to allow salmonid passage through the culvert. Low tributary flows will be temporarily captured and diverted downstream from the work zone.
    - No fill material, including asphalt or concrete, shall be allowed to enter the stream. Any concrete structures (such as culvert headwall construction) below the tops of banks shall be poured in tightly sealed forms and shall not be allowed contact with surface waters until the cement has fully cured. Poured concrete shall be excluded from the wetted channel for a period of 30 days after it is poured. During that time, the poured concrete

shall be kept moist, and runoff from the concrete shall not be allowed to enter the creek. Commercial sealants may be applied to the poured concrete surface in locations where the exclusion of water flow for a long period is difficult. If a sealant is used, water shall be excluded from the site until the sealant is dry and fully cured according to the manufacturer's specifications.

- Water that contacts wet concrete and has a pH greater than 9.0 shall be pumped out and disposed of outside the creek channel.
- No substances toxic to aquatic life shall be discharged into Lagunitas Creek or its tributaries.
- There shall be no coffer dams or dewatering of Lagunitas Creek.
- There shall be no material deposition nor other channel disturbance below the ordinary high water line of Lagunitas Creek.
- Hydroseed mixes used to stabilize disturbed areas shall not contain fertilizers.
- Equipment maintenance and fueling areas shall be located at least 100 feet away from the creek bank. Fueling must be behind a containment barrier that shall prevent any spilled or leaked fuel from running into the creek. All equipment servicing must occur within designated areas. All motorized equipment used during construction or demolition activities shall be checked for oil, fuel, and coolant leaks prior to initiating work. Any equipment found to be leaking fluids shall not be used in or around aquatic habitat features in order to minimize the chances of contaminating the habitat and potentially impacting sensitive species, particularly salmon and steelhead.
- The project's contractor shall prepare an emergency response and cleanup plan prior to beginning work at the site. The plan shall detail the methods to be used to contain and cleanup spills of petroleum products or other hazardous materials in the work area.
- All maintenance crew personnel shall receive environmental training about the sensitive nature of the special-status species in the project vicinity. This training shall include descriptions of the special-status species and all project measures in place to protect the species during construction. Crews shall also be informed to stop all work and notify their supervisor or the project biologist if special-status species are observed within the project site.

- Equipment maintenance and fueling areas shall be located at least 100 feet away from the creek bank. Fueling must be behind a containment barrier that shall prevent any spilled or leaked fuel from running into the creek. All equipment servicing must occur within designated areas. All motorized equipment used during construction or demolition activities shall be checked for oil, fuel, and coolant leaks prior to initiating work. Any equipment found to be leaking fluids shall not be used in or around aquatic habitat features in order to minimize the chances of contaminating the habitat and potentially impacting sensitive species, particularly salmon and steelhead.
- The project's contractor shall prepare an emergency response and cleanup plan prior to beginning work at the site. The plan shall detail the methods to be used to contain and cleanup spills of petroleum products or other hazardous materials in the work area.

2. Post-project road maintenance, including roadside bioswales, shall be conducted in accordance with a long-term Storm Water Management Plan (SWMP) prepared prior to the

start of construction in accordance with RWQCB and Marin County Stormwater Pollution Prevention Program (MCSTOPPP) standards, and approved by the RWQCB and Marin County. The SWMP shall also incorporate county road maintenance BMPs contained in the FishNet 4C Roads Manual.

3. In order to avoid damage to existing riparian trees in the vicinity of the construction site, all native trees with trunks adjacent to excavation areas, equipment staging and material storage areas, as well as other areas with concentrated activity by construction equipment, shall be protected with temporary construction fencing. The fencing shall be placed at the edge of the construction zone as close as feasible to the edge of the tree driplines. No construction work, storage of equipment or materials or other disturbance shall be allowed within the protected areas.

4. Marin DPW shall make available suitable cuttings from the tree removal work for use as woody debris and in bio-engineered structures along Lagunitas Creek in order to enhance salmonid habitat. The Marin DPW shall notify the signatories to the February 7, 2007 *Memorandum of Understanding for Woody Debris Management in Riparian Areas of the Lagunitas Creek Watershed* (Marin Municipal Water District, Marin County Open Space District, California Department of Parks and Recreation, National Park Service, and the Marin County Resource Conservation District – see Appendix J) of the availability of the wood, and the signatories shall notify Marin DPW if they have use for the woody debris and when they will collect the material. If the signatory agencies have not responded within 14 days Marin DPW shall dispose of the material in a legal manner.

Implementation of the above mitigation measures will reduce project impacts on salmonids to less-than-significant levels.

Impact 4.2.12 - Implementation of the Proposed Project Could Impact Wildlife Movement Corridors present within the Project Site

Open space areas (Samuel P. Taylor State Park and Golden Gate National Recreation Area) available on either side of SFDB within the project study area provide high quality habitat and a significant movement corridor for a variety of common and special-status wildlife species. The value of the wildlife movement corridor from habitats north and south of SFDB is somewhat reduced by the existence of SFDB traversing through and bisecting the project study area. The presence of SFDB and associated traffic likely restricts the movement of smaller mammals, amphibians, reptiles, and other less mobile wildlife species from moving between habitat areas north and south of the project site. However, existing culverts under the current roadway provide potential movement corridors for these species. Larger mammals, bird species, and other more mobile wildlife species likely travel between habitat areas with greater ease, but are still limited by traffic through the project study area. However, because SFDB is only a two-lane rural roadway, and traffic is much less constant than on other larger roadway types, wildlife species likely still utilize the project site to traverse between habitat areas north and south of SFDB.

Implementation of the proposed project would limit wildlife movement through the project area during the construction period and during daylight hours when construction activities are being conducted. However, the project will consist of rehabilitating SFDB, and the roadway will be similar in scale after rehabilitation as currently exists. Wildlife will likely continue to use the project site for a movement corridor after rehabilitation activities and the underlying culverts are complete.

Installation of bioswale structures along portions of the rehabilitated roadway would permanently remove some upgraded culverts from use as wildlife movement corridors by small mammals, amphibians, and reptiles. The loss of these culverts as potential wildlife movement locations would reduce the overall wildlife movement corridors available in the project study area. However, removal of these culverts would not be considered significant because a significant number of culverts would remain for wildlife movement after construction is complete and wildlife would continue to be able to cross SFDB if necessary. Additionally, the project will improve potential wildlife movement capacity for at least 26 of the 72 culverts that will be upgraded to larger diameters with the proposed project. Therefore, the impact on wildlife movement through the project area is considered less-than-significant, and no mitigation is required.

Impact 4.2.13 - Implementation of the Proposed Project Could Induce the Spread of Panic Veldt Grass and Other Non-Native Invasive Plants within the Project Site

Panic veldt grass and other invasive non-native plant species were identified along the edges of SFDB during botanical surveys conducted by Molly Boyes Botanical Consulting. Grading activities within the project disturbance zone have the potential to spread these invasive plant populations beyond their current locations. If these non-native invasive plant populations are spread into areas where native vegetation communities are present, they could out-compete native plants and special-status plant species potentially present. This impact would be considered significant. However, with the implementation of the mitigation measures below, impacts would be reduced to a less-than-significant level.

Mitigation Measures

Marin County DPW shall implement the following mitigation measures to avoid spreading invasive weed species in the project site and area:

- Prior to project implementation, DPW shall remove invasive weed populations listed by the California Invasive Plant Council (CalIPC) with ratings of A or B for impacts and invasiveness from areas of the project site where the ground surface will be disturbed and vegetation removed. Removal activities shall be conducted under the supervision of a botanist qualified in the identification of invasive weed species. Invasive weed removal shall be conducted prior to seed set (as determined by monthly spring surveys by a qualified botanist) to minimize the spread of invasive weed seeds in the project site. If it is not possible to remove weeds prior to seed set, measures to minimize the release of invasive weed seeds during weed removal (e.g., manual weed removal while placing weeds in plastic bags) shall be used.
- If necessary for erosion-control, only certified weed-free haybales shall be used.
- Construction equipment shall be cleaned prior to entering the project site to prevent the spread of invasive weeds from areas outside of the project site. Cleaning shall be achieved by rinsing equipment with water or using high-pressure air.
- When revegetation of bare soil surfaces is required, DPW shall utilize a native seed mix preapproved by CDFG and reviewed by CNPS.

5.0 LITERATURE CITED AND REFERENCES REVIEWED

AOU (American Ornithologists' Union). 1998. Check-List of North American Birds. Seventh Edition. American Ornithologists' Union, Washington, D.C. 829 pp.

Bakker, E. 1972. An island called California. Univ. of California Press, Berkeley.

Ball, L. C. 1998. Roosting behavior of pallid bats (*Antrozous pallidus*): energetic and ecological mechanisms. Dissertation, University of Nevada, Reno.

Barbour, M., S. Lyons, and M. Borchert. 2001. Coast Redwoods, A Natural and Cultural History. Cachuma Press, Los Olivos, California.

Barrett, M.E. and C.B. Shaw. 2006. Stormwater Quality Benefits of a Porous Asphalt Overlay. Report to the Texas Dept. of Transportation. July 27, 2006.

Beebe, F.L. 1974. Field studies of the Falconiformes of British Columbia. Brit. Col. Prov. Mus. Occas. Paper No. 17. 163 pp.

Bent, A. C. 1929. Life histories of North American shorebirds. Part 2. U.S. Natl. Mus. Bull. 146. 412pp.

______. 1937. Life histories of North American birds of prey. Part 1. U.S. Natl. Mus. Bull. 167. 409pp.

______. 1939. Life Histories of North American Gulls and Terns. Washington, D.C.: Washington Government Printing Office.

______. 1942. Life histories of North American flycatchers, larks, swallows, and their allies. U.S. Natl. Mus. Bull. 179. 555pp.

______. Life Histories of North American Wagtails, Shrikes, Vireos, and their Allies. U.S. National History Museum Bulletin 197.

______. 1958. Life histories of North American blackbirds, orioles, tanagers, and allies. U.S. Natl. Mus. Bull. 211. 549pp.

Bird, DM, DE Varland, and JJ Negro (eds.). 1996. Raptors in Human Landscapes – adaptations to built and cultivated environments. Academic Press. 396 pp.

BKF Engineers. 2009. Storm Water Pollution Prevention Plan for Sir Francis Drake Boulevard Improvements (From Shafter Bridge to Platform Bridge Road). Prepared for County of Marin, August 9, 2009.

Boe, K. N. 1965. Windfall after experimental cuttings in old-growth redwood. Proceedings of the Society of American Foresters. 1965:59-63.

Brattstrom, B.H. 1988. Habitat destruction on California with special reference to *Clemmys marmorata*: a perspective. pp. 13-24. *In*: H. F. DeLisle, P. R. Brown, B. Kaufman and B. M.

Brown, L., and D. Amadon. 1968. Eagles, hawks and falcons of the world. 2 Vols. Country Life Books, London. 945pp.

Bury, R.B. 1963. Occurrence of *Clemmys m. marmorata* in north coastal California. Herpetologica. 18:283.

_____. 1970. *Clemmys marmorata*. Catalogue of American Amphibians and Reptiles 100:1-3.

_____. 1972. Habits and home range of the Pacific pond turtle, *Clemmys marmorata*, in a stream community. Ph.D. Diss. Univ. California, Berkeley.

_____. Feeding ecology of the turtle, *Clemmys marmorata*. J. Herpetol. 20:515-521.

_____. Turtle of the month- *Clemmys marmorata* - a true western turtle (Pacific pond). Tortuga Gazette. 25(2):3-4.

Bury, R.B. and D.J. Germano. 1998. Annual deposition of scute rings in the western pond turtle, *Clemmys marmorata*. Chelonian Conserv. Biol. 3:108-109.

Bushnel, R. G. 1978. Effect of noise on wildlife. Introduction. pp. 7-22. *In*: Fletcher, J. L. and R. G. Bushnel (eds.). Effects of noise on wildlife. Academic Press, New York. 305 pp.

Buskirk, J.R. 1991. An overview of the western pond turtle, *Clemmys marmorata*. pp. 16-23. *In,* K.R. Beaman, F. Caporaso, S. McKeown and M.D. Graff (eds.). Proceedings of the First International Symposium on turtles and tortoises: conservation and California.

CalFlora, 2009. Information on California plants for education, research and conservation, [web application], Berkeley, California: The CalFlora Database, Available: http://www.calfl ora.org/. California Storm Water Quality Manuals and Handbooks. *http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm*.

California Department of Fish and Game. 2002. *Status Review of California Coho Salmon North of San Francisco*, Report to the CDFG. April 2002. 186pp.

Call, M. W. 1978. Nesting habits and survey techniques for common western raptors. U. S. Dep. Inter., Bur. Land Manage, Portland, OR. Tech. Note No. 316. 115pp.

Caltrans. 2005. Fisheries and Hydroacoustic Monitoring Program Compliance Report Addendum. San Francisco – Oakland Bay Bridge East Span Seismic Safety Project. May 2005. Office of Biological Sciences and Permits. Caltrans District 4.

Caltrans. 2008. Richardson Grove Operational Improvement Project; Draft Environmental Impact Report/ Environmental Assessment and Programmatic Section 4 (f) Evaluation. State of California Department of Transportation, District 1 - Humboldt County, California.

Carr, A. F. 1952. Handbook of turtles. The turtles of the United States, Canada, and Baja, California. Ithaca, New York: Comstock Publ. Assoc., Cornell Univ. Press. Ithaca, New York.

Casillas, E.B., B.B. McCain, M. Arkoosh and J.E. Steain. 1997. Estuarine *pollution and juvenile salmon health: Potential impact on survival.* p. 169–178. *In* R. L. Emmett and M. H. Schiewe (eds.), Estuarine and Ocean Survival of Northeastern Pacific Salmon. Proceedings of the Workshop. U.S. Department Commerce, National Oceanic and Atmospheric Administration, Technical Memorandum NMFS-NWFSC-29, Seattle, Washington

CDFG (California Department of Fish and Game). 2000. Guidelines for assessing effects of proposed developments on rare and endangered plants and natural communities. May 8, 2000.

_____. 2009a. California Natural Diversity Database. Rare Find 3, Version 3.0.5. Habitat Planning and Conservation Branch. Electronic Database.

_____. 2009b. Website address: www.dfg.ca.gov.

Chandler, S. K., J.D. Fraser, D. A. Buehler and J. K. D. Seegar. 1995. Perch trees and shoreline development as predictors of bald eagle distribution on Chesapeake Bay. Journal of Wildlife Management, v.59, n., 1995:325-332.

Cheatham, N.H. and J.R. Haller. 1975. An annotated list of California habitat types. University of California Natural Land and Water Reserve System. Unpublished manuscript.

Clapp, R. B., M. K. Klimkiewicz, and J. H. Kennard. 1982. Longevity records of North American birds: Gaviidae through Alcidae. J. Field Ornithology 53: 81: 208.

Clark, W. S., and R. C. Banks. 1992. The taxonomic status of the white-tailed kite. Wilson Bulletin 104: 571-570.

Coder, K. D. 2000. Soil Compaction Impacts on Tree Roots. University of Georgia Warnell School of Forestry Resources Extension Publication. July 2000 [online] http://www.forestry.uga.edu/efr

Cogswell, H. L. 1977. Water birds of California. Univ. California Press, Berkeley. 399pp.

Collier, G. 1968. Annual cycle and behavioral relationships in the red-winged and tricolored blackbirds of southern California. Ph.D. Thesis, Univ. California, Los Angeles. 374pp.

Crase, F. T., and R. W. DeHaven. 1978. Food selection by five sympatric California blackbird species. Calif. Fish and Game 64:255-267.

Crawford, B.A. and S. Rumsey. 2009. Guidance for *Monitoring Recovery of Pacific Northwest Salmon and Steelhead Listed Under the Federal Endangered Species Act.* Draft document prepared for the NMFS – Northwest Region. June 12, 2009.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. Publication FWS/OBS-2279/31. U.S. Fish and Wildlife Service, Washington, D.C.

CNPS (California Native Plant Society). 2001. *Botanical Survey Guidelines of the California Native Plant Society*. Fremontia. Vol. 29: 3-4.

_____. 2009. Inventory of Rare and Endangered Vascular Plants of California, version 7-09c. California Native Plant Society. Sacramento, CA. Accessed at http://www.cnps.org/inventory.

Dudley, T. and B. Collins. 1995. Biological invasions in California wetlands. Pacific Institute for Studies in Development, Environment, and Security. Oakland, California.

Dunk, J. R. 1995. White-tailed kite (*Elanus leucurus*). *In* The Birds of North America, No. 178 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Elliot, J. E., I. E. Moul, K. M. Cheng. 1998. Variable reproductive success of bald eagles on the British Columbia coast. Journal of Wildlife Management, v.62, n.2, 1998:518-529.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook. Simon and Schuster, New York. 785pp.

Eisenmann, E. 1971. Range expansion and population increase in North and Middle America of the white-tailed kite (*Elanus leucurus*). Amer. Birds 25:529-536.

Erichsen, A.L., S. Smallwood, N.D. Ottum, and D.M. Fry. 1996. The white-tailed kite: GIS analysis of habitat selection in the Sacramento Valley, California with implications for conservation of wildlife in agricultural landscapes. J. Captor Research 28:46.

Ernst, C.H., J.E. Lovich, and R.W. Barbour. 1994. Turtles of the United States and Canada. Smithsonian Institution Press, Washington, D.C.

Evans, E. 2000. Trees: Damage. North Carolina State University. [online] http://www.ces.ncsu.edu/depts/hort/consumer/factsheets/trees-new/text/tree_damage.html#construction

Ewins, P.J. and R. A. Andress. 1995. The diet of bald eagles, *Haliaeetus leucocephalus,* wintering in the lower Great Lakes Basin, 1987-1995. Canadian Field-Naturalist, v.109, n.4, 1995:418-425.

Feldman, M. 1982. Notes on reproduction in *Clemmys marmorata*. Herpetol. Rev. 13:10-11.

Fisher, Chris and Joseph Morlan. 1997. Birds of San Francisco and the Bay Area. Washington. Lone Pine Publishing.

Fishnet 4C, MFG, Inc., and Pacific Watershed Associates. 2004. County Road Maintenance Guidelines for Protecting Aquatic Habitat and Salmon Fisheries. Updated 2007. Website: fishnet.marin.org/projects_roads_manual.html, accessed November 1, 2009.

Fitch, H. S. 1958. Home ranges, territories, and seasonal movements of vertebrates of the Natural History Reservation. Univ. Kans., Lawrence. Publ. Mus. Nat. Hist. 11:63- 326.

Fuller, D. D. and A. J. Lind. 1992. Implications of fish habitat improvement structures for other stream vertebrates. *In* R. Harris and D. Erman (eds.), Proceedings of the Symposium on Biodiversity of Northwestern California, pp 96-104. Santa Rosa, California.

Garrett, M G., J. W. Watson and R. G. Anthony. 1993. Bald Eagle Home Range and Habitat use in the Columbia River Estuary. Journal of Wildlife Management, v.57, n.1, 1993:19-27.

Garrison, R. W. 1981. Description of the larva of *Ischnura gemina* with a key and new characters for the separation of sympatric *Ischnura* larvae. Annals of the Entomological Society of America, 74(6):525-530.

Gerrard and Bortolotti 1988. The bald eagle: haunts and habits of a wilderness monarch. Smithsonian Inst. Press, Washington, 177pp.

Good, T.P., R.S. Waples and P. Adams (editors). 2005. Updated Status of Federally-listed ESUs of West Coast Salmon and Steelhead. U.S. Dept. of Commerce NOAA Technical Memorandum NMFS-NWFSC-66. 598 pp.

Gray, E.M. 1995. DNA fingerprinting reveals a lack of genetic variation in northern populations of the western pond turtle (*Clemmys marmorata*). Conserv. Biol. 9(5):1244-1255.

Griffith, R. S. 1992. Sequoia sempervirens. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2009, October 21].

Grinnell, J., and A. H. Miller. 1944. The Distribution of the Birds of California. Pacific Coast Avifauna Number 27. Reprinted by Artemisia Press, Lee Vining, California, 1986. 615pp.

Grubb, T. G. and R. M. King. 1991. Assessing human disturbance of breeding bald eagles with classification tree models. J. Wildl. Management 55: 500-511.

Harrison, A., E. Small, and H. Mooney. 1971. Drought relationships and distribution of two Mediterranean climate Californian plant communities. Ecology 52:869-875.

Harrison, C. 1978. A field guide to the nests, eggs and nestlings of North American birds. W. Collins Sons and Co., Cleveland, OH. 416pp.

Hawbecker, A. C. 1942. A life history study of the white-tailed kite. Condor 44:267- 276.

Hensel, R. J., and W. A. Troyer. 1964. Nesting studies of the bald eagle in Alaska. Condor 66:282-286.

Hickman, J. C. (ed.). 1996. The Jepson manual: Higher Plants of California. University of California Press. Berkeley, CA.

Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished manuscript, California Department of Fish and Game, Nongame - Heritage Program, Sacramento. 156 pp.

Holland, D. C. 1988. *Clemmys marmorata* (Western Pond Turtle). Behavior. Herpetol. Rev. 19:87-88.

_____. 1991. A synopsis of the ecology and status of the western pond turtle (*Clemmys marmorata*) in 1991. Unpublished report prepared for the U.S. Fish and Wildlife Service. 141 pp.

_____. 1992. Level and pattern in morphological variation: a phylogeographic study of the western pond turtle (*Clemmys marmorata*). Ph.D. Diss., University of Southwestern Louisiana.

_____. 1994. The western pond turtle: habitat and history. U.S. Department of Energy, Bonneville Power Administration, Portland, Oregon. 11 chapters + appendices.

Holland, D.C. and R.H., Jr. Goodman. 1996. *Clemmys marmorata* (western pond turtle). Terrestrial habitat use. Herpetol. Rev. 27(4):198-199.

Holmes, T., R. L. Knight, and G. R. Craig. 1993. Responses of wintering grassland raptors to human disturbance. Wildlife Society Bulletin 21: 461-468.

Horticultural Associates. 2008. Tree Inventory – Sir Francis Drake Boulevard between Shafter Bridge and Platform Bridge Road, Marin County, California. Prepared for Synthesis Environmental Planning, Inc. February 7, 2008.

Ingles, L. G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, CA. 506 pp.

Jackman, R. E., W. G. Hunt, J. M. Jenkins and P. J. Detrich. 1999. Prey of nesting Bald Eagles in northern California. Journal of Raptor Research, v.33, n., 1999. June,:87-96.

Janzen, F.J., S.L. Hoover, and H.B. Shaffer. 1997. Molecular phylogeny of the western pond turtle (*Clemmys marmorata*): preliminary results. Linnaeus Fund Research Report. Chelonian Conserv. Biol. 2:623-626.

Jennings, M. R. 1988. Natural history and decline of native ranids in California. Pp.61-72 *in* Proceedings of the Conference on California Herpetology. Eds. H. P. DeLisle, P. R. Brown, B. Kaufman, and B. M. McGurty.

Jennings, M. R., and M. P. Hayes. 1994. Amphibian and reptile species of special concern in California. Final report. California Department of Fish and Game, Inland Fisheries Division. Rancho Cordova, CA.

Jurek, R. M., and H. R. Leach. 1973. California shorebird study: Accelerated research program on shore and upland migratory game birds. Calif. Dept. Fish and Game, Sacramento. P. R. project W-54-R. Final Rep. 233pp.

Kim, H., E.A. Seagren and A.P. Davis. 2000. Engineered bioretention for removal of nitrate from stormwater runoff. WEFTEC 2000 Conference Proceedings on CDROM Research Symposium, Nitrogen Removal, October, Anaheim, California.

Kuchler, A.W. 1977. Appendix: the map of the natural vegetation of California. Pages 909-938 In M.G. Barbour and J. Major, editors, Terrestrial vegetation of California. John Wiley and Sons, New York.

Lanner, R. M. 1999. Conifers of California. Cachuma Press, Los Olivos, California.

Lardie, R.L. 1975. Notes on eggs and young of *Clemmys marmorata marmorata* (Baird and Girard). Occ. Pap. Mus. Natur. Hist. Univ. Puget Sound. 47:654.

Laudenslayer, W.F., Jr., et al. 1991. A checklist of Amphibians, Reptiles, Birds, and Mammals of California. California Department of Fish and Game.

Lee, J. M. and D. B. Griffith. 1977. Transmission audible noise and wildlife. *In*: Proceedings Symp. Ninth Int'l. Congress on Acoustics. 4-9 July 1977, Madrid Spain.

Lind, A. J., H. H. Welsh, Jr., and R. A. Wilson. 1996. The effects of a dam on breeding habitat and egg survival of the foothill yellow-legged frog (*Rana boylii*) in northwestern California. Herpetological Review 27(2):62-67.

LSA Associates. 2010. Sir Francies drake Roadway Rehabilitation Project Draft Environmental Impact Report (EIR). Section 4.10- Noise.

Lovitch, J.E. 1999. Western Pond Turtle *Clemmys marmorata*. Department of Biology, University of California, Riverside.

Luckenbach, R. A. 1975. What off-road vehicles are doing to the desert. Fremontia 2:3-11.

Mabie, D. W., M. T. Merendino and D. H. Reid. 1995. Prey of nesting bald eagles in Texas. Journal of Raptor Research, v.29, n.1, 1995:10-14.

Mabie, D. W., M. T. Merendino and D. H. Reid. 1994. Dispersal of Bald Eagles Fledged in Texas. Journal of Raptor Research, v. 28, n. 4, 1994: 213-219.

Macdonald, K. B. 1977b. Plant and animal communities of Pacific North American salt marshes. Pages 167-191 In V. J. Chapman, ed. Wet coastal ecosystems. Elsevier Scientific Publ. Co., Amsterdam.

Marin County. 2008. Stormwater Quality Manual for Development Projects in Marin County – A Low Impact Development Approach. Prepared by the Marin County Stormwater Pollution Prevention Program (MCSTOPP) in cooperation with Marin County and Marin's Cities and Towns.

Marin Municipal Water District (MMWD). 2009. Lagunitas Creek Salmon Spawner Survey Report 2008-2009. Prepared by the MMWD Fishery Program staff, 220 Nallen Drive, Corte Madera, CA 94925. October 2009. 24 pages.

Martin, A. C., H. S. Zim, and A. L. Nelson. 1961. American wildlife and plants, a guide to wildlife food habits. Dover Publ., Inc., New York. 500pp.

Mayer, K.E., and W.F. Laudenslayer. 1988. A guide to wildlife habitats of California. California Department of Forestry and Fire Protection, Sacramento, California.

McCaskie, G., P. De Benedictis, R. Erickson, and J. Morlan. 1979. Birds of northern California, an annotated field list. 2nd ed. Golden Gate Audubon Soc., Berkeley. 84pp.

McNaughton, S. J., and L. L. Wolf. 1973. General ecology. Holt, Rinehart, and Winston Inc., San Francisco.

McPherson, E. G., G. Gonzalez, G. Monfette, and R. Lorenzen. 2004. Street Trees of Los Angeles. City Trees 90:6-12.

Miller, R.R., C. Hubbs, and F.H. Miller. 1991. Ichthyological exploration of the American west: the Hubbs-Miller era, 1915-1950. Pp. 19-40. In: Battle against extinction. Native Fish Management in the American west. (W.L. Minckley and J.E. Deason, eds.), University of Arizona Press, Tucson.

Mou, P., R. J. Mitchell, and R. H. Jones. 1997. Root distribution of two tree species under a heterogeneous nutrient environment. Journal of Applied Ecology 34:645-656.

Moyle, P. 1976. Inland fishes of California. University of California Press, Berkeley, California. 405pp.

Moyle, P., Israel, J., and S. Purdy. 2008. Salmon, Steelhead, and Trout in California: Status of an Emblematic Fauna. Report prepared by Center for Watershed Sciences, University of California, Davis. Report commissioned by California Trout. 316 pages.

Moyle, P., R. M. Yoshiyama, Jack E. Williams, and Eric D. Wikramanayake. 1995. Fish Species of Special Concern in California. The Resources Agency, Department of Fish and Game. Final Report for Contract No. 2128IF.

Munz, P.A., and D.D. Keck. 1973. A California flora with supplement. University of California Press, Berkeley, California.

Murphy, R. K., M. W. Gratson, and R. N. Rosenfield. 1988. Activity and habitat use by a breeding male Cooper's hawk in a suburban area. J. Raptor Research 22: 97-100.

National Marine Fisheries Service (NMFS). 1996. *Factors for Decline – A Supplement to the Notice of Determination for West Coast Steelhead under the Endangered Species Act.* NMFS Protected Species Branch, 525 NE Oregon Street, Suite 500, Portland, Oregon 97232. August 1996. 80pp.

_____. 1997. *Status Review of Chum Salmon from Washington, Oregon and California.* NOAA Technical Memorandum NMFS-NWFSC-32. NMFS Conservation Biology Division, 2725 Montlake Blvd. E, Seattle, WA. 98112. December 1997. 257 pp. + Appends.

_____. 1998. *Factors Contributing to the Decline of Chinook Salmon: An Addendum to the 1996 West Coast Steelhead Factors for Decline Report.* NMFS Protected Species Branch, 525 NE Oregon Street, Suite 500, Portland, Oregon 97232. June 1998. 71pp.

_____. 2001. *Status Review Update for Coho Salmon (Oncorhynchus kisutch) from the Central California Coast and the California Portion of Southern Oregon/Northern California Coasts Evolutionarily Significant Units.* Southwest Fisheries Science Center, Santa Cruz Laboratory. April 12, 2001 Revision.

_____. 2010. *Public Draft Recovery Plan for the Central California Coast Coho Salmon Evolutionarily Significant Unit.* March 2010. NMFS Southwest Region, Santa Rosa, California.

Nelson, S.K. 1997. Marbled Murrelet (*Brachyramphus marmoratus*) *In* The Birds of North America, No 276 (A. Poole and F. Gill, eds). The Academy of Natural Sciences, Philadelpia, PA, and the American Ornithologists' Union, Washington, D.C.

Nelson, P. M. 1987. Transportation noise reference book. - Butterworth & Co. Cambridge, UK.

Newcomb, C.P. and D.D. MacDonald. 1991. *Effects of suspended sediments on aquaticeEcosystems.* North American Journal of Fisheries Management. 11:72-82.

NOAA Fisheries. 2009. Website address: www.nmfs.noaa.gov.

Orians, G. H. 1961. The ecology of blackbird (*Agelaius*) social systems. Ecol. Monogr. 31:285-312.

Orr 1954. Natural history of the pallid bat, *Antrozous pallidus* (LeConte). Proceedings of the California Academy of Sciences 28(4):165-246.

Page, L.M. and B.M. Burr. 1991. A field guide to freshwater fishes of North America north of Mexico. The Peterson Field Guide Series, Vol 42. Houghton Mifflin Company, Boston, MA.

Peterson, D. J., and R. K. Murphy. 1992. Prey delivered to two cooper's hawk *Accipiter cooperii* nests in northern mixed grass prairie. Canadian Field-Naturalist 106: 385-386.

Pickwell. 1930. The white-tailed kite. Condor 32: 221-239.

Pope, C.H. 1939. Turtles of the United States and Canada. Alfred A. Knopf, Inc. New York, New York.

Point Reyes National Seashore, (PRNS). 2001. Tomales Bay Guidelines For Protection and Use. Point Reyes National Seashore. Point Reyes Station, CA. 33 pages.

Powers, R. F. and H. V. Wiant. 1970. Sprouting of old-growth coastal redwood stumps on slopes. Forest Science 16:339-341.

Rathbun, G.B., N. Siepel and D. Holland. 1992. Nesting behavior and movements of western pond turtles, *Clemmys marmorata*. Southwest. Nat. 37:319-324.

Rathbun, G.B., M.R. Jennings, T.G. Murphey, and N.R. Seipel. 1993. Status and ecology of sensitive aquatic vertebrates in lower San Simeon and Pico creeks, San Luis Obispo County, California. Report to California Department of Parks and Recreation, San Simeon, CA.

Reese, D.A. and H.H. Welsh, Jr. 1988. Habitat use by western pond turtles in the Trinity River, California. J. Wildlife Manag. 62:842-853.

Ricketts, E. F., J. Calvin, and J. W. Hedgpeth. 1968. Between Pacific tides. 4th ed. Stanford Univ. Press, Stanford, Calif.

Ross Taylor and Associates. 2003. Marin County Stream Crossing Inventory and Fish Passage Evaluation – Final Report. Prepared for the County of Marin Department of Public Works. July 2003. 73pp.

Ross Taylor and Associates. 2007. *Tomki Road in Mendocino County – Impacts to Salmonid Habitat and Management Options to Reduce Impacts.* Draft Report prepared for Mendocino County. 15pp.

Sanders, T. A. and W. D. Edge. 1998. Breeding bird community composition in relation to riparian vegetation structure in the western United States. Journal of Wildlife Management 62:461-473.

Sawyer, J.O. and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society.

Scholz, N., N.K. Truelove, B.L. French, B.A. Berejikian, T.P. Quinn, E. Casillas and T.K. Collier. 2000. *Diazinon disrupts antipredator and homing behavior in Chinook salmon (Oncorhynchus tshawytscha). Canadian Journal of Fishery and Aquatic Science.* 57:1911-1918.

Skinner, M. W., and B. M. Pavlik (eds.). 1994. Inventory of rare and endangered vascular plants of California. 5th edition. (Special Publication No. 1.) California Native Plant Society. Sacramento, CA.

Slavens, K. 1995. The status of the western pond turtle in Klickitat County, including notes on the

1995 survey of Lake Washington, King County. Unpubl. Rep. on file at WDFW. 25 pp.

Small, A. 1974. The Birds of California, Winchester Press, New York, NY.

_____. 1994. California Birds: Their Status and Distribution. Ibis Publishing Company: Vista, CA. 342 pp.

Smith, R. L. 1974. Ecology and field biology. Harper and Row, New York.

Spencer, D. A., ed. 1976. Wintering of the migrant bald eagle in the lower 48 states. Natl. Agric. Chem. Assoc. Publ., Wash. DC. 170pp.

Stebbins, R.C. 1954. Amphibians and reptiles of western North America. New York: McGraw Hill Book Co., New York, New York.

_____. 1985. Western reptiles and amphibians. Houghton Mifflin Company, Boston. 336 pp.

_____. 2003. A Field Guide to Western Reptiles and Amphibians. Third edition Houghton Mifflin Company, Boston, MA. 533 pp.

Stephens, S. L. and D. L. Fry. 2005. Fire history in coast redwood stands in the northeastern Santa Cruz Mountains, California. Fire Ecology 1:2-19.

Stillwater Sciences. 2008. Lagunitas limiting factors analysis: limiting factors for coho salmon and steelhead. Final Report. Prepared for the Marin Resource Conservation District, Point Reyes Station, California. 72pp. + Appends.

Stillwater Sciences. 2009. San Geronimo Valley Existing Conditions Report. Prepared for the Marin County Department of Public Works, San Rafael, CA by Stillwater Sciences, Berkeley, CA. January 2009.

Stone, E. C. and R. B. Vasey. 1968. Preservation of coast redwood on alluvial flats. Science 159:157-161.

Storer, T. I. 1925. A synopsis of the amphibia of California. University of California Publication Zoology 27:1-342.

Synthesis Environmental Planning (SEP). 2008. Approximate age of redwood trees along project alignment, Sir Francis Drake Boulevard Reconstruction Project, Marin County, California. Letter report to Marin County Public Works Dept., May 30, 2008.

_____. 2009. Wetland Delineation of the Sir Francis Drake Boulevard Rehabilitation Project, Marin County, California. Unpublished report. Report prepared for Marin County Department of Public Works, San Rafael, California. July.

Shuford, W.D. 1993. The Marin County Breeding Bird Atlas: A Distribution and natural History of Coastal California Birds.

Terres, J. K. 1980. The Audubon Society Encyclopedia of North American Birds. Alfred A. Knopf, New York, New York. 1109pp.

Thelander, C. G. 1973. Bald eagle reproduction in California, 1972-1973. Calif. Dept. Fish and Game, Sacramento. Wildl. Manage. Branch Admin. Rep. 73-5. 17pp.

Urban Design Tools. 2009. Website address: http://www.lid-stormwater.net/bio_benefits.htm

USACE (U.S. Army Corps of Engineers Environmental Laboratory). 1987. U.S. Army Corps of Engineers Wetland Delineation Manual, Technical Report Y-87-1. Vicksburg, Mississippi.

United States Fish and Wildlife Service (USFWS). 1983. Republication of the lists of endangered and threatened species. Federal Register 48:34182-34196.

_____. 1992. Endangered and threatened wildlife and plants; 90-day finding and commencement of status reviews for a petition to list the western pond turtle and California red-legged frog. Fed. Reg. 57:45761-45762.

_____. 1997a. Endangered and threatened species: Review of plant and animal taxa; Proposed Rule. 50 CFR 17. Federal Register, September 19, 1997. 62 (182): 49397-49411. U.S. Department of the Interior, Washington, D.C.

_____. Recovery Plan for the Threatened Marbled Murrelet *(Brachyramphus marmoratus)* in Washington, Oregon, and California. Portland, Oregon. 203 pp.

_____. 1998a. California Freshwater Shrimp *(Syncaris pacfica* Holmes) Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. 94 pp.

_____. 1998b. Seven Coastal Plants and the Myrtle's Silverspot Butterfly Recovery Plan. Portland, Oregon. 141 pp.

_____. 2002. Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, Oregon. viii + 173 pp.

_____. 2006. Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California. United States Fish and Wildlife Service, Arcada, California.

_____. 2008. Final Recovery Plan for the Northern Spotted Owl, *Strix occidentalis caurina*. U.S. Fish and Wildlife Service, Portland, Oregon. xii + 142 pp.

_____. 2009. Website Address: http://sacramento.fws.gov/.

_____. 2010. Endangered and Threatened Wildlife and Plants; revised Designation of Critical Habitat for the California Red-legged Frog. 50 CFR Part 17. Federal Register Vol 75, No. 51: 12816-12959

Van Denburgh, J. 1922. The reptiles of Western North America; an account of the species known to inhabit California, Oregon, Washington, Idaho, Utah, Nevada, Arizona, British Columbia, Sonora, and Lower California. Volume I. Lizards. Occasional Papers of the

Academy of Sciences (10):1-611.

Waian, L. B., and R. C. Stendell. 1970. The white-tailed kite in California with observations of the Santa Barbara population. Calif. Fish and Game 56:188-198.

Warner, J. S., and R. L. Rudd. 1975. Hunting by the white-tailed kite (*Elanus leucurus*). Condor 77:226-230.

Watson, G. W. and P. Kelsey. 2006. The impact of soil compaction on soil aeration and fine root density of *Quercus palustris*. Urban Forestry and Urban Greening 4:69-74.

Weinstein, M. 1978. Impact of off-road vehicles on the avifauna of Afton Canyon, CA. Report to Bureau of Land Management, California Desert Plan Program, Riverside, CA. Contract No. CA-0606-CT7-2734. 34 pp.

Welsh, H. 1994. *Bioregions: An Ecological and Evolutionary Perspective and a Proposal for California*. California Fish and Game (80) 3:97-124.

Williams, D. F. 1986. Mammalian species of special concern in California. Wildlife Management Division Administrative Report 86- 1. California Department of Fish

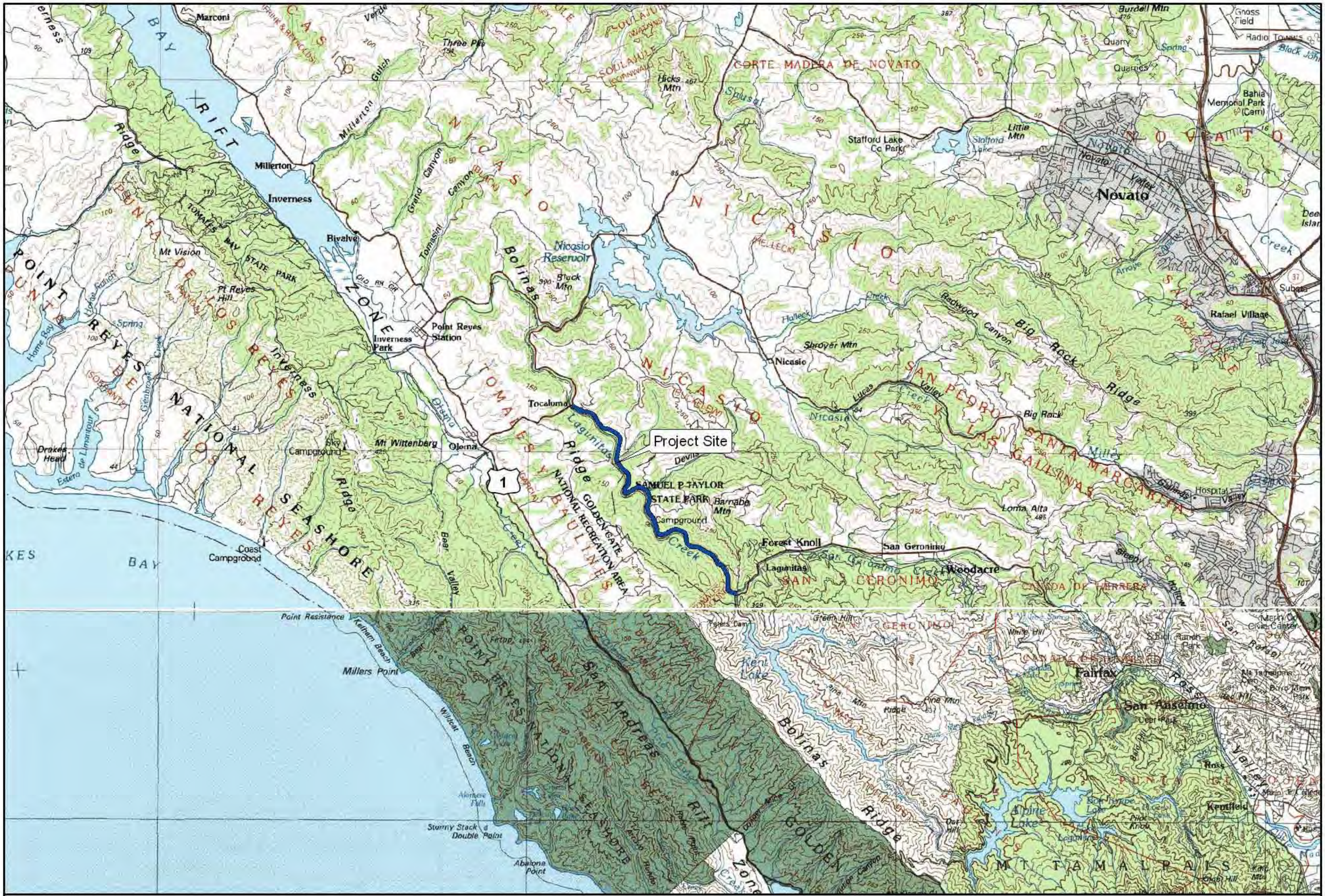
Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White. 1990. California's wildlife, volumes 1, 2, and 3. California Statewide Wildlife Habitat Relationships System, California Department of Fish and Game, Sacramento, CA.

Zwank, P.J., B. L. Tarrant, R. Valdez and D. L. Clason. 1996. Wintering bald eagle populations and behavior in the middle Rio Grande Basin, New Mexico. Southwestern Naturalist, v.41, n., 1996:149-154.

Zweifel, R. G. 1955. Ecology, distribution, and systematics of frogs of the *Rana boylii* group. Univ. of California Publ. Zool. 54:207-292.

SIR FRANCIS DRAKE BOULEVARD
ROADWAY REHABILITATION PROJECT
BIOLOGICAL ASSESSMENT

APPENDIX A
FIGURES

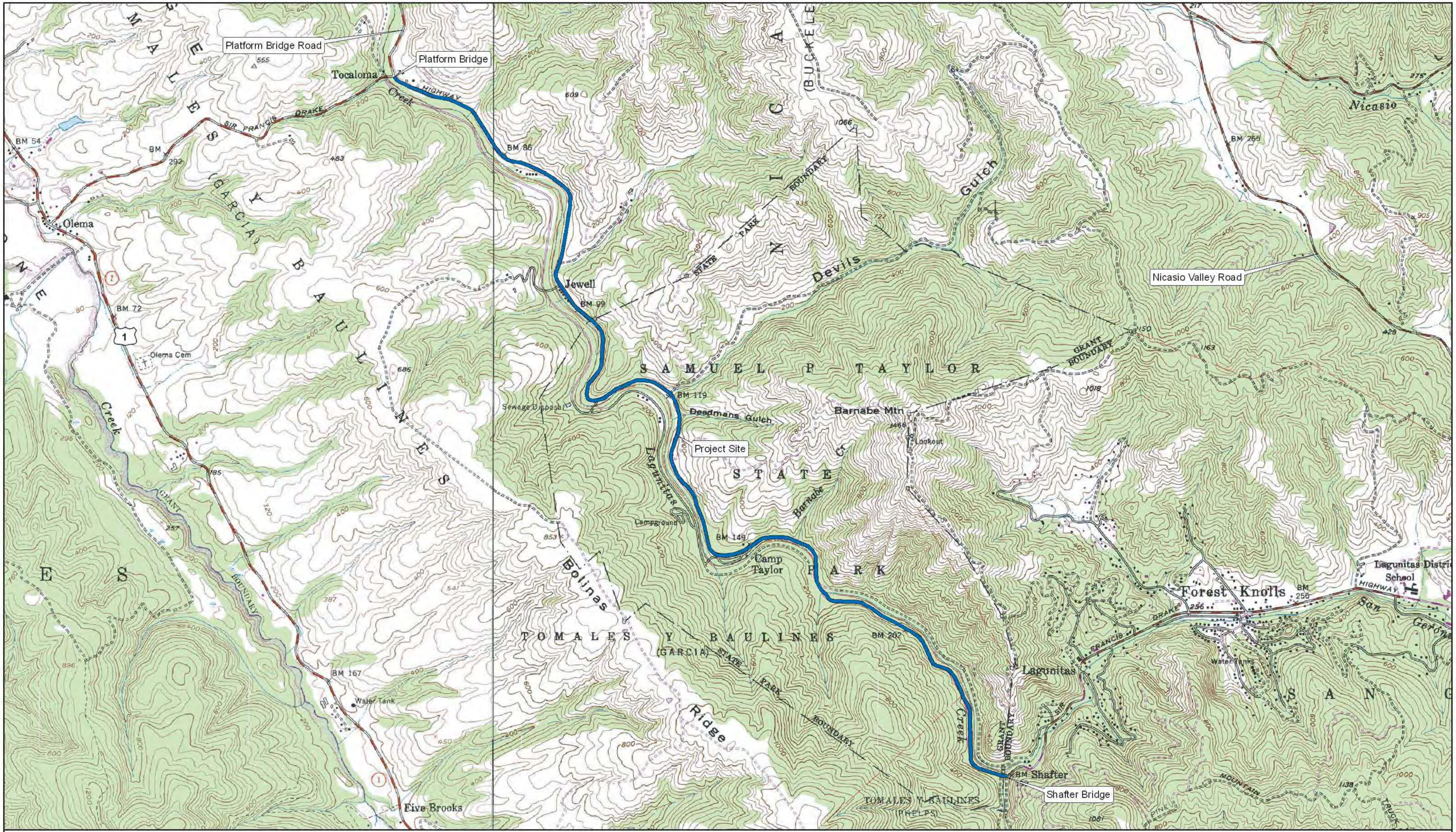


SIR FRANCIS DRAKE BOULEVARD REHABILITATION PROJECT

Project Vicinity Map

Souces: Maptech Terrain Navigator Pro, 2008.

Figure 1



SIR FRANCIS DRAKE BOULEVARD REHABILITATION PROJECT

Project Location Map

Souces: Maptech Terrain Navigator Pro, 2008.

N

0 0.25 0.5 Miles

Figure 2

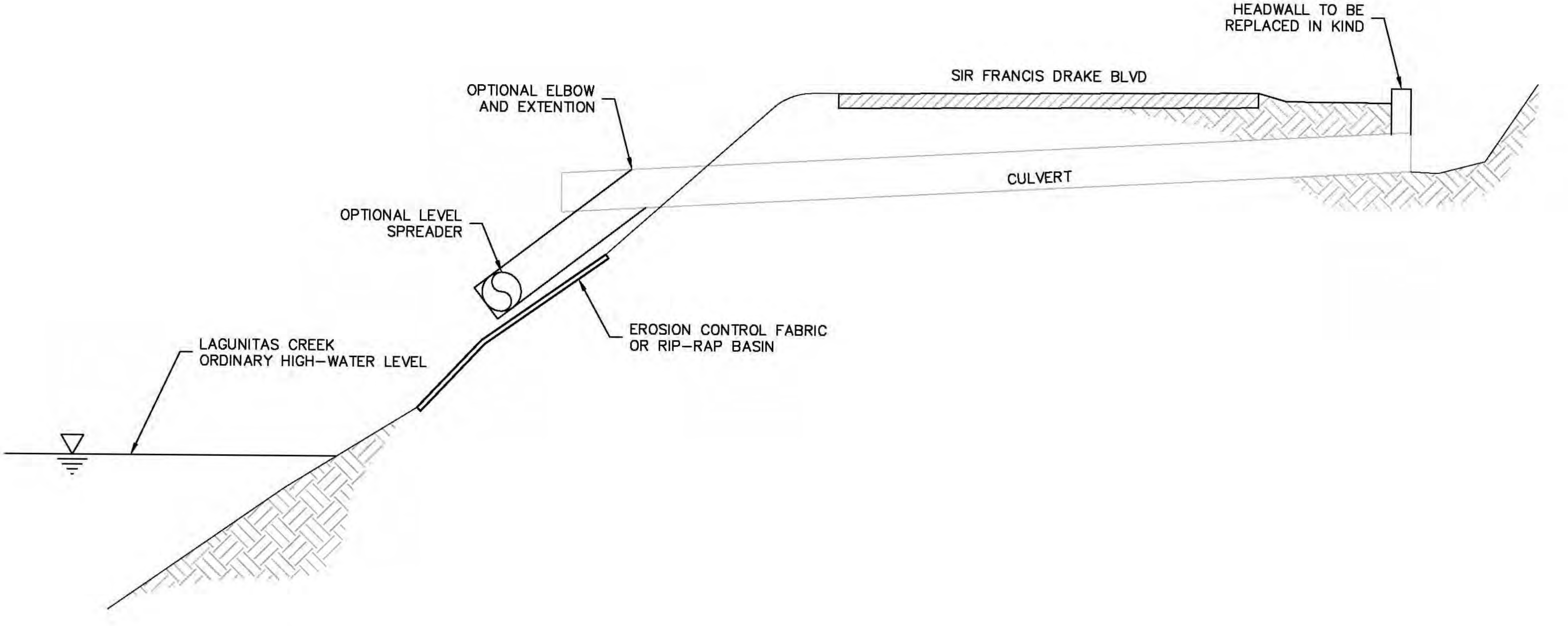
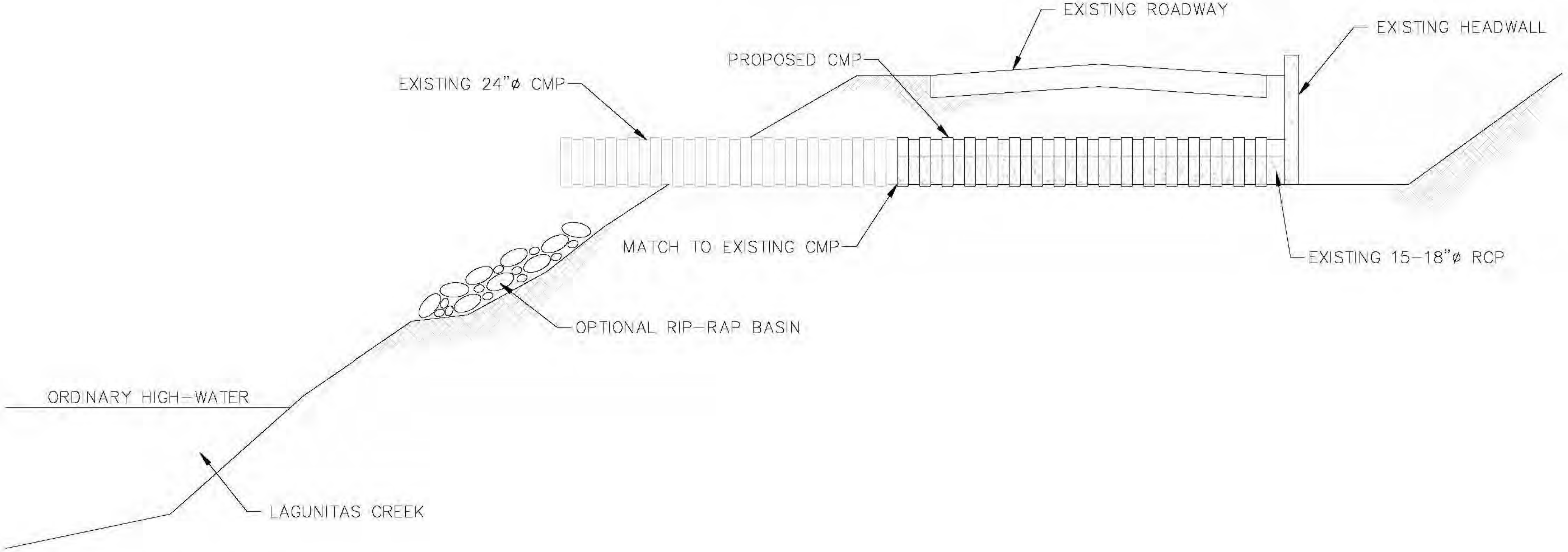


Figure 3 - Typical Culvert Replacement with Optional Level Spreader

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-12 Culvert Repair Exhibit\CulvertRepairDetail1.dwg
PLOT TIME: 10-12-09
PLOTTED BY: mile



© BKF ENGINEERS

SIR FRANCIS DRAKE BLVD
CULVERT REPAIR DETAIL 1
COUNTY OF MARIN
CA

BKF
ENGINEERS / SURVEYORS / PLANNERS

2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200
925-940-2299 (FAX)

Date: 10/12/2009
Scale: NTS
Design: RCS
Drawn: EMM
Approved: RCS
Job No: 20065075

No.	Revisions

Drawing Number:
1
1 OF 1

Figure 4 - Typical Culvert Replacement with Riprap

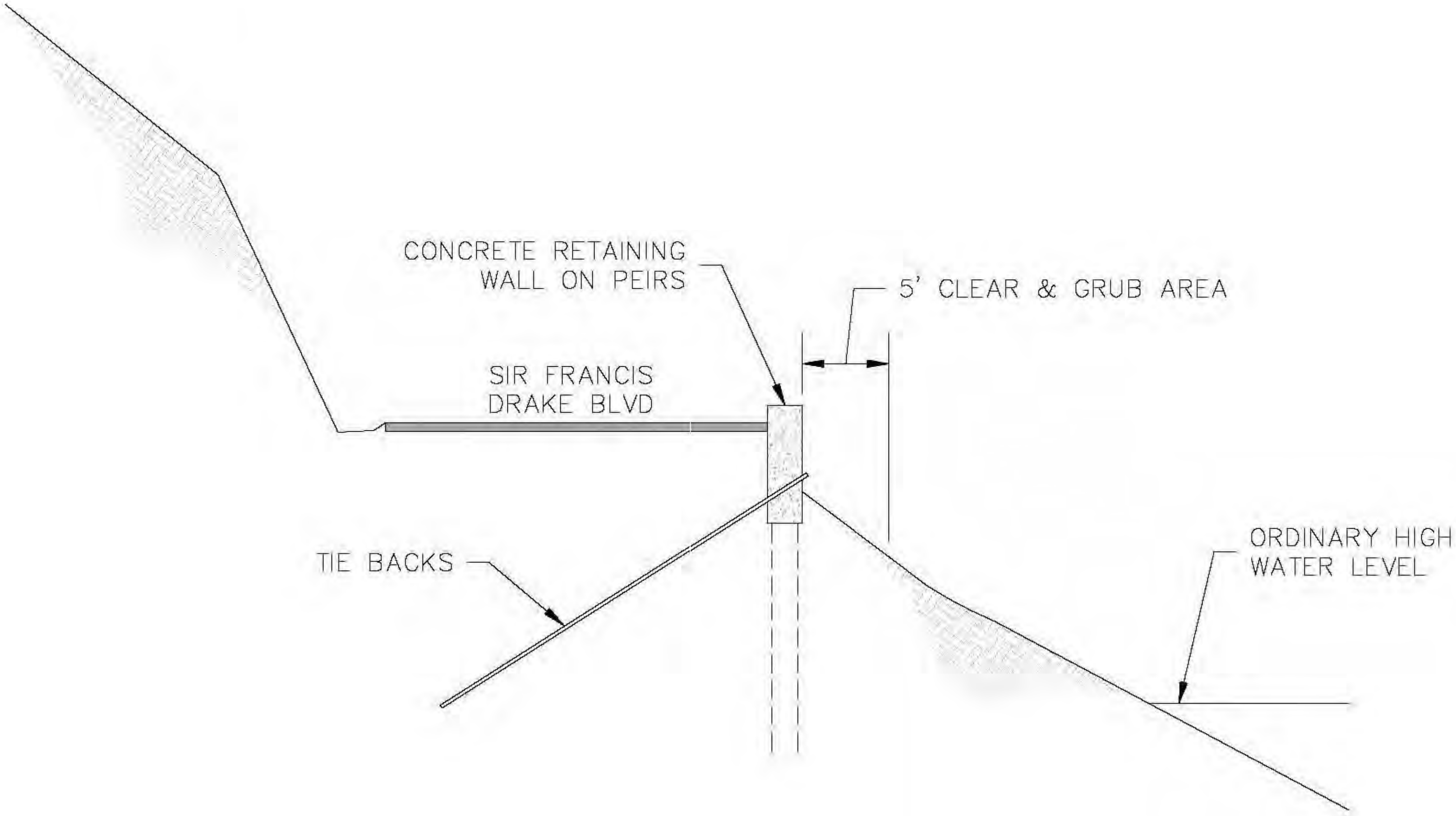
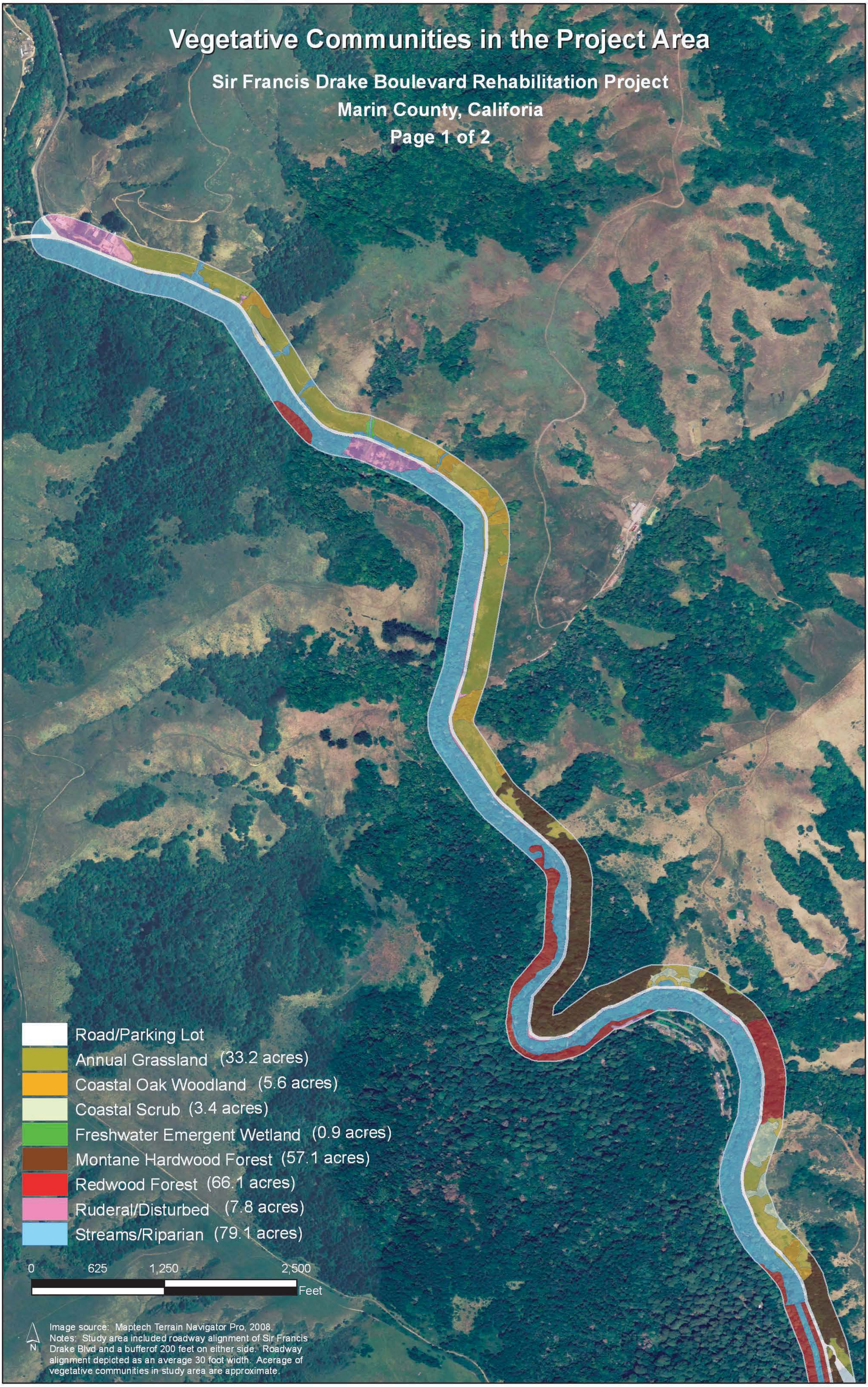


Figure 5 - Conceptual Cross-section
Slope Repair Retaining Wall at Station 270+25

Figure 6 - Conceptual Plan View
Slope Repair Retaining Wall at Station 270+25



Vegetative Communities in the Project Area

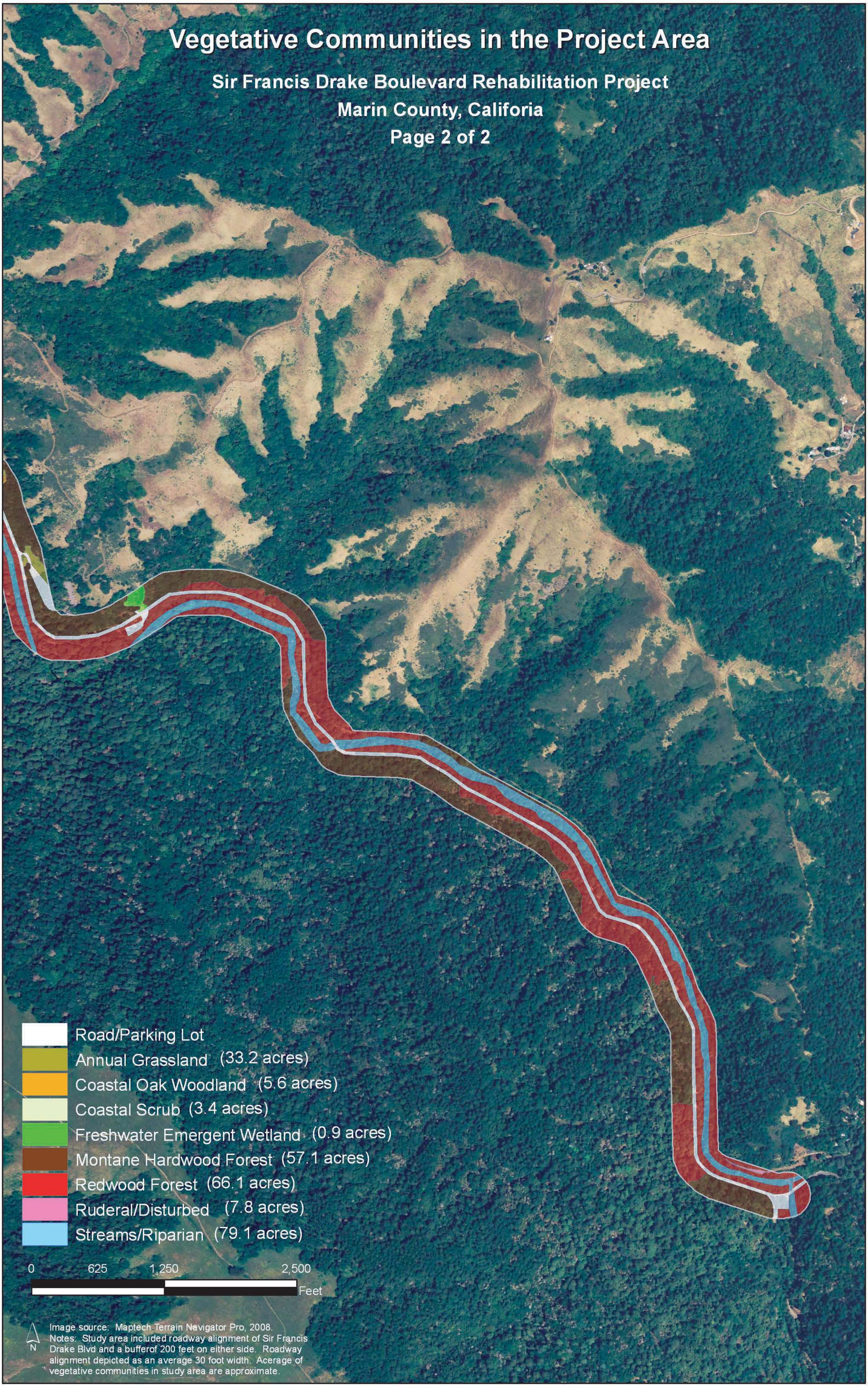
Sir Francis Drake Boulevard Rehabilitation Project

Marin County, California

Page 1 of 2

Image source: Maptech Terrain Navigator Pro, 2008.
Notes: Study area included roadway alignment of Sir Francis Drake Blvd and a bufferof 200 feet on either side. Roadway alignment depicted as an average 30 foot width. Acerage of vegetative communities in study area are approximate.

Figure 7a

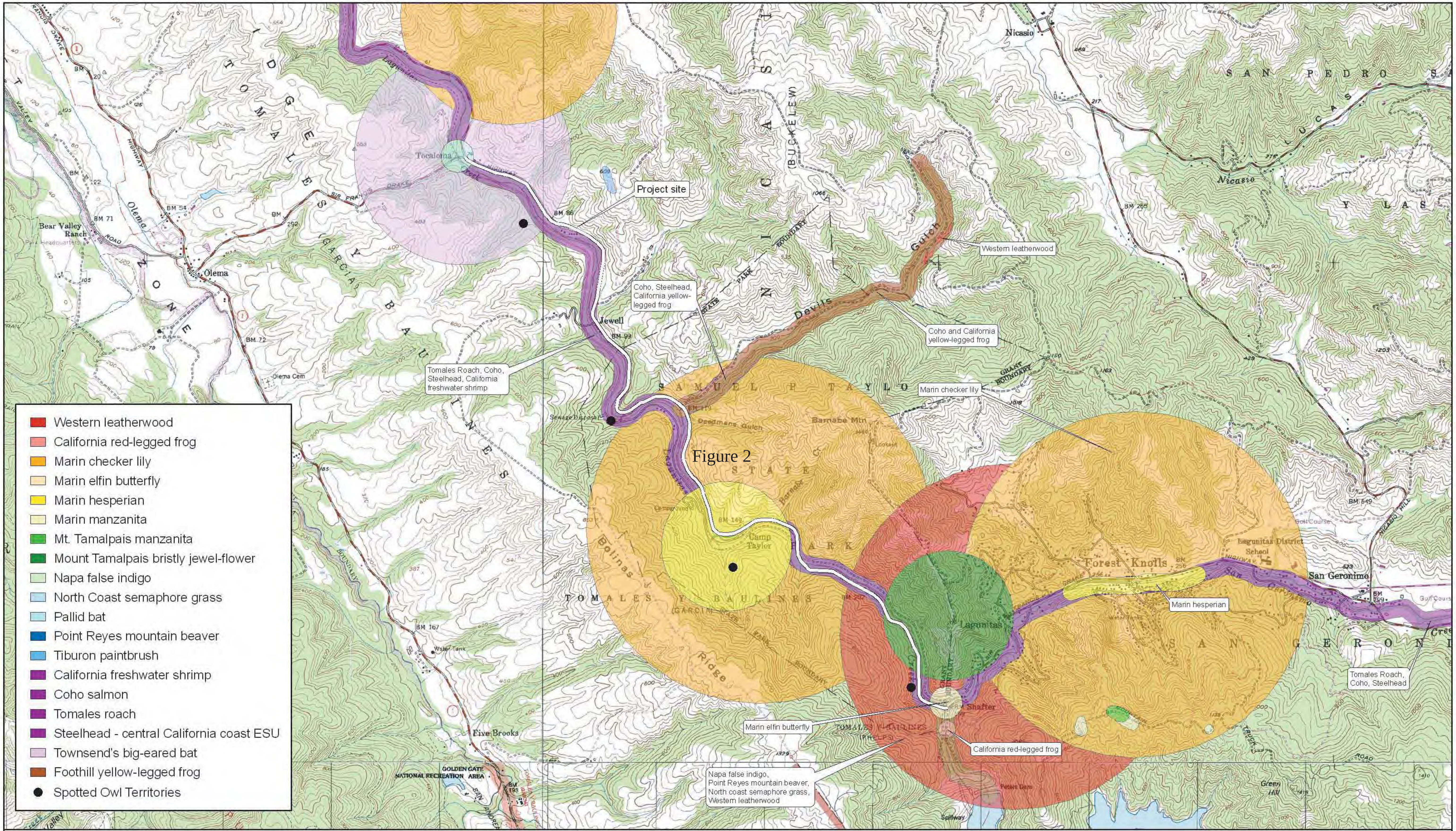


Vegetative Communities in the Project Area

Sir Francis Drake Boulevard Rehabilitation Project
Marin County, California
Page 2 of 2

Image source: Maptech Terrain Navigator Pro, 2008.
Notes: Study area included roadway alignment of Sir Francis Drake Blvd and a bufferof 200 feet on either side. Roadway alignment depicted as an average 30 foot width. Acerage of vegetative communities in study area are approximate.

Figure 7b



Souces: Maptech Terrain Navigator Pro, 2008; California Department of Fish and Game - California Natural Diversity Database (CNDDB) 2009 and BIOS Spotted Owl Territory Data. Notes: Several species occurrence polygons contained multiple species or overlap with other polygons. Color coded legend must be used in conjunction with callout boxes to decipher map. Only occurrences within one mile of the project area are depicted.

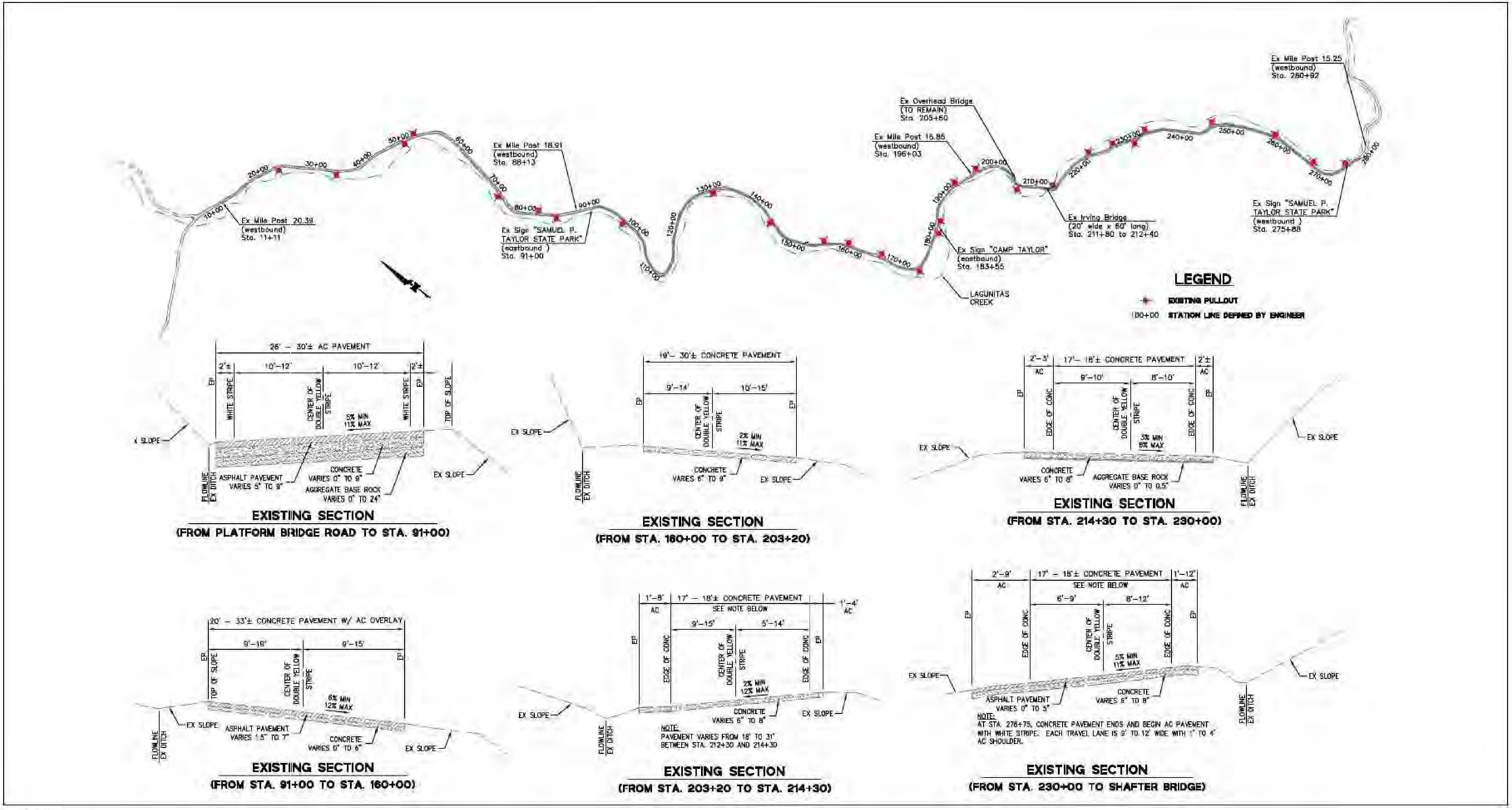
SIR FRANCIS DRAKE BOULEVARD REHABILITATION PROJECT

CNDDB Occurrences and Spotted Owl Territories
In the Vicinity of the Project Area

Figure 8

SIR FRANCIS DRAKE BOULEVARD
ROADWAY REHABILITATION PROJECT
BIOLOGICAL ASSESSMENT

APPENDIX B
CONCEPTAUL PROJECT PLAN



LSA

FIGURE 3.3-2

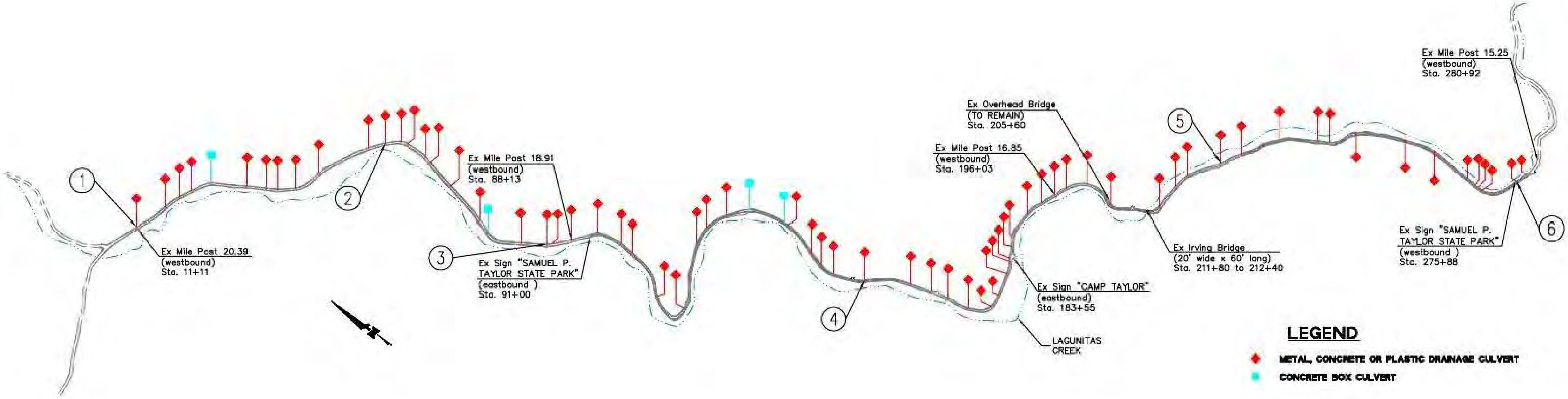
Sir Francis Drake Roadway Improvements Project

Existing Site Conditions

NOT TO SCALE

SOURCE: BKF ENGINEERS, 2010

P:\BKF0902\EIR\Screencheck DEIR\2010 DEIR Figures\Figure3.3-2_ExistingSiteConditions.cdr (04/02/2010)



①

②

③

④

⑤

⑥

LSA

NOT TO SCALE

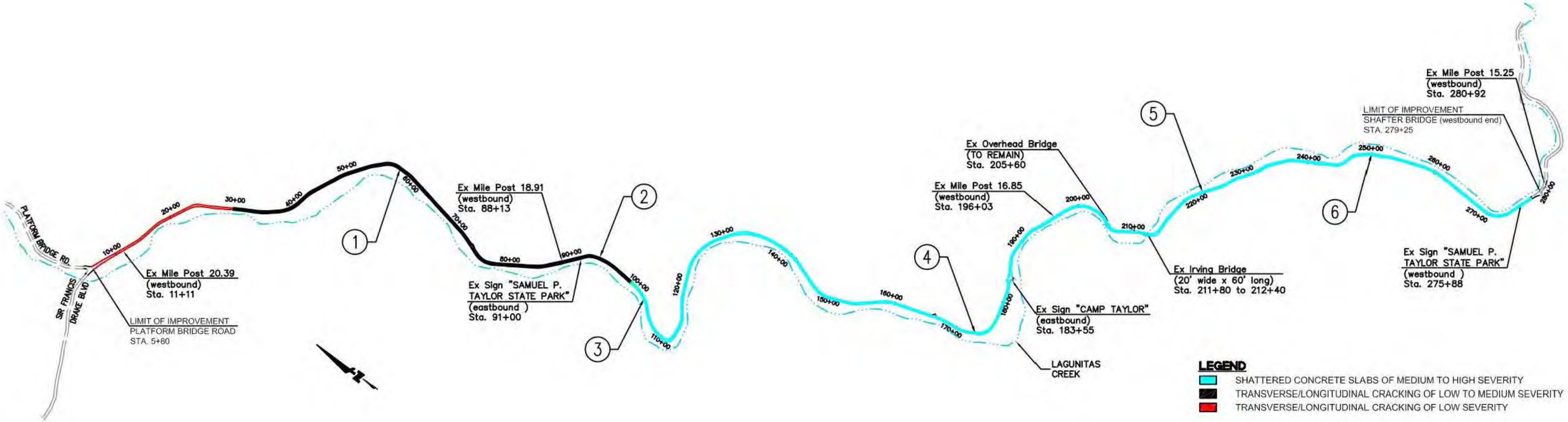
SOURCE: BKF ENGINEERS, 2010

FIGURE 3.3-3

Sir Francis Drake Roadway Improvements Project

Existing Drainage Structures

P:\BKF0902\EIR\Screencheck DEIR\2010 DEIR Figures\Figure3.3-3_ExistingDrainageStructures.cdr (04/02/2010)



① **DISLOCATED SLAB**

② **SHOULDER ALLIGATOR CRACKING**

③ **SHATTERED CONCRETE SLAB**

④ **SHATTERED CONCRETE SLAB**

⑤ **SHATTERED CONCRETE SLAB**

⑥ **SHATTERED CONCRETE SLAB**

LSA

FIGURE 3.3-4

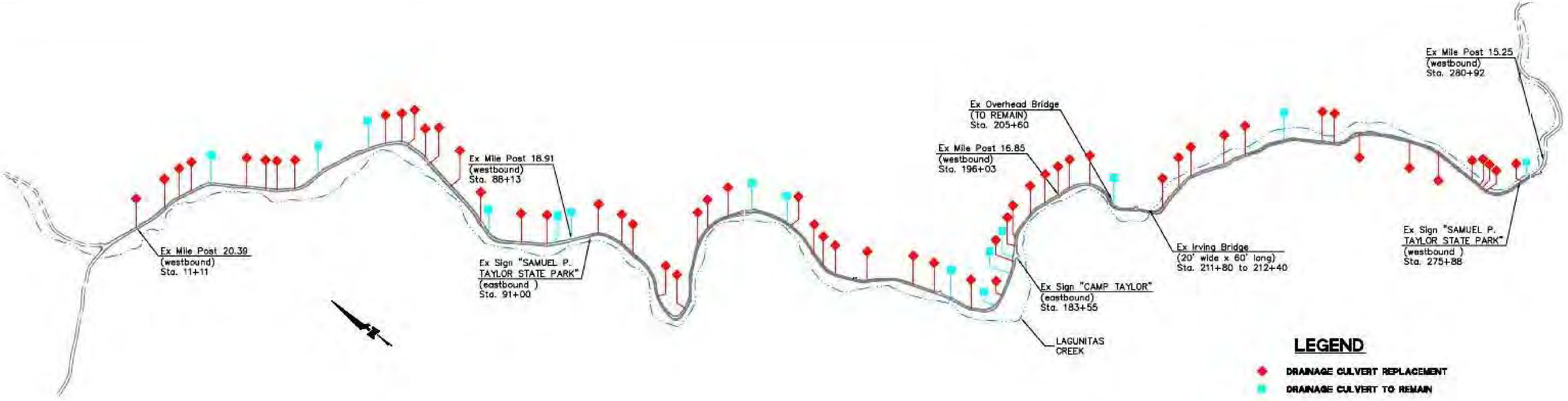
Sir Francis Drake Roadway Improvements Project

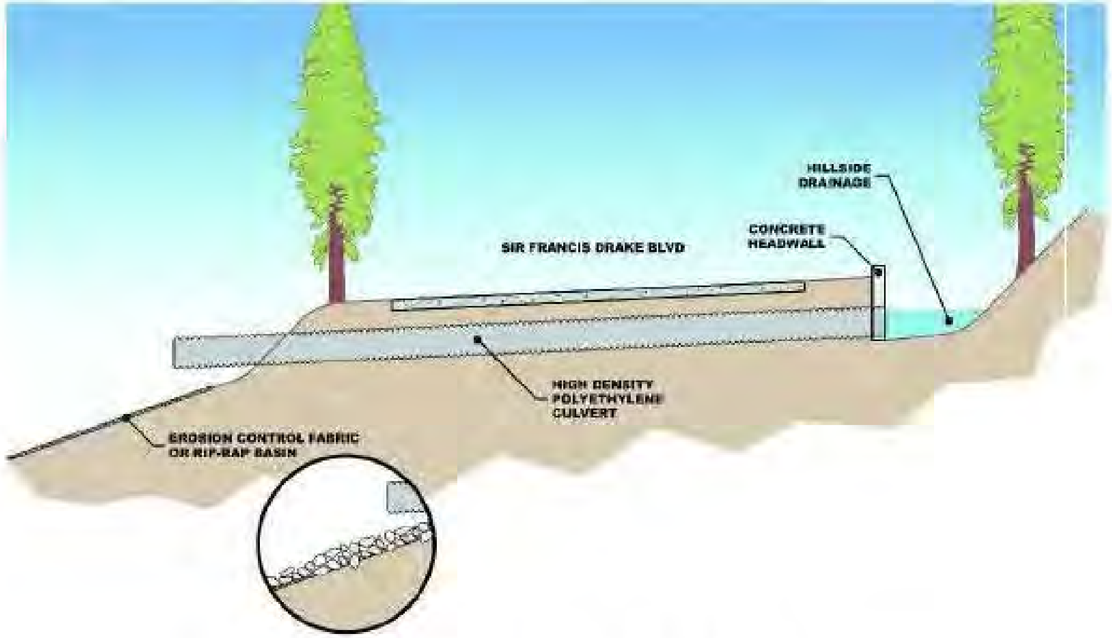
Pavement Conditions

NOT TO SCALE

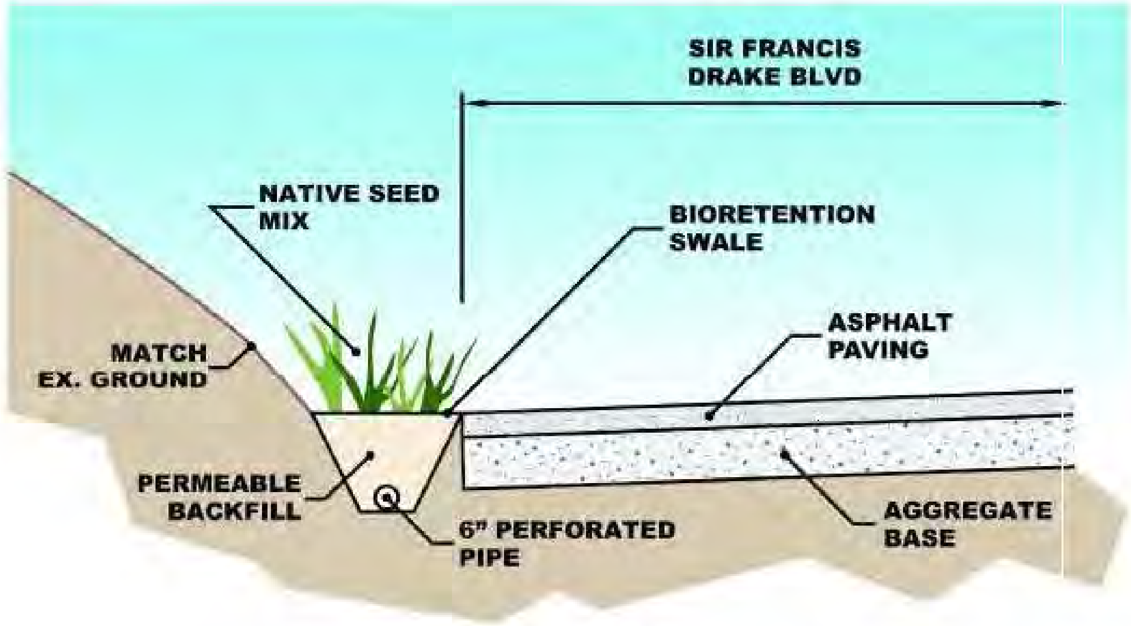
SOURCE: BKF ENGINEERS, 2010

P:\BKF0902\EIR\Screencheck DEIR\2010 DEIR Figures\Figure3.3-4_PavementConditions.cdr (04/02/2010)





PROPOSED NEW CULVERT



PROPOSED SWALE SECTION

LSA

FIGURE 3.4-1

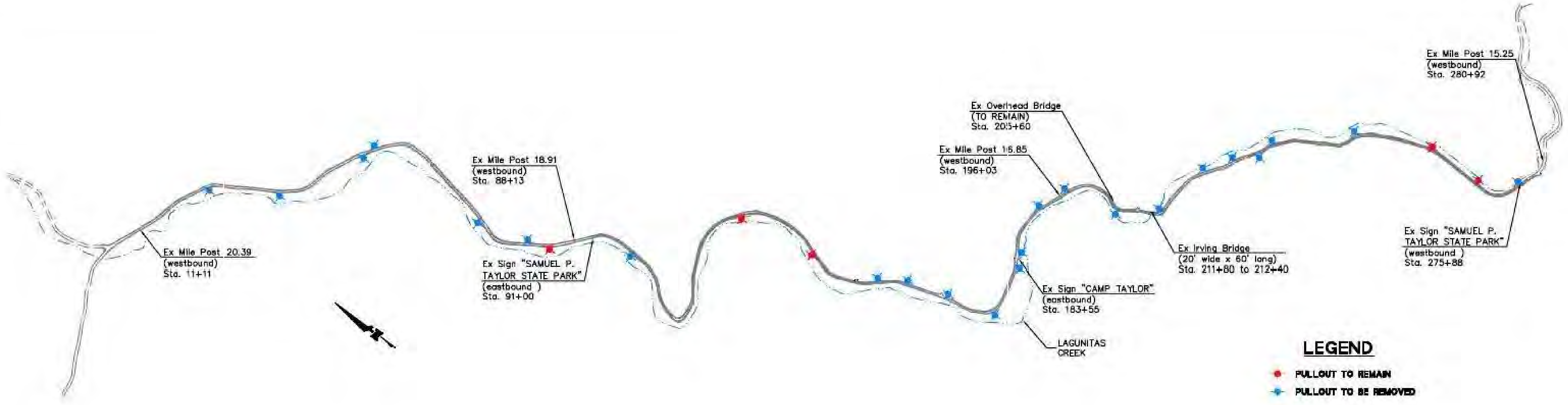
Sir Francis Drake Roadway Improvements Project

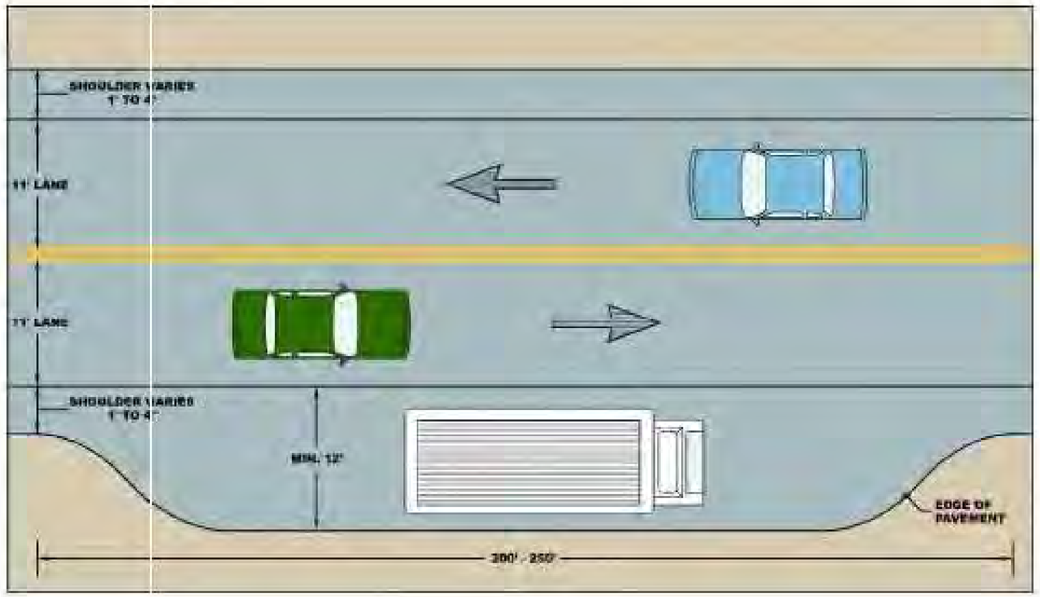
Proposed Drainage Improvements

NOT TO SCALE

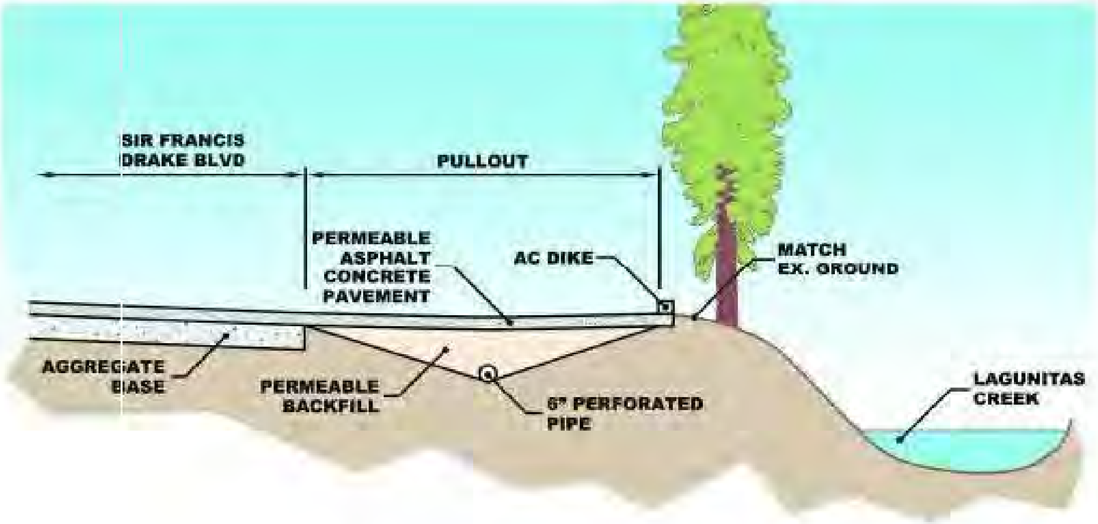
SOURCE: BKF ENGINEERS, 2010

P:\BKF0902\EIR\Screencheck DEIR\2010 DEIR Figures\Figure3.4-1_ProposedDrainageImprovements.cdr (04/02/2010)





TYPICAL PULLOUT



TYPICAL PULLOUT SECTION

LSA

FIGURE 3.4-2

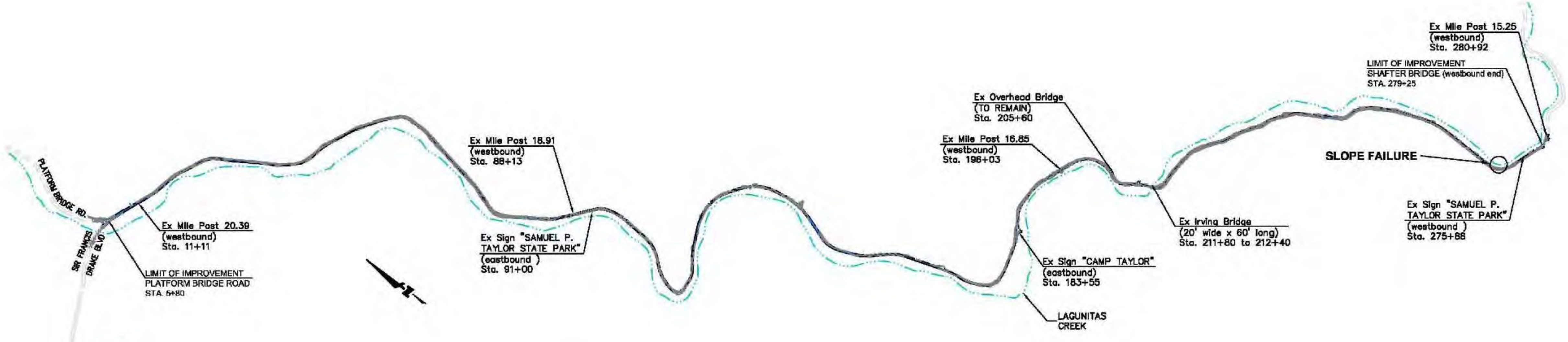
Sir Francis Drake Roadway Improvements Project

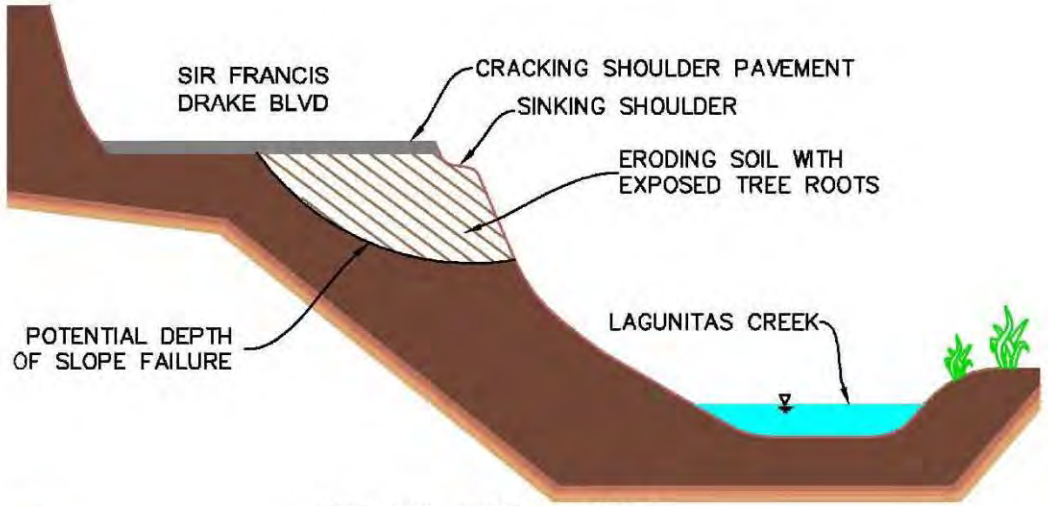
Proposed Pullout Improvements

NOT TO SCALE

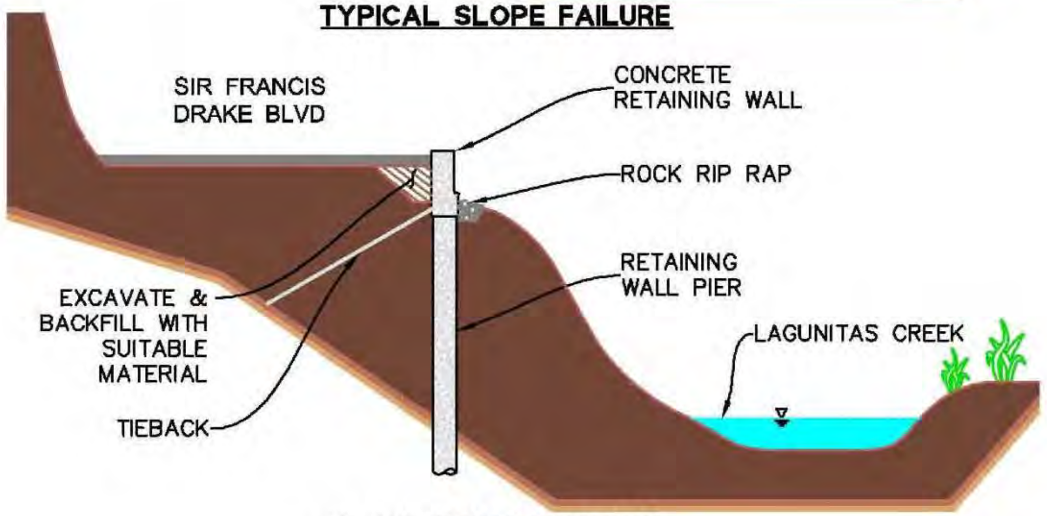
SOURCE: BKF ENGINEERS, 2010

P:\BKF0902\EIR\Screencheck DEIR\2010 DEIR Figures\Figure3.4-2_ProposedPulloutImprovements.cdr (04/02/2010)





TYPICAL SLOPE FAILURE



SLOPE REHABILITATION

PHOTO 1: SLOPE FAILURE

PHOTO 2: EDGE OF PAVEMENT

EXISTING FAILURE CONDITIONS

LSA

FIGURE 3.4-3

Sir Francis Drake Roadway Improvements Project

Proposed Slope Repair

NOT TO SCALE

SOURCE: BKF ENGINEERS, 2010

P:\BKF0902\EIR\Screencheck DEIR\2010 DEIR Figures\Figure3.4-3_ProposedSlopeRepair.cdr (04/02/2010)

Conceptual visual simulation of proposed slope repair as viewed from Lagunitas Creek

Conceptual visual simulation of retaining wall for slope repair as viewed from Sir Francis Drake Boulevard

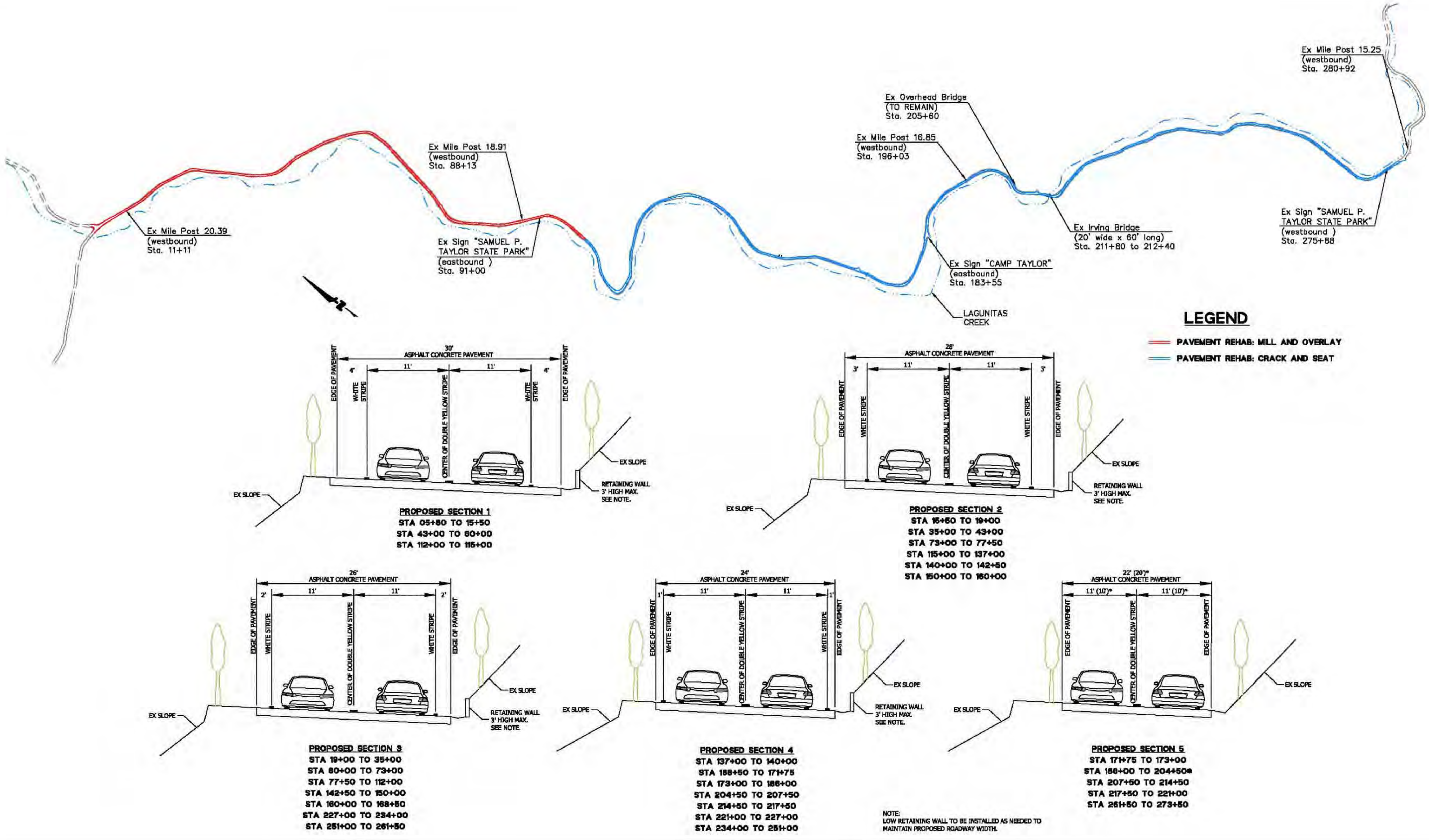
LSA

FIGURE 3.4-4

Sir Francis Drake Roadway Improvements Project

Visual Simulations of Slope Repair

SOURCE: BKF ENGINEERS, 2010



LSA

FIGURE 3.4-5

Sir Francis Drake Roadway Improvements Project

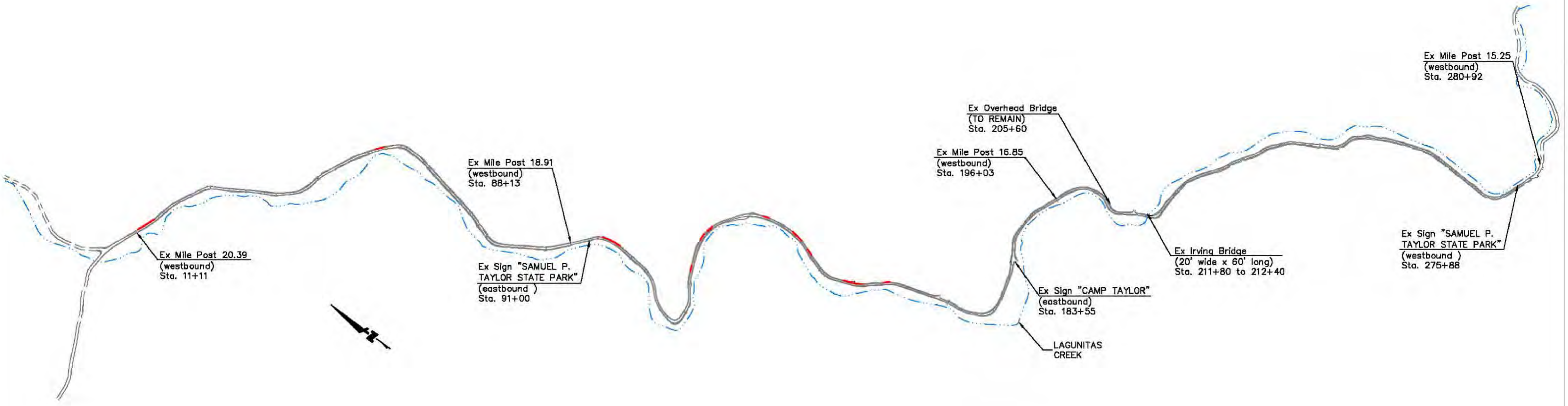
Additional Project Improvements

N

NOT TO SCALE

SOURCE: BKF ENGINEERS, 2010

P:\BKF0902\EIR\Screencheck DEIR\2010 DEIR Figures\Figure3.4-5_AdditionalProjectImprovements.cdr (04/06/2010)



LIMITS OF RETAINING WALL

STA 11+50 TO STA 14+50
STA 51+50 TO STA 52+90
STA 93+00 TO STA 96+00
STA 119+20 TO STA 120+20
STA 124+30 TO STA 125+50
STA 126+00 TOSTA 127+00
STA 135+00 TO STA 136+00
STA 140+00 TO STA 142+00
STA 143+50 TO STA 144+70
STA 151+25 TO STA 154+50
STA 157+50 TO STA 158+50

LSA

N

NOT TO SCALE

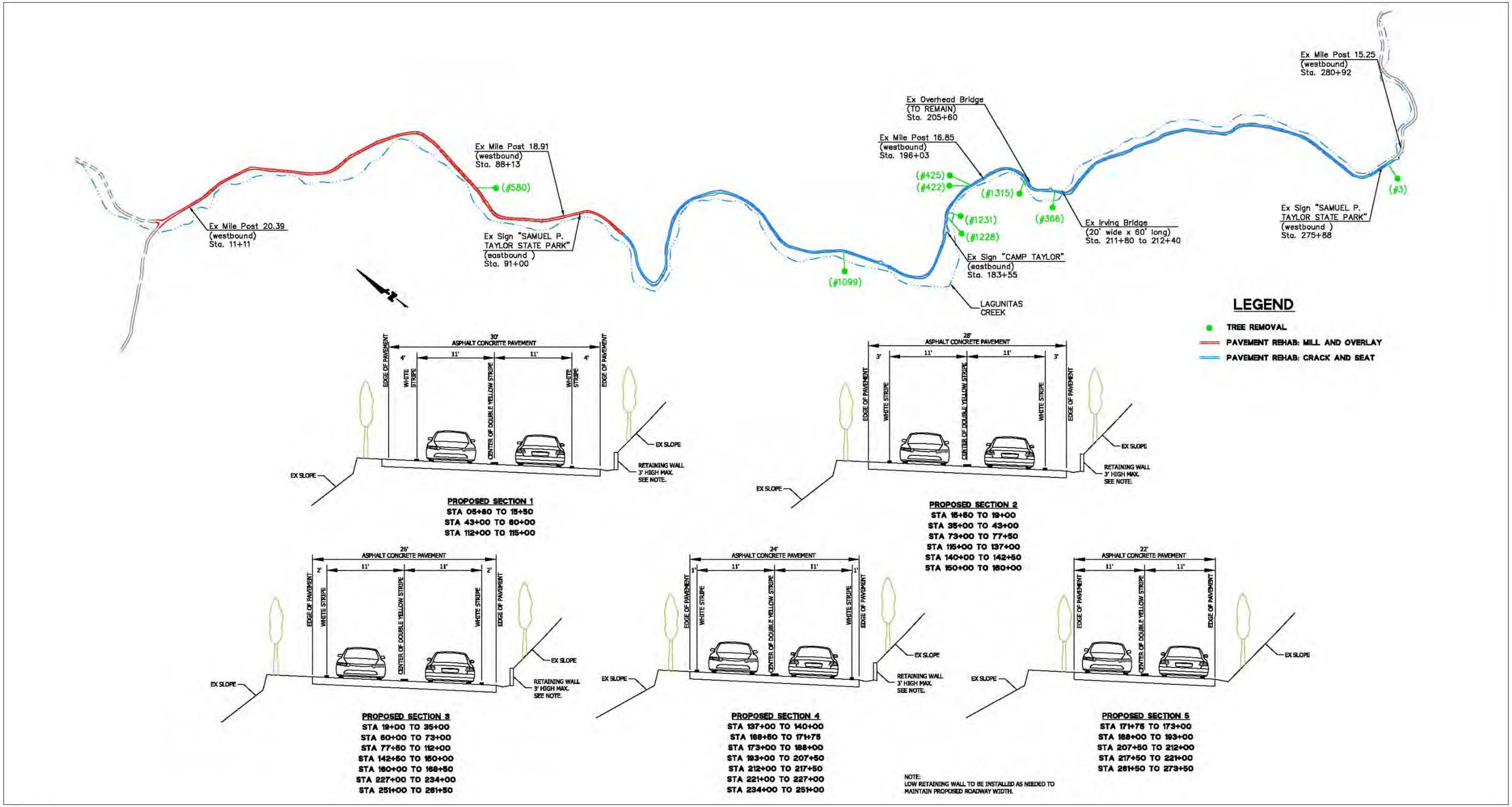
SOURCE: BKF ENGINEERS, 2010

FIGURE 3.4-6

Sir Francis Drake Roadway Improvements Project

Proposed Retaining Wall Improvements

P:\BKF0902\EIR\Screencheck DEIR\2010 DEIR Figures\Figure3.4-6_ProposedRetainingWallImprovements.cdr (04/02/2010)



LSA

FIGURE 3.4-8

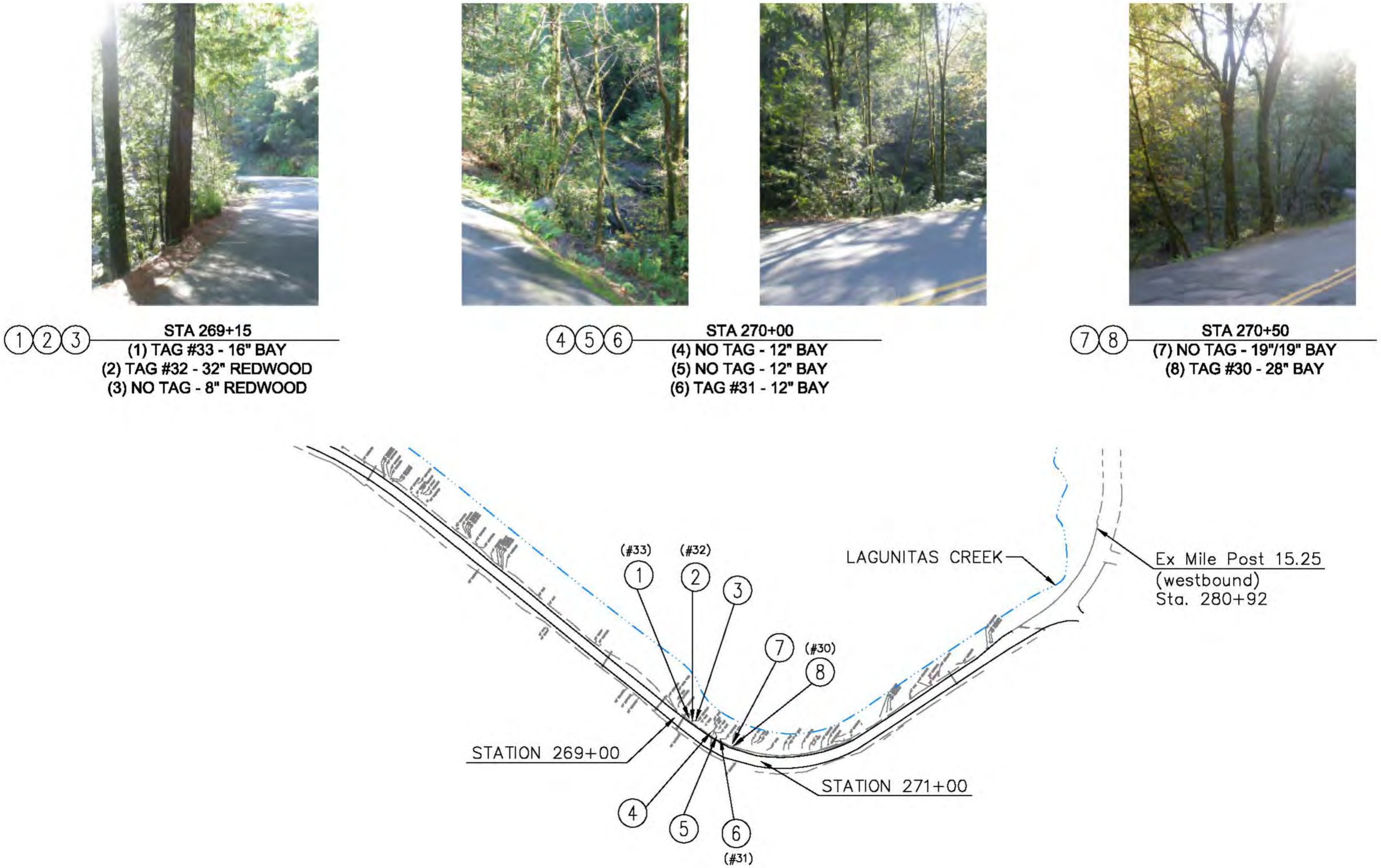
Sir Francis Drake Roadway Improvements Project

Option A Improvements

NOT TO SCALE

SOURCE: BKF ENGINEERS, 2010

P:\BKF0902\EIR\Screencheck DEIR\2010 DEIR Figures\Figure3.4-8_OptionAImprovements.cdr (04/06/2010)



LSA

FIGURE 4.2-2

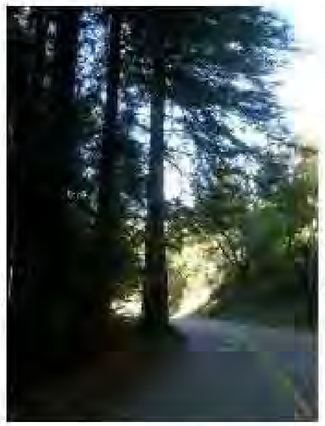
Sir Francis Drake Roadway Improvements Project

Tree Removal for Slope Repair

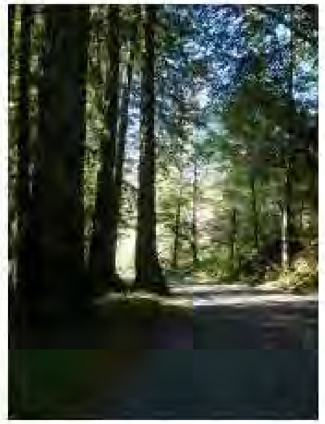
NOT TO SCALE

SOURCE: BKF ENGINEERS, 2010

P:\BKF0902\EIR\Screencheck DEIR\2010 DEIR Figures\Figure4.2-2_TreeRemoval.cdr (04/06/2010)



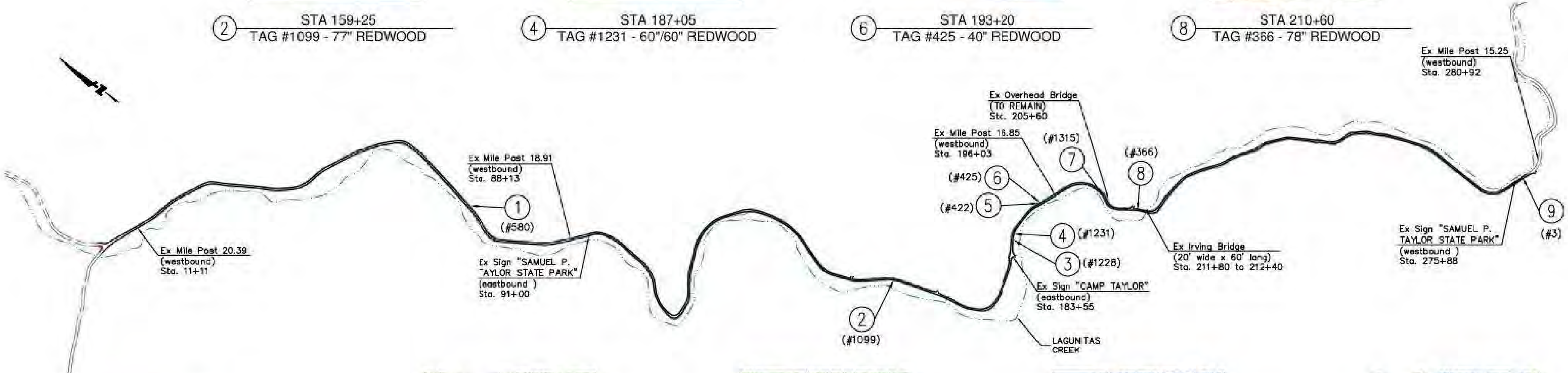
② STA 159+25
TAG #1099 - 77" REDWOOD



④ STA 187+05
TAG #1231 - 60"/60" REDWOOD

⑥ STA 193+20
TAG #425 - 40" REDWOOD

⑧ STA 210+60
TAG #366 - 78" REDWOOD



① STA 70+00
TAG #580 - 25"/20" OAK

③ STA 186+15
TAG #1228 - 55" REDWOOD

⑤ STA 193+05
TAG #422 - 24" REDWOOD

⑦ STA 204+40
TAG #1315 - 50" REDWOOD

⑨ STA 277+00
TAG #3 - 95" REDWOOD

LSA

FIGURE 4.2-3

Sir Francis Drake Roadway Improvements Project

Tree Removal for Option A

NOT TO SCALE

SOURCE: BKF ENGINEERS, 2010

P:\BKF0902\EIR\Screencheck DEIR\2010 DEIR Figures\Figure4.2-3_TreeRemoval-OptionA.cdr (04/06/2010)

SIR FRANCIS DRAKE BOULEVARD
ROADWAY REHABILITATION PROJECT
BIOLOGICAL ASSESSMENT

APPENDIX C
PHOTOGRAPHS OF PROJECT AREA

Photograph 1. SFDB. Photograph looking east from near Shafter Bridge.

Photograph 2. SFDB. Photograph looking southeast from roadway.

Photograph 3. SFDB. Photograph looking southeast from intersection of SFDB and Platform Bridge Road.

Photograph 4. SFDB. Photograph looking southeast from roadway.

Photograph 5. SFDB. Photograph looking northwest from roadway.

Photograph 6. Lagunitas Creek adjacent to the southern side of SFDB. Photograph looking northwest from creek.

Photograph 7. SFDB with Lagunitas Creek to the south. Photograph looking east from southern edge of roadway.

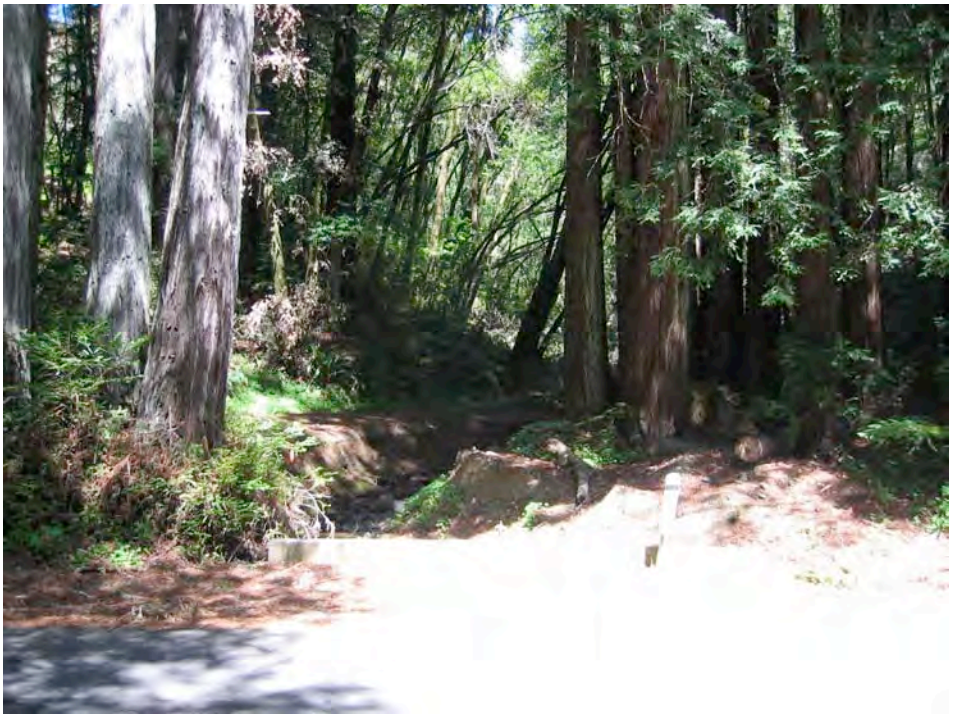
Photograph 8. SFDB. Photograph looking northwest from roadway.

Photograph 9. Unnamed stream on south side of SFDB. Stream crosses under SFDB via a corrugated metal culvert. Photograph looking south from roadway.

Photograph 10. Unnamed stream on north side of SFDB. Stream crosses under SFDB via a corrugated metal culvert extending from cement headwall in picture under existing roadway. Photograph looking north from roadway.

Photograph 11. SFDB and adjacent annual grassland habitat and freshwater emergent wetlands in road ditch. Photograph looking northwest from roadway.

Photograph 12. SFDB. Photograph looking southeast from shoulder of roadway.



Photograph 13. Barnabe Creek. Barnabe Creek flows under SFDB through two (2) corrugated steel culverts. Photograph looking north from roadway.

Photograph 14. SFDB. Photograph looking west from Shafter Bridge.

Photograph 15. Typical roadcut along northern shoulder of SFDB. Photograph looking north from shoulder of roadway.

Photograph 16. SFDB. Note riparian corridor along Lagunitas Creek on left hand side of photograph. Photograph looking northwest from roadway.

SIR FRANCIS DRAKE BOULEVARD ROADWAY REHABILITATION PROJECT BIOLOGICAL ASSESSMENT

APPENDIX D
CULVERT REPLACEMENT TABLE

APPENDIX D: SUMMARY OF EXISTING CULVERTS AND PROPOSED REPLACEMENT WORK

BKF Structure #	STA	MP	Ex. Size (in)	Culvert Size to Convey 100-year Storm	Proposed Culvert Size (in)	Ex. Significant Wildlife Crossing	Ex. Downstream Erosion	Proposed Headwall Repair	Proposed Pipe Repair	Proposed Energy Dissapation	Proposed Elbow w/ Down Slope	Notes
1	11+11	20.39	24	24	24	possible	unknown	rebuild (e) headwall	match to (e) CMP	none	no	
2	16+47	20.28	15	18	24	no	no	rebuild (e) headwall	match to (e) CMP	none	no	
3	19+20	20.23	15	24	24	no	unknown	rebuild (e) headwall	match to (e) CMP	none	no	cannot see outlet
4	21+30	20.19	15	15	24	no	unknown	rebuild (e) headwall	match to (e) CMP	none	no	cannot see outlet
5	24+50	20.13	90" x 90"	90" x 90"	90" x 90"	yes	no	(e) headwall to remain untouched	no repair recommended	N/A	N/A	McIssac Creek
6	29+95	20.03	18	24	24	possible	unknown	rebuild (e) headwall	match to (e) CMP	none	no	
7	32+80	19.97	15	18	24	no	unknown	rebuild (e) headwall	match to (e) CMP	none	no	cannot see outlet
8	34+55	19.94	15	15	24	no	unknown	rebuild (e) headwall	match to (e) CMP	none	no	
9	37+40	19.88	18	18	24	possible	no	rebuild (e) headwall	match to (e) CMP	none	no	
10	41+70	19.80	48	48	48	yes	no	(e) headwall to remain untouched	no repair recommended	N/A	N/A	check cover
11	50+25	19.64	48	48	48	possible	unknown	(e) headwall to remain untouched	no repair recommended	N/A	N/A	cannot see outlet
12	53+00	19.58	15	15	24	no	no	rebuild (e) headwall	match to (e) CMP	none	no	
13	55+50	19.54	15	15	24	no	no	rebuild (e) headwall	match to (e) CMP	none	no	
14	56+45	19.52	18	18	24	possible	no	rebuild (e) headwall	match to (e) CMP	none	no	
15	59+70	19.46	18	24	24	possible	no	rebuild (e) headwall	replace entire pipe	none	no	
16	60+85	19.43	18	18	24	possible	no	rebuild (e) headwall	match to (e) CMP	none	no	
17	65+65	19.34	15	18	24	no	unknown	rebuild (e) headwall	match to (e) CMP	none	no	(e) pipe type unknown
18	72+60	19.21	15	15	24	no	unknown	rebuild (e) headwall	match to (e) CMP	none	no	
19	74+50	19.17	68" x 118"	68" x 118"	68" x 118"	yes	unknown	(e) headwall to remain untouched	no repair recommended	N/A	N/A	Cheda Creek
20	80+30	19.06	15	15	24	no	unknown	rebuild (e) headwall	match to (e) CMP	none	no	
21	84+25	18.99	24	24	24	possible	unknown	(e) headwall to remain untouched	match to (e) CMP	N/A	N/A	cannot see outlet
22	85+10	18.98	15	15	15	no	no	(e) headwall to remain untouched	no repair recommended	N/A	N/A	
23	88+10	18.91	36	36	36	yes	no	(e) headwall to remain untouched	no repair recommended	N/A	N/A	(e) concrete pipe to be replaced
24	92+35	18.83	36	36	36	no	no	rebuild (e) headwall	connect to (e) at CB	none	no	CB and elbowed pipe (e)
25	96+15	18.76	15	24	24	no	no	rebuild (e) headwall	match to (e) CMP	none	no	elbowed pipe (e)

APPENDIX D: SUMMARY OF EXISTING CULVERTS AND PROPOSED REPLACEMENT WORK

BKF Structure #	STA	MP	Ex. Size (in)	Culvert Size to Convey 100-year Storm	Proposed Culvert Size (in)	Ex. Significant Wildlife Crossing	Ex. Downstream Erosion	Proposed Headwall Repair	Proposed Pipe Repair	Proposed Energy Dissapation	Proposed Elbow w/ Down Slope	Notes
26	98+40	18.72	18	18	24	possible	unknown	rebuild (e) headwall	match to (e) CMP	none	yes	
27	106+30	18.56	15	18	24	no	no	rebuild (e) headwall	match to (e) CMP	none	yes	
28	112+95	18.44	15	24	24	no	unknown	rebuild (e) headwall	match to (e) CMP	none	no	culvert at hair-pin turn
29	123+45	18.24	30	42	42	yes	no	rebuild (e) headwall	replace entire pipe	none	no	(e) pipe entirely concrete
30	125+85	18.19	15	18	24	no	unknown	rebuild (e) headwall	match to (e) CMP	none	no	cannot see outlet
31	129+50	18.12	15	15	24	no	unknown	rebuild (e) headwall	match to (e) CMP	none	no	cannot see outlet
32	133+00	18.05	12' x 20'	12' x 20'	12' x 20'	yes	no	(e) headwall to remain untouched	no repair recommended	N/A	N/A	Devil's Gulch
33	139+00	17.94	Box Culvert	Box Culvert	Box Culvert	yes	no	(e) headwall to remain untouched	no repair recommended	N/A	N/A	Deadman's Gulch
34	139+45	17.93	12	12	12	no	yes	rebuild (e) headwall	replace entire pipe	none	no	
35	145+00	17.83	12	24	24	no	no	rebuild (e) headwall	match to (e) CMP	none	no	
36	147+30	17.78	15	15	24	no	no	rebuild (e) headwall	match to (e) CMP	none	no	
37	149+70	17.73	15	24	24	no	unknown	rebuild (e) headwall	match to (e) CMP	none	no	cannot see outlet
38	154+80	17.64	15	30	30	no	yes	rebuild (e) headwall	replace entire pipe	rip-rap	yes	
39	161+90	17.50	24	30	30	possible	no	rebuild (e) headwall	replace entire pipe	none	no	
40	165+50	17.44	15	24	24	no	yes	rebuild (e) headwall	match to (e) CMP	none	yes	backfill outlet area
41	168+00	17.38	24	24	24	no	yes	rebuild (e) headwall	no repair recommended	rip-rap	yes	backfill outlet area
42	171+50	17.32	18	42	24	yes	yes	rebuild (e) headwall	match to (e) CMP	erosion fabric	yes	protect tree roots
43	175+40	17.24	18	18	18	yes	unknown	(e) headwall to remain untouched	no repair recommended	N/A	N/A	drains to campground swale
44	177+60	17.20	18	18	24	yes	no	build headwall	replace entire pipe	none	no	drains to campground swale
45	181+05	17.14	15	15	15	no	no	(e) headwall to remain untouched	no repair recommended	N/A	N/A	drains to campground swale
46	183+05	17.10	18	18	24	possible	no	rebuild (e) headwall	match to (e) CMP	none	no	
47	183+70	17.13	12	12	12	no	no	no headwall	no repair recommended	N/A	N/A	under-driveway culvert
48	185+40	17.05	18	18	24	possible	no	rebuild (e) headwall	match to (e) CMP	none	no	
49	186+80	17.03	18	18	24	no	no	rebuild (e) headwall	replace entire pipe	erosion fabric	yes	
50	190+80	16.95	18	30	30	possible	no	rebuild (e) headwall	replace entire pipe	none	no	
51	193+70	16.89	18	18	18	no	yes	rebuild (e) headwall	replace entire pipe	erosion fabric	no	

APPENDIX D: SUMMARY OF EXISTING CULVERTS AND PROPOSED REPLACEMENT WORK

BKF Structure #	STA	MP	Ex. Size (in)	Culvert Size to Convey 100-year Storm	Proposed Culvert Size (in)	Ex. Significant Wildlife Crossing	Ex. Downstream Erosion	Proposed Headwall Repair	Proposed Pipe Repair	Proposed Energy Dissapation	Proposed Elbow w/ Down Slope	Notes
52	196+00	16.85	18" & 30"	6' x 6'	6' x 6'	no	no	rebuild (e) headwall	possible box culvert	erosion fabric	no	Barnabe Creek
53	197+90	16.81	24	24	24	yes	yes	rebuild (e) headwall	replace entire pipe	erosion fabric	yes	
54	201+25	16.75	18	24	24	no	yes	rebuild (e) headwall	replace entire pipe	erosion fabric	yes	
55	205+60	16.66	18	18	18	yes	no	(e) headwall to remain untouched	no repair recommended	N/A	N/A	
56	214+40	16.50	18	36	36	no	yes	build headwall	replace entire pipe	erosion fabric	no	cut outlet and place rip-rap
57	218+40	16.42	18	18	18	yes	no	rebuild (e) headwall	replace entire pipe	none	no	(e) concrete pipe to be replaced
58	220+80	16.37	18	18	24	no	no	rebuild (e) headwall	match to (e) CMP	erosion fabric	yes	
59	226+20	16.27	18	18	18	possible	no	rebuild (e) headwall	match to (e) CMP	none	no	cannot see outlet
60	229+60	16.21	18	24	24	yes	no	rebuild (e) headwall	match to (e) CMP	none	no	cannot see outlet
61	235+95	16.09	24	42	24	yes	no	(e) headwall to remain untouched	no repair recommended	N/A	N/A	
62	241+90	15.97	18	30	30	no	yes	build headwall	replace entire pipe	erosion fabric	no	
63	244+10	15.93	24	24	24	possible	no	rebuild (e) headwall	match to (e) CMP	none	no	
64	248+15	15.86	24	24	24	no	no	rebuild (e) headwall	match to (e) CMP	none	no	cannot see outlet
65	255+80	15.70	24	42	42	no	yes	rebuild (e) headwall	replace entire pipe	erosion fabric	yes	
66	260+50	15.61	18	30	30	yes	yes	rebuild (e) headwall	replace entire pipe	erosion fabric	no	(e) concrete pipe to be replaced
67	267+15	15.49	18	18	24	yes	no	rebuild (e) headwall	match to (e) CMP	none	no	
68	268+65	15.46	24	24	24	possible	no	rebuild (e) headwall	match to (e) CMP	none	no	
69	269+25	15.45	24	24	24	no	yes	rebuild (e) headwall	replace entire pipe	erosion fabric	yes	to go through retaining wall
70	270+10	15.43	24	24	24	no	yes	rebuild (e) headwall	replace entire pipe	erosion fabric	yes	to go through retaining wall
71	276+10	15.38	12	24	24	no	no	rebuild (e) headwall	match to (e) CMP	none	no	cannot see outlet
72	278+10	15.32	18	18	18	possible	no	(e) headwall to remain untouched	no repair recommended	N/A	N/A	part of Irving Bridge

SIR FRANCIS DRAKE BOULEVARD
ROADWAY REHABILITATION PROJECT
BIOLOGICAL ASSESSMENT

APPENDIX E
PLANT AND ANIMAL SPECIES OBSERVED IN THE PROJECT STUDY AREA

PLANT SPECIES OBSERVED

Source: Synthesis Environmental Planning, Inc.

Plant Species Observed During Field Surveys

Scientific Name	**Common Name**
Acer macrophyllum	Big leaf maple *
Acer negundo var. Californicum	California box elder *
Acacia decurrens	Green wattle *
Acaena pinnatifida var. *californica*	No common name
Achillea millefolium	Yarrow
Adenocaulon bicolor	Trail plant
Adiantum aleuticum	Five-finger fern
Adiantum jordanii	California maidenhair
Aesculus californica	California buckeye
Aira caryophyllea	Silver hair grass *
Alisma plantago-aquatica	Water plantain
Allium triquetrum	Three corner leek *
Alnus rhombifolia	White alder
Amsinckia menziesii var. *intermedia*	Fiddleneck
Anagallis arvensis	Scarlet pimpernel *
Anaphalis margaritacea	Pearly everlasting
Anemone oregano	Windflower
Anthriscus caucalis	Bur chervil *
Aquilegia Formosa	Columbine
Aralia californica	Elk clover
Arbutus menziesii	Madrone
Aristolochia californica	California pipe-vine
Artemisia californica	California sagebrush
Artmemisisa douglasiana	Douglas' mugwort
Asarum caudatum	Wild ginger
Athyrium filix-femina var. *cyclosorum*	Coastal lady fern
Avena barbata	Slim oat *
Baccharis pilularis	Coyote brush
Barbarea orthoceras	Winter cress *
Barbarea verna	Winter cress *
Bellis perennis	English daisy *
Boykinia occidentalis	Brook foam
Brassica rapa	Field mustard *
Briza maxima	Rattlesnake grass *
Briza minor	Little rattlesnake grass *
Bromus carinatus	California brome
Bromus hordeaceus	Soft chess *
Bromus laevipes	Weeping brome
Bromus tectorum	Downy brome *
Calandrina ciliata	Red maids
Calystegia purpurata var.*purpurata*	Morning-glory
Capsella bursa-pastoris	Shepherd's purse *
Cardamine californica var. *californica*	Milk maids
Cardamine oligosperma	Bitter-cress
Carduus pycnocephalus	Italian thistle *
Carex amplifolia	Sedge
Carex densa	Sedge
Carex globosa	Woodland sedge

Plant Species Observed During Field Surveys	
Scientific Name	**Common Name**
Carex nudata	Torrent sedge
Castilleja subinclusa ssp. *franciscana*	Indian paintbrush
Ceanothus thyrsiflorus	Blue blossom
Cerastium glomeratum	Mouse-ear chickweed *
Chamomilla suaveolens	Pineapple weed *
Chlorogalum pomeridianum var. *pomeridianum*	Soap plant
Circaea alpina ssp. *pacifica*	Enchanter's nightshade
Cicuta douglasii	Water hemlock
Cirsium brevistylum	No common name
Cirsium spp.	Thistle *
Cirsium vulgare	Bull thistle *
Clarkia cocinna ssp. *cocinna*	Red ribbons
Clarkia puppurea ssp. *quadrivulnera*	Wine-cup clarkia
Clarkia rubicunda	Ruby-chalice clarkia
Claytonia parviflora ssp. *parviflora*	Linear-leaf miner's lettuce
Claytonia perfoliata ssp. *perfoliata*	Broadleaf miner's lettuce
Clematis ligusticifolia	Virgin's bower
Clintonia andrewsiana	No common name
Collinsia heterophylla	Chinese houses
Conium maculatum	Poison hemlock *
Convolvulus arvensis	Bindweed *
Cornus sericea var. *sericea*	Creek dogwood
Coronopus didymus	Wart cress *
Corylus cornuta var. *californica*	California hazel
Cotoneaster pannosa	No common name
Cynoglossum grande	Hounds tongue
Cynosurus echinatus	Dogfoot grass *
Cyperus eragrostis	Umbrella sedge
Cystopteris fragilis	Brittle fern
Dactylis glomerata	Orchard grass *
Danthonia californica	No common name
Delphinium nudicaule	Red larkspur
Deschampsia elongate	Slender hairgrass
Dicentra Formosa	Bleeding heart
Dichelostemma capitatum ssp.*capitatum*	Blue dicks
Digitalis purpurea	Foxglove *
Dipsacus fullonum	Fullers teasel
Disporum hookeri	Green fairy bells
Disporum smithii	White fairy bells
Dryopteris arguta	Coastal wood fern
Dudleya cymosa var.*cymosa*	Rock lettuce
Ehrharta erecta	Veldt grass *
Elamus glaucus ssp. *glaucus*	Blue wild-rye
Elymus californicus	California bottlebrush
Epilobium ciliatum ssp. *ciliatum*	Northern willow herb
Epipactis gigantea	Stream orchid
Equisetum telmateia ssp. braunii	Giant horsetail
Erechtites minima	Australian fireweed *
Erechtites minima	Australian fireweed

Plant Species Observed During Field Surveys	
Scientific Name	**Common Name**
Eriogonum nudum var. *nudum*	Nude buckwheat
Eriophyllum lanatum var.*arachnoideum*	Woolly sunflower
Erodium botrys	Broad-leaf filaree *
Erodium cicutarium	Red-stem filaree *
Eschscholzia californica	California poppy
Euphorbia peplus	Petty spurge *
Foeniculum vulgare	Fennel
Fragaria vesca	Wild strawberry
Fraxinus latifolia	Oregon ash
Fritillaria affinis var. *affinis*	Mission bells
Galium aparine	Goose grass *
Galium porrigens var. *porrigens*	Climbing bedstraw
Galium triflorum	Sweet-scented bedstraw
Garrya elliptica	Tassel bush silk
Gaultheria shallon	Salal
Genista monspessulana	French broom *
Geranium dissectum	Cut-leaved cranesbill *
Geranium molle	Soft cranesbill *
Gnaphalium californicum	California everlasting cudweed
Gnaphalium Ramosissimum	Pink cudweed
Hedera canariensis	Algerian ivy *
Hedera helix	English ivy *
Helenium puberulum	Sneezeweed
Hemizonia congesta var.. *Lutescens*	Hayfield tarweed
Heracleum maximum	Cow parsnip
Heteromeles arbutifolia	Toyon
Heuchera micrantha	Alum-root
Hieracium albiflorum	Hawkweed
Hierochloe occidentalis	Vanilla grass
Hirschfeldia incana	Shortpod mustard *
Holcus lanatus	Velvet grass *
Holodiscus discolor	Ocean-spray
Hordeum murinum ssp. *leporinum*	Farmer's foxtail *
Hypochaeris glabra	Smooth Cats-Ear *
Iris douglasiana var. *major)*	Douglas iris
Juncus bufonius var. *bufonius*	Toad rush
Juncus effuses	Rush
Juncus patens Rush	Rush
Lapsana communis	Nipplewort *
Lathyrus vestitus var. *vestitus*	Hillside Sweet-Pea
Leymus tridicoides	No common name
Ligusticum apiifolium	Lovage
Lilium pardalinum ssp. *pardalinum*	Leopard lily
Lithocarpus densiflorus var. *densiflorus*	Tanbark oak
Lithophragma affine	Woodland star
Lithophragma heterophyllum	Woodland star
Lolium multiflorum	Annual Italian ryegrass *
Lolium perenne	Perennial ryegrass *
Lonicera hispidula var. *vacillans*	California honeysuckle

Plant Species Observed During Field Surveys

Scientific Name	**Common Name**
Lotus humistratus	Colchita
Lotus micranthus	Hill Lotus
Lotus scoparius var. *scoparius*	Deerweed
Lupinus bicolor	Dove lupine
Lupinus latifolius var. *latifolius*	Lupine
Luzula comosa	Wood-rush
Madia madioides	Woodland madia
Marah fabaceus	Man-root
Marah oreganus	Coast man-root
Medicago arabica	Spotted medick *
Medicago polymorpha	Bur clover *
Melica califonica	California melic
Melica harfordii	Melicgrass
Melica subulata	Alaska oniongrass
Melica torreyana	Melicgrass
Mentha pulegium	European pennyroyal *
Mimulus aurantiacus	Bush monkeyflower
Mimulus cardinalis	Scarlet monkeyflower
Mimulus guttatus	Yellow monkeyflower
Mimulus moschatus	Musk flower
Mitella ovalis	Miterwort
Monardella villosa ssp. *villosa*	Coyote-mint
Montia parvifolia	Stoloniferous montia
Myosotis latifolia	Forget-me-not *
Myosotis latifolia	Forget-me-not
Nassella (Stipa) pulchra	Purple needlegrass
Nemophila heterophylla	No common name
Oemleria (Osmaronia) cerasiformis	Oso berry
Osmorhiza berteroi	Sweet cicely
Oxalis albicans ssp. *pilosa*	Wood-sorrel
Oxalis oregano	Redwood sorrel
Paspalum dilatatum	Dallisgrass *
Pentagramma triangularis	Goldback fern
Petasites frigidus var. *palmatus*	Western coltsfoot
Philadelphus spp.	Mock orange *
Physocarpus capitatus	Ninebark
Picris echioides	Bristly ox tongue
Plagiobothrys nothofulvus	Popcorn flower
Plantago lancealata	Ribwort *
Plantago major	Common plantain *
Platystemon californicus	Cream-cup
Poa annua	Annual bluegrass *
Poa howellii	Bluegrass
Poa kelloggii	Bluegrass
Poa pratensis ssp. *pratensis*	Kentucky bluegrass *
Polypodium californicum	California polypody
Polystichum munitum	Western sword fern
Prunella vulgaris var. *vulgaris*	Selfheal *
Prunus spp.	Cherry-plum

Plant Species Observed During Field Surveys	
Scientific Name	**Common Name**
Pseudotsuga menziesii var. *menziesii*	Douglas-fir
Pteridium aquilinum var. *pubescens*	Bracken fern
Quercus agrifolia var. *agrifolia*	Coast live oak
Quercus chrysolepis	Canyon live oak
Ranunculus californicus	California buttercup
Ranunculus muricatus	Prickle-fruit buttercup *
Raphanus sativus	Radish *
Rhamnus (Frangula) californica ssp. *californica*	Coffee berry
Rhododendron macrophyllum	Western rhododendron
Rhododendron occidentale	Western azalea
Romanzoffia californica	Mist maiden
Rorippa nasturtium-aquaticum	Water cress *
Rosa gymnocarpa	Wood rose
Rubus discolor	Himalayan blackberry *
Rubus parviflorus	Thimbleberry
Rubus ursinus	California blackberry
Rumex acetosella	Sheep sorrel *
Rumex salicifolius var. *salicifolius*	Willow dock
Salix lasiolepis	Arroyo willow
Salix sitchensis	Sitka willow
Sambucus Mexicana	Blue elderberry
Sanicula arctopoides	Footsteps-of-spring
Sanicula bipinnatifida	Purple sanicle
Sanicula crassicaulis	Pacific sanicle
Satureja (Clinopodium) douglasii	Yerba buena
Scandix pectin-veneris	Shepherd's needle *
Scirpus microcarpus	Bulrush
Scoliopus bigelovii	Fetid adder's tongue
Scrophularia californica ssp. *californica*	Bee-plant
Sedum spathulifolium	Spoon-leaved stonecrop
Senecio aronicoides	Butterweed
Sequoia sempervirens	Redwood
Sherardia arvensis	Field madder *
Sidalcea malviflora	Checkerbloom
Sinapis arvensis	Charlock *
Sisymbrium officinale	Hedge mustard *
Sisyrinchium bellum	Blue-eyed grass
Smilacina (Maianthemum) racemosa	Fat solomon
Smilacina (Maianthemum) stellata	Slim solomon
Solanum americanum	Black nightshade *
Soleirolia soleirolii	Baby's tears
Soliva sessilis	Chamomile sticker *
Spergularia rubra	Sand spurrey *
Stachys ajugoides var. *rigida*	Hedge nettle
Stellaria media	Chickweed *
Symphoricarpos albus var. *laevigatus*	Streamside snowberry
Symphoricarpos mollis	Low snowberry
Symphytum asperum lepechin	Prickly comfrey
Tanacetum parthenium	Feverfew *

Plant Species Observed During Field Surveys	
Scientific Name	**Common Name**
Taraxacum officinale	Dandelion *
Tellima grandiflora	Fringe-cups
Torilis arvensis	Hedge parsley *
Torilis arvensis purpurea	Hedge parsley *
Torilis nodosa	Hedge parsley *
Toxicodendron diversilobum	Poison oak
Trientalis latifolia	Star-flower
Trifolium bifidum var. *bifidum*	Notched-leaf clover
Trifolium willdenovii	Tomcat clover
Trillim ovatum ssp. *ovatum*	White wake-robin
Trillium chloropetalum	Sessile-flowered wake-robin
Triteleia hyacithina	White brodiaea
Tritelia laxa	Ithuriel's spear
Typha angustifolia	Narrow-leaved cattail
Typha latifolia	Broad-leaved cattail
Umbellularia californica	California bay
Urtica dioica ssp. holosericea	Stinging Nettle
Vaccinium ovatum	Huckleberry
Vancouveria planipetala	Inside out flower
Veronica americana	American brooklime
Vicia villosa ssp. varia	Vetch
Vinca major	Periwinkle *
Viola glabella	Stream violet
Viola sempervirens	Redwood violet
Whipplea modesta	Modesty
Woodwardia fimbriata	Western chain fern
Wyethia glabra	Coast range mule ears

Notes:
* - Plant species not native to project area.

Animal Species Observed

Source: Synthesis Environmental Planning, Inc.

Animal Species Observed During Field Surveys

Scientific Name	**Common Name**
Accipiter cooperii	Cooper’s hawk
Agelaius phoeniceus	Red-winged blackbird
Anas platyrhynchos	Mallard
Aphelocoma californica	Western scrub-jay
Ardea herodias	Great blue heron
Batrachoseps attenuatus	California slender salamander
Buteo jamaicensis	Red-tailed hawk
Callipepla californica	California quail
Canis latrans	Coyote
Carduelis tristis	American goldfinch
Carpodacus mexicanus	House finch
Cathartes aura	Turkey vulture
Charadrius vociferus	Killdeer
Corvus corax	Common raven
Cyanocitta stelleri	Steller’s jay
Didelphis virginiana	Virginia opossum
Dryocopus pileatus	Pileated woodpecker
Euphagus cyanocephalus	Brewer’s blackbird
Hirundo rustica	Barn swallow
Lepus californicus	Black-tailed jackrabbit
Meleagris gallopavo	Wild turkey
Melospiza melodia	Song sparrow
Mephitis mephitis	Striped skunk
Mimus polyglottos	Northern mockingbird
Odocoileus hemionus	Black-tailed deer
Passer domesticus	House sparrow
Pipilo crissalis	California towhee
Poecile rufescens	Chestnut-backed chickadee
Procyon lotor	Northern raccoon
Pseudacris sierra	Sierran treefrog
Sceloporus occidentalis	Western fence lizard
Sialia mexicana	Western bluebird
Spermophilus beecheyi	California ground squirrel
Sturnella neglecta	Western meadowlark
Troglodytes aedon	House wren
Tyrannus verticalis	Western kingbird
Zenaida macroura	Mourning dove
Zonotrichia albicollis	White-throated sparrow
Zonotrichia atricapilla	Golden-crowned sparrow
Zonotrichia leucophrys	White-crowned sparrow

SIR FRANCIS DRAKE BOULEVARD
ROADWAY REHABILITATION PROJECT
BIOLOGICAL ASSESSMENT

APPENDIX F
BOTANICAL SURVEY REPORT

Proposed Road Repaving and Shoulder Expansion

Samuel P. Taylor State Park
Marin County, CA

Prepared for
Synthesis Environmental Planning

Prepared by
Molly Boyes, Botanical Surveying Consultant
14 Sherwood Lane, Inverness, CA 94937

Revised July 14, 2009

Contents

1.0 Introduction

1.1. Study Objectives and Overview

The County of Marin in cooperation with Samuel P. Taylor State Park has proposed a project to resurface 5.4 miles of Sir Francis Drake Boulevard through the Park. The proposed project area runs from Shafter Bridge at highway marker 15.32 to Platform Bridge in Tocaloma at highway marker 20.54. Refer to Figure 1 for an area map. The project area includes 50 feet on either side of the road. The total project area is approximately 26.5 hectares. The County also proposes to expand the highway shoulder in certain locations as part of this project. We conducted this study to identify and assess potential risks to any special status plant species in the project area. In particular, we looked for the species listed in Table 4 – Target Plants and Species of Concern for Survey in Project Area. This list is a compilation of special status species identified by federal and state authorities, as well as by the California Native Plant Society.

The original road cut dates to the mid-1800s. Native plant communities colonized the cliffs on both sides of the road. Were the same cuts made today, the exposed soil would likely be colonized by invasive exotic species. There is a high level of alpha diversity – biodiversity at the ecosystem level (Whitaker 1972) – at this location, including a high density of native plants. No threatened or endangered plant species were observed growing in the project area. Surveys of the area did not reveal significant encroachment by invasive natives or exotic plants.

1.2. Description of Study Area

Samuel P. Taylor State Park is located entirely within Marin County. It lies approximately 15 miles west of San Rafael and 3 miles east of Olema. The lush forests in the park grow in the moist valley between low ridges characteristic of Bolinas Ridge and the southern North Coast Range. They are dominated by Coast Redwood (*Sequoia sempervirens*) and Coast Douglas-fir (*Pseudotsuga menziesii ssp. menziesii*). The park also features areas of open, native grassland. Sir Francis Drake Boulevard traverses the park in a general southeast to northwest direction. The dominant landform in the park is Barnabe Mountain (1,466 feet) on the north side of Sir Francis Drake Blvd. The road closely follows the path of Lagunitas Creek through the park. Several species of salmon spawn in and migrate through multiple lengths of the creek in the study area.

The predominant plant communities (California Dept. of Fish and Game 2003) in the study area include the following:

- Coastal Oak Woodland
- Coastal Scrub
- Douglas Fir
- Mixed Chaparral
- Montane Hardwood
- Montane Hardwood-Conifer
- Montane Riparian
- Pasture
- Perennial Grassland

- Redwood
- Riparian

The riparian zone is an important ecological resource in the project area. This area surrounds and includes Lagunitas Creek the entire length of the project area. Distinct habitat patches occur along the riparian zone, starting with the extremely diverse length between Shafter Bridge and Irving Bridge. At the numerous places where feeder streams meet Lagunitas Creek, plant diversity is higher.

Starting at the east end (Shafter Bridge, Location 3), the tree canopy in predominantly redwood. Plant species here include western azalea, Boykinia, leopard lily, western coltsfoot, torrent sedge, and bulrush. Moving west, as the canopy changes, so do the understory plants. For example, western azaleas become less common and stop occurring altogether.

At about mile marker 16.54, in the riparian zone on either side of Irving Bridge, is also an area of high plant diversity. Downstream of Irving Bridge, stream orchids become common for approximately the next mile.

Within the campground along the riparian zone, there is a higher incidence of introduced plants, including western rhododendron, *Ehrharta erecta, Vinca major, and* baby tears (*Soleirolia soleirolii).* West of the campground, the tree canopy transitions to bay, live oak, alder, buckeye, and willow. Some of the largest live oak trees and white alders in the park occur along the creek bank in this section. Large patches of Vinca, an invasive exotic plant, grow near Devil's Gulch Creek. Native plants of note there include red monkeyflower, virgin's bower, ninebark, and oso berry.

At the west end of the project area, Sitka and arroyo willows dominate, forming extensive stands. Other species noted there include blue elderberry and twinberry.

2.0 Methods

2.1. Special Status Plants

We performed a literature review to determine which special status plants had been observed historically in the study area. We also looked for special status plants that could potentially be affected by the road-widening project. We reviewed the California Natural Diversity Database (CNDDB 2007) for the San Geronimo 7.5 minute USGS quadrangle map. Rare plants were defined as species that meet the following criteria: 1) They are listed, proposed, or under review as rare, threatened, or endangered under the Federal Endangered Species Act or the California Endangered Species Act; or 2) They are considered rare or endangered by the California Native Plant Society (CNPS). There were no observations of threatened or endangered species specifically recorded for the study area.

2.2. Special Status Plant Surveys

We followed the rare plant monitoring guidelines established by the California Department of Fish and Game (CDFG 2000), as adopted by the CNPS. As required, we conducted floristic field surveys between April 5 and July 10, 2007, the proper seasonal time to detect most special status plants by phenotypic analysis. The lone exception is Koch's cord-moss (*Entosthodon kochii*). This species grows on rocks in sunny areas, and dries up before April, rendering it unidentifiable. Surveys for this plant should be done in February – March. We identified all plants encountered to a sufficient taxonomic level to determine their rarity and listing status.

We performed repeated line transect sampling on foot on both sides of Sir Francis Drake Boulevard throughout the proposed project area. We focused on areas with significant plant diversity and those having the highest probability of hosting special status species. Specifically, this included a 50-foot-wide margin on both sides of the road for length of the project area, with the exception of dense near-monoculture areas of willow and *Rubus* thickets.

Because we did not detect any rare, threatened, or endangered species, we did not collect any voucher specimens.

3.0 Results

3.1. General Observations

Starting at the east end of the project area near Shafter Bridge and moving west, the dominant plant community on southwest side of the road is Douglas fir. Coast Canyon Live Oaks comprise the subcanopy. Plant surveys revealed that the east end of the project area hosts the highest richness of native plant species. See Table 1 for a complete list of species that we observed on our surveys.

Two places of interest in this area are cliff-side communities with diverse and distinct plant populations. The first, located at 38°00'16N, 122°43'33W, is visible from the road. Refer to Figure 1 for location. We observed 34 individual brittle ferns (*Cystopteris fragilis)*, uncommon in this area. Growing out the same cliff formation in an area of roughly 1200 square feet were 25 other plant species. Notable species include inside-out flower (*Vancouveria planipetala*), *Huechera microcantha,* and goldenback fern (*Pentagramma triangularis).* A diverse cluster of 21 plant species as observed approximately 40 feet north along the same cliff formation. The cliff here is steeper and higher. The cliff face is dominated by thousands of individual California polypods (*Polypodium californicum*). Other notable plants include at least 50 individual checker lilies (*Frittilaria affine*), spoon-leaved sedum (*Sedum spathulifolium*), western columbine (*Aquilegia formosa),* and stoloniferous montia (*Montia parvifolia*).

Redwood forest dominates the riparian areas along the northeast side of the road. The northeast side of the road is flanked by a slope that descends to Lagunitas Creek. Refer to Figure 1 for location. This slope is colonized by riparian and upland plants, including Oregon ash (*Fraxinus latifolia*), leopard lilies (*Lilium pardalinum*), western azalea (*Rhododendron occidentale),* western coltsfoot (*Petastites frigidus*), and various sedges (*Carex*). Brook foam (*Boykinia* *occidentalis*) occurs sporadically along the riparian area. We observed a single individual silk tassel bush (*Garrya elliptica*). This plant, though uncommon, is not a species of special concern.

Continuing west along Sir Francis Drake Boulevard, the forest composition varies in the proportion of redwoods and tanoaks (*Lithocarpus densiflora*) that are present. Many tanoaks showed evidence of infestation by the pathogen *Phytopthora ramorum*, responsible for Sudden Oak Death. Common species on the forest floor include redwood violets (V*iola sempervirens),* Fetid adder's tongue (*Scoliopus biglovii*), redwood oxalis (*Oxalis oregana*), the bunchgrass *Bromas leavipes*, and wood fern (*Dryopteris* sp.).

Another point of interest is the roadside spring at 38°00'45N, 122°42'54W. Refer to Figure 1 for location. We observed a total of 19 natives and 4 non-native species here. The southernmost population of miterwort (*Mitella ovalis*) occurs here (Calflora.org 2007). The area around the spring is a perennial bog wetland. Native plants of note include California spikenard (*Aralia californica*) and vanilla grass (*Hierochloe occidentalis*). Himalayan blackberry, an invasive exotic, was observed here.

Northeast of the roadside spring, we found a population of mist maidens (*Romanzoffia californica*), a plant of occasional occurrence (CNPS). This population was located at 38°00'51N, 122°43'00W. Refer to Figure 1 for location.

We observed a population of bottlebrush grass (*Elymus californicus)* 20 feet west of Irving Bridge, mile marker 16.54. The area around this population is colonized by redwood violet. This species is on the CNPS watch list (List 4). Refer to Figure 1 for location. Approximately 20 feet east of the bridge is a patch of *Carex amplifolia*, an uncommon sedge in this area. We also observed stream orchids (*Epipactis gigantean)* at numerous locations on the west side of Irving Bridge.

North of Sir Francis Drake Boulevard near the Madrone Group Camps, **Coastal Oak Woodlands** were observed. These occur both as subdominant understory at the edge of open mixed conifers (redwood and Douglas fir), and as the dominant canopy. Predominant plants here include modesty (*Whipplea modest*), Douglas iris (*Iris douglasiana var. major).* We observed a few individuals of *Elymus californicus.*

West of the Madrone Group Camps (mile marker 17.64) is an area dominated by Native Perennial Grassland. California grassland and oak savanna communities provide important habitat for wildlife habitat (Guisti et al. 1996). Approximately 90% of the species listed in the Inventory of Rare and Endangered Species in California (Skinner and Pavlik 1994), occur on California grasslands. These habitats face dramatic reduction for a number of reasons, including conversion to cropland, development, and displacement by exotic species. Botanists consider native grasslands to be one of the state's most threatened ecosystems (Noss et al. 1995). We observed a rich diversity of native forbs on this patch of grassland. These species include *Acaena pinnatifida*, coyote mint (*Monardella villosa*), checkerbloom (*Sidalcea malviflora*), winecup clarkia (*Clarkia purpurea*, var. *quadrivulnera*), popcorn flower (*Plagiophthrys nothofulvus*), and Monterey centaury (*Centaruium muehlenbergii*). We also observed some invasive annuals on the edges of these habitat patches.

Further west, 60 feet east of mile marker 18.72, just east of Jewel, we observed a large population of red-ribbon clarkia (*Clarkia concinna* ssp. *concinna*). We estimate that at least 1,000 clarkia plants were growing on cliffs of loose rock on the east side of the road. See Location #6 on Figure 1 for the location.

At the west end of the project area are dense stands of willows (*Salix sp.*). Elderberry (*Sambucus mexicana*), twinberry (*Lonicera involucrata),* and other natives were also observed.

3.2. Special Status Plants Found

No rare, threatened, or endangered species were observed.

3.3. Noxious Weeds and Non-native Plants

Introduced plants on the proposed project area are listed in Table 2.

Panic veldt grass (*Ehrharta erecta*), a perennial grass native to Southern Africa, is by far the most common and invasive species observed in the project area. Care should be taken during road work to prevent the inadvertent spreading of this plant. It propagates by wind-borne seed dispersal and is very difficult to remove once established.

4.0 Recommendations

No listed species were observed in the project, so no special mitigation measures are required.

Considering the high alpha diversity (diversity at the stand or community level) and high proportion of native plants located along the road and riparian areas of SPTSP, great care should be taken to ensure a successful vegetative response to the road resurfacing project. All locations noted should be given appropriate consideration in the planning and executing of this project.

Location #1 refers to the cliffs containing native plant communities should be disturbed as little as possible.

Location #2 is a continuation of the same cliff, but with a very different native plant community. It should also be disturbed as little as possible.

At Location #3 across the road, road improvements are necessary to improve the crumbling shoulder. Great care should be taken to protect this area, which marks the eastern-most boundary of the state park. Many native species occur here that do not occur upstream. This spot marks beginning of a healthy and unique riparian area.

Location #4. The hillside spring is the southernmost home (location) of miterwort (*Mitella ovalis*). This population should be protected, along with some other species. Himalayan blackberry needs to be carefully removed from this area. *Ehrharta erecta* is across the road and in the adjacent ditch and should be removed.

Location #5 marks the location of a population of mist maidens (*Romanzoffia californica*) that grows on the shoulder and the embankment adjacent to the road.

Location #6 is the native grassland. Care should be taken during road work to avoid introducing non-native, invasive species to this area. Any materials stored in these areas should be weed-free. Anyone walking in this area should clean their footwear of seeds from other locations.

Location #7 is where we observed a large population of red-ribbon clarkia near Jewel. Populations this size are uncommon and worthy of protection as a source population. Care should be taken not to disturb these cliffs or damage this population.

Proper storage of material is important to protect native plants. Road construction materials, such as ground asphalt and road base, should be stored in areas large enough to accommodate the materials without spilling or leaching into the creek or native plant patches. One location would be the turnout at Devil's Gulch at mile marker 18.05.

References

Calflora database (www.calflora.org)

California Department of Fish and Game. 2000. Guidelines for assessing the effects of proposed projects on rare, threatened, and endangered plants and natural communities. (Revision of 1983 guidelines.) Sacramento, CA, 2 pp.

California Native Plant Society. 2001. CNPS botanical survey guidelines. Pages 38-40 in California Native Plant Society's inventory of rare and endangered vascular plants of California (D.P. Tibor, editor). Sixth edition. Special Publication No. 1, California Native Plant Society, Sacramento, 387 pp.

Guisti, G., T. Scott, B. Garrison, and K. Shaffer. 1996. Pages 34-50 in Standiford, R.B., technical coordinator. Guidelines for managing California's hardwood rangelands. University of California, Division of Agriculture and Natural Resources Publication 3368.

Nelson, J.R. 1987. Rare plant surveys: techniques for impact assessment. Pages 159-166 in Conservation and management of rare and endangered plants: proceedings of a California conference on the conservation and management of rare and endangered plants (T.S. Elias, editor). California Native Plant Society, Sacramento, 630 pp.

Noss, R.F., Laroe, E.T., Scott, J.M. 1995. Endangered ecosystems of the United States: a preliminary assessment of loss and degradation. U.S. Department of the Interior, National Biological Service Biological Report 28, Washington DC, USA.

Skinner, M.W. and B.M. Pavlik. 1994. Inventory of Rare and Endangered Vascular plants of California. Fifth edition. California Native Plant Society, Sacramento, California, USA.

U.S. Fish and Wildlife Service. 1996. Guidelines for conducting and reporting botanical inventories for federally listed, proposed, and candidate plants. Sacramento, California. 2 pp.

Appendix A

Tables

Table 1 – List of Plant Species Observed in Project Area

Scientific Name	Common Name	Introduced Species (*)
ACERACEAE (Maple Family)		*****
Acer macrophyllum	Big-Leaf Maple	
Acer negundo var. Californicum	Box Elder	
ALISMATACEAE (Water-Plantain Family)		
Alisma plantago-aquatica	Water Plantain	
ANACARDIACEAE (Sumac or Cashew Family)		
Toxicodendron diversilobum	Poison Oak	
APIACEAE/UMBELLIFERAE (Carrot Family)		
Anthriscus caucalis	Bur Chervil	*
Cicuta douglasii	Water Hemlock	
Conium maculatum	Poison Hemlock	*
Foeniculum vulgare	Fennel	
Heracleum maximum	Cow Parsnip	
Ligusticum apiifolium	Lovage	
Osmorhiza berteroi	Sweet Cicely	
Sanicula arctopoides	Footsteps-Of-Spring	
Sanicula bipinnatifida	Purple Sanicle	
Sanicula crassicaulis	Pacific Sanicle	
Scandix pectin-veneris	Shepherd’s Needle	*
Torilis arvensis	Hedge Parsley	*
Torilis arvensis purpurea	Hedge Parsley	*
Torilis nodosa	Hedge Parsley	*
APOCYNACEAE (Dogbane Family)		
Vinca major	Periwinkle	*
ARALIACEAE (Ginseng Family)		
Aralia californica	Elk Clover	
Hedera canariensis	Algerian Ivy	*
Hedera helix	English Ivy	*
ARISTOLOCHIACEAE (Pipevine Family)		
Aristolochia californica	California Pipe-Vine	
Asarum caudatum	Wild Ginger	
ASTERACEAE/COMPOSITAE (Sunflower/Composite Family)		
Achillea millefolium	Yarrow	
Adenocaulon bicolor	Trail Plant	
Anaphalis margaritacea	Pearly Everlasting	
Artemisia californica	California Sagebrush	
Artmemisisa douglasiana	Douglas' Mugwort	
Baccharis pilularis	Coyote Brush	
Bellis perennis	English Daisy	*

Scientific Name	Common Name	Introduced Species (*)
Carduus pycnocephalus	Italian Thistle	*
Chamomilla suaveolens (Matricaria matricarioides)	Pineapple Weed	*
Cirsium sp.	Thistle	*
Cirsium vulgare	Bull Thistle	*
Cirsium brevistylum		
Erechtites minima	Australian Fireweed	*
Eriophyllum lanatum var.*arachnoideum*	Woolly Sunflower	
Gnaphalium californicum	California Everlasting Cudweed	
Gnaphalium Ramosissimum	Pink Cudweed	
Helenium puberulum	Sneezeweed	
Hemizonia congesta var.. *Lutescens*	Hayfield Tarweed	
Hieracium albiflorum	Hawkweed	
Hypochaeris glabra	Smooth Cats-Ear	*
Lapsana communis	Nipplewort	*
Madia madioides (Anisocarpus madioides)	Woodland Madia	
Petasites frigidus var. *palmatus*	Western Coltsfoot	
Picris echioides	Bristly Ox Tongue	*
Senecio aronicoides	Butterweed	
Soliva sessilis	Chamomile Sticker	*
Tanacetum parthenium	Feverfew	*
Taraxacum officinale	Dandelion	*
Wyethia glabra	Coast Range Mule Ears	
BERBERIDACEAE (Barberry Family)		
Vancouveria planipetala	Inside Out Flower	
BETULACEAE (Birch Family)		
Alnus rhombifolia	White Alder	
Corylus cornuta var. *californica*	California Hazel	
BLECHNACEAE (Deer Fern Family)		
Woodwardia fimbriata	Western Chain Fern	
BORAGINACEAE (Borage Family)		
Amsinckia menziesii var. *intermedia*	Fiddleneck	
Cynoglossum grande	Hounds Tongue	
Myosotis latifolia	Forget-Me-Not	*
Plagiobothrys nothofulvus	Popcorn Flower	
BRASSICACACEAE/CRUCIFERAE (Mustard Family)		
Barbarea orthoceras	Winter Cress	*
Barbarea verna	Winter Cress	*
Brassica rapa	Field Mustard	*
Capsella bursa-pastoris	Shepherd's Purse	*
Cardamine californica var. *californica*	Milk Maids	
Cardamine oligosperma	Bitter-Cress	

Scientific Name	**Common Name**	**Introduced Species (*)**
Coronopus didymus	Wart Cress	*
Hirschfeldia incana	Shortpod Mustard	*
Raphanus sativus	Radish	*
Rorippa nasturtium-aquaticum	Water Cress	*
Sinapis arvensis	Charlock	*
Sisymbrium officinale	Hedge Mustard	*
CAPRIFOLIACEAE (Honeysuckle Family)		
Lonicera hispidula var. *vacillans*	California Honeysuckle	
Sambucus Mexicana	Blue Elderberry	
Symphoricarpos albus var. *laevigatus*	Streamside Snowberry	
Symphoricarpos mollis	Low Snowberry	
CARYOPHYLLACEAE (Pink Family)		
Cerastium glomeratum	Mouse-Ear Chickweed	*
Spergularia rubra	Sand Spurrey	*
Stellaria media	Chickweed	*
CONVOLVULACEAE (Morning–glory Family)		
Calystegia purpurata var..*purpurata*	Morning-Glory	
Convolvulus arvensis	Bindweed	*
CORNACEAE (Dogwood Family)		
Cornus sericea var. .*sericea*	Creek Dogwood	
CRASSULACEAE (Stonecrop Family)		
Dudleya cymosa var..*cymosa*	Rock Lettuce	
Sedum spathulifolium	Spoon-Leaved Stonecrop	
CUCURBITACEAE (Gourd Family)		
Marah fabaceus	Man-Root	
Marah oreganus	Coast Man-Root	
CYPERACEAE (Sedge Family)		
Carex amplifolia		
Carex densa		
Carex globosa	Woodland Sedge	
Carex nudata	Torrent Sedge	
Cyperus eragrostis	Umbrella Sedge	
Scirpus microcarpus	Bulrush	
DENNSTAEDTIACEAE (Bracken Family)		
Pteridium aquilinum var. *pubescens*	Bracken	
DIPSACACEAE (Teasel Family)		
Dipsacus fullonum	Fullers Teasel	
DRYOPTERIDACEAE (Wood Fern Family)		
Athyrium filix-femina var. *cyclosorum*	Coastal Lady Fern	
Cystopteris fragilis	Brittle Fern	
Dryopteris arguta	Coastal Wood Fern	

Scientific Name	Common Name	Introduced Species (*)
Polystichum munitum	Western Sword Fern	
EQUISATACEAE (Horsetail Family)		
Equisetum telmateia ssp. Braunii	Giant Horsetail	
ERICACEAE (Heath Family)		
Arbutus menziesii	Madrone	
Gaultheria shallon	Salal	
Rhododendron macrophyllum	Western Rhododendron	
Rhododendron occidentale	Western Azalea	
Vaccinium ovatum	Huckleberry	
EUPHORBIACEAE (Spurge Family)		
Euphorbia peplus	Petty Spurge	*
FABACEAE/LEGUMINOSAE (Legume Family)		
Acacia decurrens	Green Wattle	*
Genista monspessulana	French Broom	*
Lathyrus vestitus var. *vestitus*	Hillside Sweet-Pea	
Lotus humistratus	Colchita	
Lotus micranthus	Hill Lotus	
Lotus scoparius var. *scoparius*	Deerweed	
Lupinus bicolor	Dove Lupine	
Lupinus latifolius var. *latifolius*	Lupine	
Medicago arabica	Spotted Medick	*
Medicago polymorpha	Bur Clover	*
Trifolium bifidum var. *bifidum*	Notched-Leaf Clover	
Trifolium willdenovii	Tomcat Clover	
Vicia villosa ssp. varia	Vetch	
FAGACEAE (Oak Family)		
Lithocarpus densiflorus var. *densiflorus*	Tanbark Oak	
Quercus agrifolia var. *agrifolia*	Coast Live Oak	
Quercus chrysolepis	Canyon Live Oak	
GARRYACEAE (Silk Tassel Family)		
Garrya elliptica	Silk Tassel Bush	
GERANIACEAE (Geranium Family)		
Erodium botrys	Broad-Leaf Filaree	*
Erodium cicutarium	Red-Stem Filaree	*
Geranium dissectum	Cut-Leaved Cranesbill	*
Geranium molle	Soft Cranesbill	*
HIPPOCANACEAE (Buckeye Family)		
Aesculus californica	California Buckeye	
HYDROPHYLLACEAE (Waterleaf Family)		
Nemophila heterophylla		
Romanzoffia californica	Mist Maiden	

Scientific Name	Common Name	Introduced Species (*)
IRIDACEAE (Iris Family)		
Iris douglasiana var. *major)*	Douglas Iris	
Sisyrinchium bellum	Blue-Eyed Grass	
JUNCACEAE (Rush Family)		
Juncus bufonius var. *bufonius*	Toad Rush	
Juncus effuses	Rush	
Juncus patens	Rush	
Luzula comosa	Wood-Rush	
LAMIACEAE/LABIATAE (Mint Family)		
Mentha pulegium	European Pennyroyal	*
Monardella villosa ssp. *villosa*	Coyote-Mint	
Prunella vulgaris var. *vulgaris*	Selfheal	*
Satureja (Clinopodium) douglasii	Yerba Buena	
Stachys ajugoides var. *rigida (S. r.* var. *quercetorum)*	Hedge Nettle	
LAURACEAE (Laurel Family)		
Umbellularia californica	California Bay	
LILIACEAE (Lily Family)		
Allium triquetrum	Three Corner Leek	*
Chlorogalum pomeridianum var. *pomeridianum*	Soap Plant	
Clintonia andrewsiana		
Dichelostemma capitatum ssp.*capitatum*	Blue Dicks	
Disporum hookeri	Green Fairy Bells	
Disporum smithii	White Fairy Bells	
Fritillaria affinis var. *affinis*	Mission Bells	
Lilium pardalinum ssp. *pardalinum*	Leopard Lily	
Scoliopus bigelovii	Fetid Adder's Tongue	
Smilacina (Maianthemum) racemosa	Fat Solomon	
Smilacina (Maianthemum) stellata	Slim Solomon	
Trillium chloropetalum	Sessile-Flowered Wake-Robin	
Trillim ovatum ssp. *ovatum*	White Wake-Robin	
Tritelia laxa	Ithuriel’s Spear	
Triteleia hyacithina	White Brodiaea	
MALVACEAE (Mallow Family)		
Sidalcea malviflora	Checkerbloom	
OLEACEAE (Olive Family)		
Fraxinus latifolia	Oregon Ash	
ONAGRACEAE (Evening Primrose Family)		
Circaea alpina ssp. *pacifica*	Enchanter’s Nightshade	
Clarkia cocinna ssp. *cocinna*	Red Ribbons	
Clarkia puppurea ssp. *quadrivulnera*	Wine-Cup Clarkia	
Clarkia rubicunda	Ruby-Chalice Clarkia	

Scientific Name	**Common Name**	**Introduced Species (*)**
Epilobium ciliatum ssp. *ciliatum*	Northern Willow Herb	
ORCHIDACEAE (Orchid Family)		
Epipactis gigantea	Stream Orchid	
OXALIDACEAE (Oxalis Family)		
Oxalis albicans ssp. *pilosa (O.p.)*	Wood-Sorrel	
Oxalis oregano	Redwood Sorrel	
PAPAVERACEAE (Poppy Family)		
Dicentra formosa	Bleeding Heart	
Eschscholzia californica	California Poppy	
Platystemon californicus	Cream-Cup	
PHILADELPHACEAE (Mock Orange Family)		
Philadelphus sp.	Mock Orange	*
Whipplea modesta	Modesty	
PINACEAE (Pine Family)		
Pseudotsuga menziesii var. *menziesii*	Douglas-Fir	
PLANTAGINACEAE (Plantain Family)		
Plantago lancealata	Ribwort	*
Plantago major	Common Plantain	*
POACEAE/GRAMINEAE (Grass Family)		
Aira caryophyllea	Silver Hair Grass	*
Avena barbata	Slim Oat	*
Briza maxima	Rattlesnake Grass	*
Briza minor	Little Rattlesnake Grass	*
Bromus carinatus	California Brome	
Bromus hordeaceus	Soft Chess	*
Bromus laevipes	Weeping Brome	
Bromus tectorum	Downy Brome	*
Cynosurus echinatus	Dogfoot Grass	*
Dactylis glomerata	Orchard Grass	*
Danthonia californica		
Deschampsia elongate	Slender Hairgrass	
Ehrharta erecta	Veldt Grass	*
Elymus californicus	Calif. Bottlebrush	
Elamus glaucus ssp. *glaucus*	Blue Wild-Rye	
Hierochloe occidentalis	Vanilla Grass	
Holcus lanatus	Velvet Grass	*
Hordeum murinum ssp. *leporinum*	Farmer's Foxtail	*
Leymus tridicoides		
Lolium multiflorum	Annual Italian Ryegrass	*
Lolium perenne	Perennial Ryegrass	*
Melica califonica	California Melic	

Scientific Name	Common Name	Introduced Species (*)
Melica harfordii	Melicgrass	
Melica subulata	Alaska Oniongrass	
Melica torreyana	Melicgrass	
Nassella (Stipa) pulchra	Purple Needlegrass	
Paspalum dilatatum	Dallisgrass	*
Poa annua	Annual Bluegrass	*
Poa howellii	Bluegrass	
Poa kelloggii	Bluegrass	
Poa pratensis ssp. *pratensis*	Kentucky Bluegrass	*
POLEMONIACEAE (Phlox Family)		
Collomia heterophylla		
POLYGONACEAE (Buckwheat Family)		
Eriogonum nudum var. *nudum*	Nude Buckwheat	
Rumex acetosella	Sheep Sorrel	*
Rumex salicifolius var. *salicifolius*	Willow Dock	
Polypodiaceae (Polypody Family)		
Polypodium californicum	California Polypody	
PORTULACACEAE (Purslane Family)		
Calandrina ciliata	Red Maids	
Claytonia parviflora ssp. *Parviflora*	Linear-Leaf Miner’s Lettuce	
Claytonia perfoliata ssp. *Perfoliata*	Broadleaf Miner's Lettuce	
Montia parvifolia	Stoloniferous Montia	
PRIMULACEAE (Primrose Family)		
Anagallis arvensis	Scarlet Pimpernel	*
Trientalis latifolia	Star-Flower	
PTERIDACEAE (Brake Family)		
Adiantum aleuticum	Five-Finger Fern	
Adiantum jordanii	California Maidenhair	
Pentagramma triangularis	Goldback Fern	
RANUNCULACEAE (Buttercup Family)		
Anemone oregano	Windflower	
Aquilegia formosa	Columbine	
Clematis ligusticifolia	Virgin’s Bower	
Delphinium nudicaule	Red Larkspur	
Ranunculus californicus	California Buttercup	
Ranunculus muricatus	Prickle-Fruit Buttercup	*
RHAMNACEAE (Buckthorn Family)		
Ceanothus thyrsiflorus	Blue Blossom	
Rhamnus (Frangula) californica ssp. *Californica*	Coffee Berry	
ROSACEAE (Rose Family)		
Acaena pinnatifida var. *californica*		

Scientific Name	**Common Name**	**Introduced Species (*)**
Cotoneaster pannosa		
Fragaria vesca	Wild Strawberry	
Heteromeles arbutifolia	Toyon	
Holodiscus discolor	Ocean-Spray	
Oemleria (Osmaronia) cerasiformis	Oso Berry	
Physocarpus capitatus	Ninebark	
Prunus sp.	Cherry-Plum	
Rosa gymnocarpa	Wood Rose	
Rubus discolor	Himalaya-Berry	*
Rubus parviflorus	Thimbleberry	
Rubus ursinus	California Blackberry	
RUBIACEAE (Madder Family)		
Galium aparine	Goose Grass	*
Galium porrigens var. *porrigens*	Climbing Bedstraw	
Galium triflorum	Sweet-Scented Bedstraw	
Sherardia arvensis	Field Madder	*
SALICACEAE (Willow Family)		
Salix lasiolepis	Arroyo Willow	
Salix sitchensis	Sitka Willow	
SAXIFRAGACEAE (Saxifrage Family)		
Boykinia occidentalis	Brook Foam	
Heuchera micrantha	Alum-Root	
Lithophragma affine	Woodland Star	
Lithophragma heterophyllum	Woodland Star	
Mitella ovalis (at the roadside/hillside spring)	Miterwort	
Tellima grandiflora	Fringe-Cups	
SCROPHULARIACEAE (Figwort Family)		
Castilleja subinclusa ssp. *franciscana*	Indian Paintbrush	
Collinsia heterophylla	Chinese Houses	
Digitalis purpurea	Foxglove	*
Mimulus aurantiacus	Bush Monkeyflower	
Mimulus cardinalis	Scarlet Monkeyflower	
Mimulus guttatus	Yellow Monkeyflower	
Mimulus moschatus	Musk Flower	
Scrophularia californica ssp. *californica*	Bee-Plant	
Veronica americana	American Brooklime	
SOLANACEAE (Nightshade Family)		
Solanum americanum	Black Nightshade	*
TAXODIACEAE (Bald Cypress Family)		

Scientific Name	Common Name	Introduced Species (*)
Sequoia sempervirens	Redwood	
URTICACEAE (Nettle Family)		
Urtica dioica ssp. holosericea	Stinging Nettle	
VIOLACEAE (Violet Family)		
Viola glabella	Stream Violet	
Viola sempervirens	Redwood Violet	

Table 2 – Invasive Exotic Plant Species Observed in the Project Area

Scientific Name	Common Name
APIACEAE/UMBELLIFERAE (Carrot Family)	
Conium maculatum	Poison Hemlock
Foeniculum vulgare	Fennel
Torilis arvensis	Hedge Parsley
Torilis arvensis purpurea	Hedge Parsley
Torilis nodosa	Hedge Parsley
APOCYNACEAE (Dogbane Family)	
Vinca major	Periwinkle
ARALIACEAE (Ginseng Family)	
Hedera canariensis	Algerian Ivy
Hedera helix	English Ivy
ASTERACEAE/COMPOSITAE (Sunflower/Composite Family)	
Carduus pycnocephalus	Italian thistle
Cirsium vulgare	Bull thistle
Erechtites minima	Australian Fireweed
Lapsana **communis**	Nipplewort
Picris echioides	Bristly Ox Tongue
Soliva sessilis	Chamomile sticker
BORAGINACAEA (Borage Family)	
Myosotis latifolia	Forget-me-not
Symphytum asperum lepechin	Prickly Comfrey
BRASSICACACEAE/CRUCIFERAE (Mustard Family)	
Brassica rapa	*Field Mustard*
Hirschfeldia incana	Shortpod Mustard
Rorippa nasturtium-aquaticum	Water Cress
Sinapis arvensis	Charlock
Sisymbrium officinale	Hedge Mustard
CONVOLVULACEAE (Morning–glory Family)	
Convolvulus arvensis	Bindweed
DIPSACACEAE (Teasel Family)	
Dipsacus fullonum	Fullers Teasel
FABACEAE/LEGUMINOSAE (Legume Family)	
Genista monspessulana	French Broom
Medicago arabica	Spotted Medick
LAMIACEAE/LABIATAE (Mint Family)	
Mentha pulegium	European Pennyroyal
Prunella vulgaris var. vulgaris	Selfheal

Scientific Name	**Common Name**
LILIACEAE (Lily Family)	
Allium triquetrum	Three Corner Leek
PLANTAGINACEAE (Plantain Family)	
Plantago lancealata	Ribwort
Plantago major	Common Plantain
POACEAE/GRAMINEAE (Grass Family)	
Briza maxima	Rattlesnake grass
Bromus tectorum	Downy brome
Cynosurus echinatus	Dogfoot Grass
Dactylis glomerata	Orchard Grass
Ehrharta erecta	Veldt Grass
Holcus lanatus	Velvet Grass
Hordeum murinum ssp. leporinum	Farmer’s Foxtail
Paspalum dilatatum	Dallisgrass
POLYGONACEAE (Buckwheat Family)	
Rumex acetosella	Sheep Sorrel
RANUNCULACEAE (Buttercup Family)	
Ranunculus muricatus	Prickle-fruit Buttercup
ROSACEAE (Rose Family)	
Rubus discolor	Himalaya-berry
SCROPHULARIACEAE (Figwort Family)	
Digitalis purpurea	Foxglove
SOLANACEAE (Nightshade Family)	
Solanum americanum	Black Nightshade
URTICACEAE (Nettle Family)	
Soleirolia soleirolii	Baby’s Tears

Table 3 – Plant Survey Dates and Times

Date	Start Time	End Time	Net hours
April 3, 2007	9:00 AM	1:00 PM	4:00
April 4, 2007	9:00 AM	1:00 PM	4:00
April 5, 2007	9:00 AM	1:00 PM	4:00
April 14, 2007	8:00 AM	11:30 AM	3:30
April 18, 2007	9:00 AM	1:00 PM	4:00
April 23, 2007	8:30 AM	1:30 PM	5:00
April 24, 2007	9:00 AM	1:00 PM	4:00
April 25, 2007	9:00 AM	1:00 PM	4:00
May 5, 2007	9:00 AM	1:00 PM	4:00
May 8, 2007	9:00 AM	1:00 PM	4:00
May 9, 2007	9:00 AM	1:00 PM	4:00
May 14, 2007	9:00 AM	1:00 PM	4:00
May 20, 2007	9:00 AM	1:00 PM	4:00
May 22, 2007	10:00 AM	12:00 PM	2:00
May 24, 2007	9:00 AM	1:00 PM	4:00
June 2, 2007	9:00 AM	1:00 PM	4:00
June 3, 2007	9:00 AM	1:00 PM	4:00
June 12, 2007	9:00 AM	1:00 PM	4:00
June 13, 2007	9:00 AM	1:00 PM	4:00
June 14, 2007	10:00 AM	12:00 PM	2:00
July 10, 2007	9:00 AM	1:00 PM	4:00
Total			**80:30**

Table 4 – Target Plants and Species of Concern for Survey in Project Area

Note: All of these plants have the potential to occur in the Study Area.

Common Name/ Scientific Name	Status[1]			Habitat	Flowering Period
	Federal	State	CNPS		
Sonoma Alopecurus *Alopecurus aequalis var. sonomensis*	FE	-	1B	Freshwater marshes and swamps, riparian scrub. Found in wet areas, marshes, and riparian banks with other wetland species. Elevational range: 5 to 360 meters.	May-July
Napa False Indigo *Amorpha californica* var. *napensis*	-	-	1B	Broadleaved upland forest, chaparral, and cismontane woodland. Found in openings in forest, woodland, or chaparral. Elevational range: 150 to 2,000 meters.	April-July
Bent-Flowered Fiddleneck *Amsinckia lunaris*	-	-	1B	Coastal bluff scrub, cismontane woodland, and valley and foothill grassland. Elevational range: 3 to 500 meters.	March-June
Mt. Tamalpais Manzanita *Arctostaphylos hookeri var. montana*	-	-	1B	Chaparral, and valley and foothill grassland. Found on serpentine slopes. Elevational range: 160 to 760 meters.	February-April
Marin Manzanita *Arctostaphylos virgata*	-	-	1B	Broadleafed upland forest, closed-cone coniferous forest, chaparral, and north coast coniferous forest. Found on sandstone or granitic soil. Elevational range: 60 to 700 meters.	January-March
Swamp Harebell *Campanula californica*	-	-	1B	Bogs, fens, closed-cone coniferous forest, coastal prairie, meadows, freshwater marsh, and north coast coniferous forest. Elevational range: 1 to 405 meters.	June-October
Tiburon Indian Paintbrush *Castilleja affinis var. neglecta*	FE	ST	1B	Valley and foothill grassland on rocky serpentine soils. Elevational range: 60 to 400 meters.	April-June
Mt. Vision Caenothus *Ceanothus gloriosus var. porrectus*	-	-	1B	Closed-cone coniferous forest, coastal prairie, coastal scrub, and valley and foothill grassland. Elevational range: 25 to 305 meters.	February-May
Franciscan Thistle *Cirsium andrewsii*	-	-	1B	Coastal bluff scrub, broadleaved upland forest, coastal scrub, and coastal prairie. Elevational range: 0 to 150 meters.	March-July

Common Name/ Scientific Name	**Status**[1]			**Habitat**	**Flowering Period**
	Federal	**State**	**CNPS**		
Mt. Tamalpais Thistle *Cirsium hydrophilum var. vaseyi*	-	-	1B	Broadleaved upland forest, chaparral, meadows, and seeps. Elevational range: 265 to 620 meters.	May-August
Western Leatherwood *Dirca occidentalis*	-	-	1B	Broadleafed upland forest, chaparral, closed-cone coniferous forest, cismontane woodland, north coast conifer forest, and riparian forest. Found on brushy slopes and mesic sites, mostly in mixed evergreen and foothill woodland communities. Elevational range: 30 to 550 meters.	January-April
Koch's Cord-Moss *Entosthodon kochii*	-	-	1B	Cismontane woodland. Elevational range: 180 to 1,000 meters.	None
Tiburon Buckwheat *Eriogonum luteolum var. caninum*	-	-	3	Chaparral, coastal prairie, and valley and foothill grassland. Found on sepentine soils. Elevational range: 10 to 500 meters.	May-September
Fragrant Fritillary *Fritillaria liliacea*	-	-	1B	Coastal scrub, valley and foothill grassland, coastal prairie, and cismontane woodland. Elevational range: 3 to 410 meters.	February-April
San Francisco Gumplant *Grindelia hirsutula var. maritima*	-	-	1B	Coastal bluff scrub, coastal scrub, and valley and foothill grassland. Found on in sandy or serpentine soils. Elevational range: 15 to 400 meters.	June-September
Marin Western Flax *Hesperolinon congestum*	FT	ST	1B	Chaparral and valley and foothill grassland. Found in serpentine barrens and in serpentine grassland and chaparral. Elevational range: 5 to 370 meters. Chaparral and valley and foothill grassland. Found in serpentine barrens and in serpentine grassland and chaparral. Elevational range: 5 to 370 meters.	April-July
Woolly-Headed Lessingia *Lessingia hololeuca*	-	-	3	Broadleafed upland forest, coastal scrub, lower montane coniferous forest, valley and foothill grassland. Found on clay and serpentine soils. Elevational range: 15 to 305 meters.	June-October

Common Name/ Scientific Name	**Status[1]**			**Habitat**	**Flowering Period**
	Federal	**State**	**CNPS**		
Mason's Lilaeopsis *Lilaeopsis masonii*	-	Rare	1B	Freshwater and brackish marshes and swamps, riparian scrub.	April-November
Coast Lily *Lilium maritumum*	-	-	1B	Closed-cone coniferous forest, coastal prairie, coastal scrub, broadleaved upland forest, north coast coniferous forest, and freshwater marsh and swamp. Elevational range: 5 to 335 meters.	May-August
Marsh Microseris *Microseris paludosa*	-	-	1B	Closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland. Elevational range: 5 to 300 meters.	April-August
Marin County Navarretia *Navarretia rosulata*	-	-	1B	Closed-cone coniferous forest and chaparral. Found In serpentine and rocky soils. Elevational range: 200 to 635 meters.	May-July
North Coast Semaphore Grass *Pleuropogon hooverianus*	-	ST	1B	Broadleaved upland forest, meadows and seeps, and north coast coniferous forest. Elevational range: 10 to 671 meters.	April-August
Tamalpais Oak *Quercus parvula var. tamalpaisensis*	-	-	1B	Lower montane coniferous forest. Elevational range: 100 to 750 meters.	March-April
California Beaked-Rush *Rhynchospora californica*	-	-	1B	Bogs, fens, marshes, swamps, lower montane coniferous forest, meadows, and seeps. Elevational range: 45 to 1,010 meters.	May-July
Tamalpais Jewel-Flower *Streptanthus batrachopus*	-	-	1B	Closed-cone coniferous forest and chaparral. Found In serpentine soils. Elevational range: 305 to 650 meters.	April-June
Mt. Tamalpais Jewel-Flower *Streptanthus glandulosus var. pulchellus*	-	-	1B	Chaparral and valley and foothill grassland. Elevational range: 150 to 800 meters.	May-July
Showy Indian Clover *Trifolium amoenum*	FE	-	1B	Valley and foothill grassland, coastal bluff scrub; sometimes serpentinite. Elevation 5 to 415 meters.	April-June
San Francisco Owl's-Clover *Triphysaria floribunda*	-	-	1B	Coastal prairie, coastal scrub, and valley and foothill grassland. Usually found on serpentine soils. Elevational range: 10 to 160 meters.	April-June

1. Plant status definitions and governing agencies are as follows:

Federal

FE	Endangered: Any species that is in danger of extinction throughout all or a significant portion of its range.
FT	Threatened: Any species likely to become endangered within the foreseeable future.
–	No Status

State

SE	Listed as endangered under the California Endangered Species Act
ST	Listed as threatened under the California Endangered Species Act
CSC	California species of special concern
–	No Status

California Native Plant Society (CNPS)

1B	Plants rare, threatened, or endangered in California and elsewhere.
2	Plants rare, threatened or endangered in California but more common elsewhere.
3	Plants about which we need more information.
4	Plants of limited distribution: A watch list.

Sources: California Natural Diversity Database (CDFG 2007), California Native Plant Society Online Database of Endangered, Threatened, and Rare Plant Species (CNPS 2007), and USFWS Online Database of Endangered and Threatened Species (USFWS 2007).

Appendix B

Figures

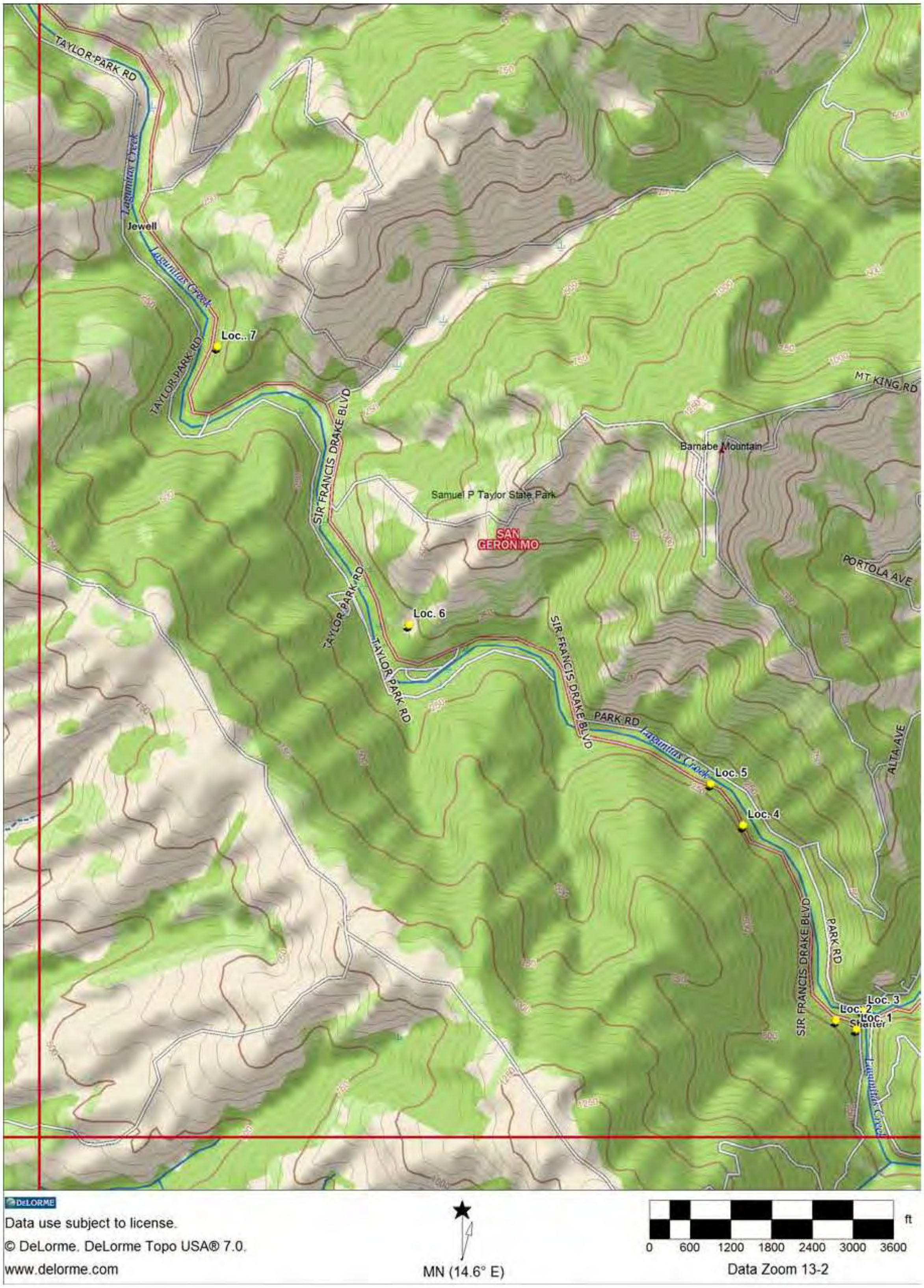


Figure 1: Project Area Map, Samuel P. Taylor State Park. Locations 1-7 are noted.

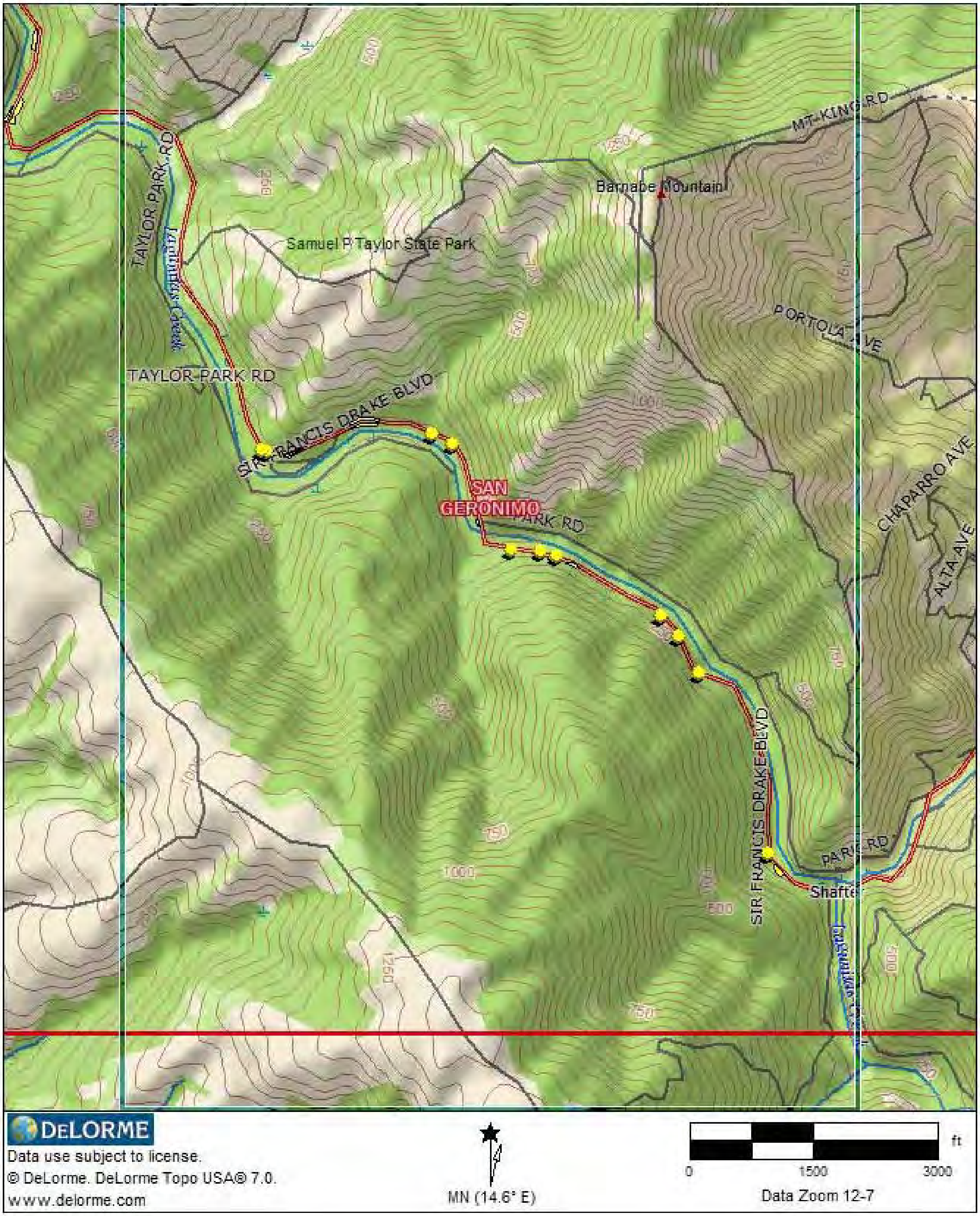
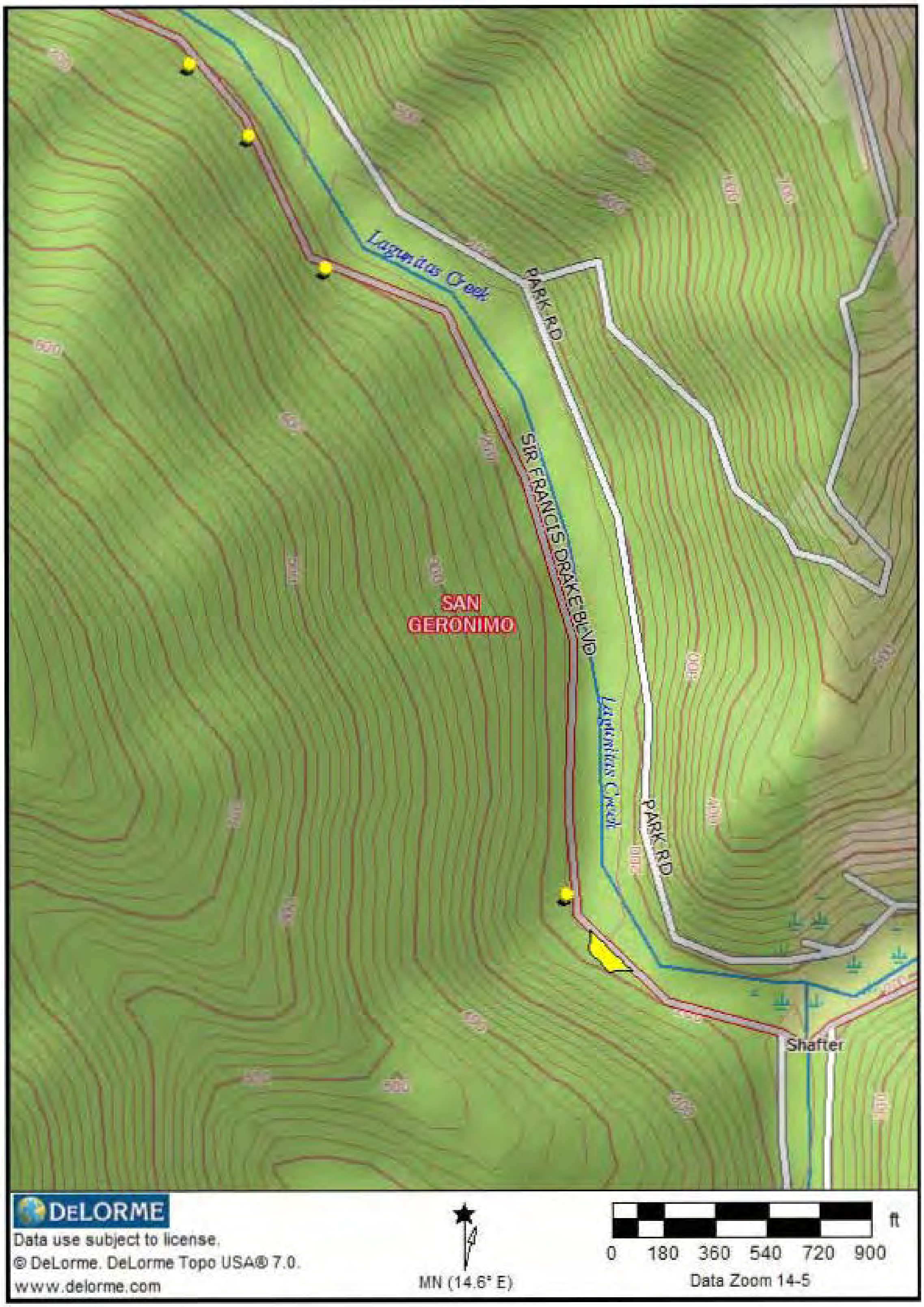
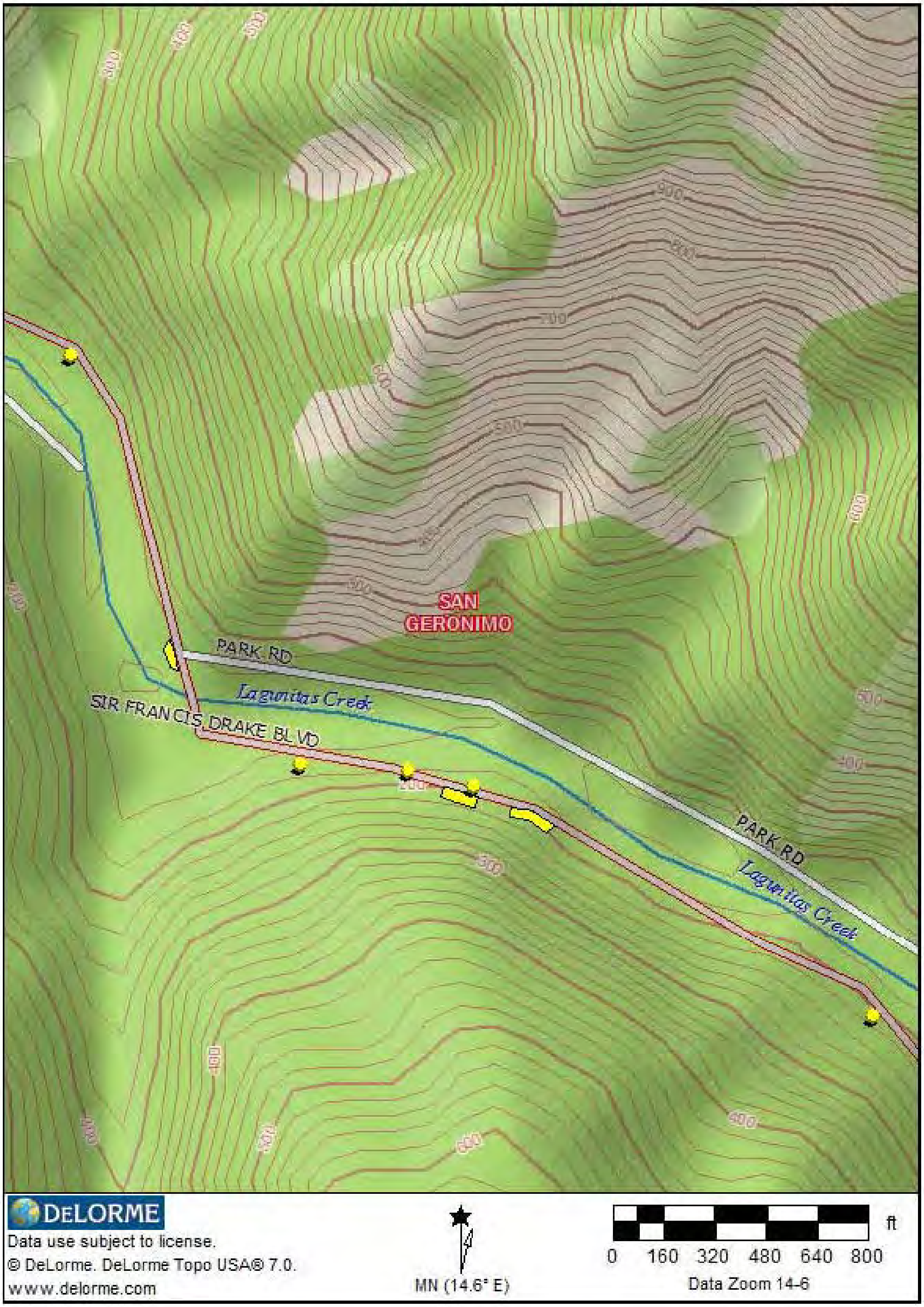
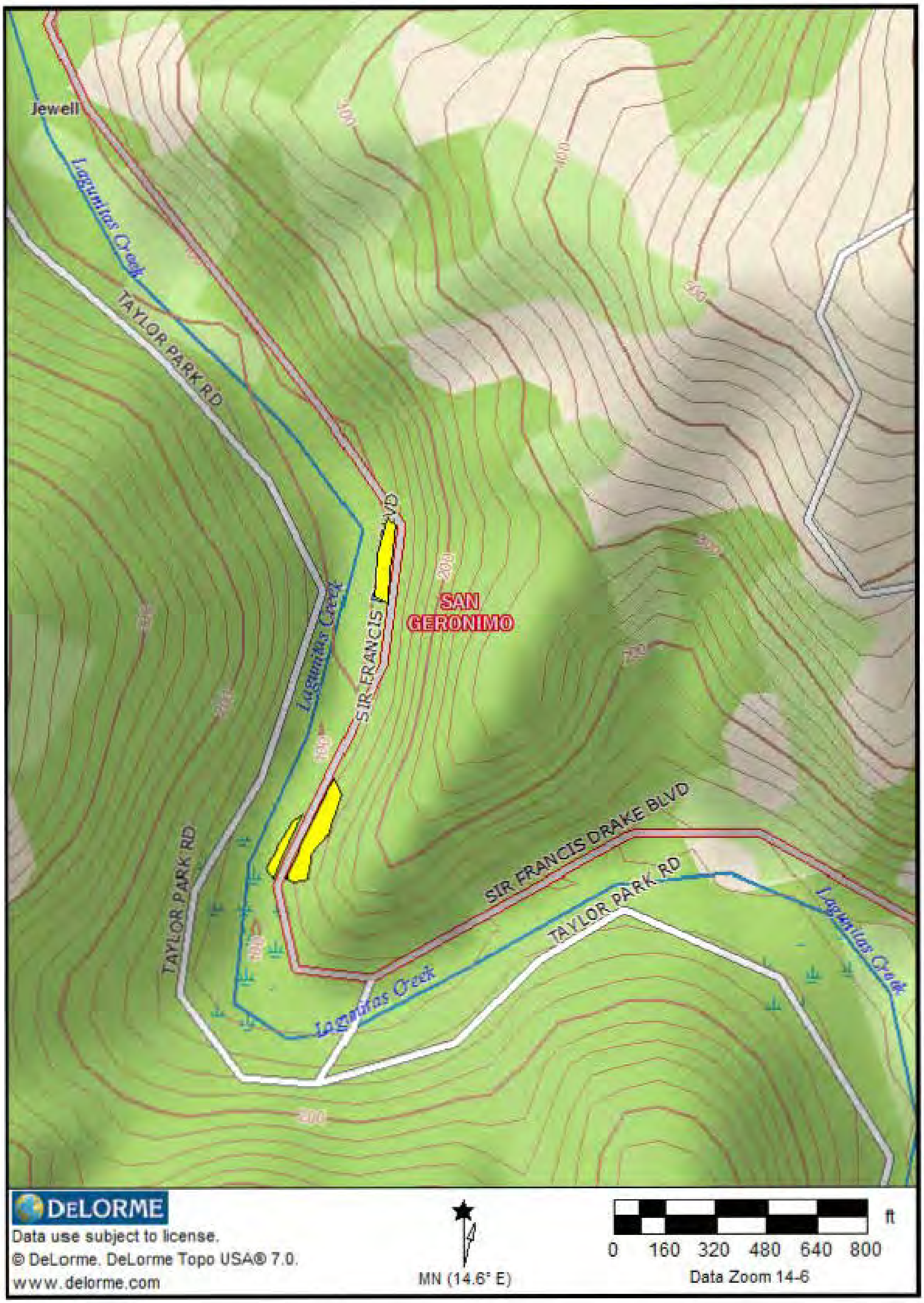


Figure 2 – *Ehrharta erecta* locations on Project Area


Lagunitas Creek
PARK RD
SIR FRANCIS DRAKE BLVD
SAN GERONIMO
Lagunitas Creek
PARK RD
Shafter
DELORME
Data use subject to license.
© DeLorme. DeLorme Topo USA® 7.0.
www.delorme.com
MN (14.6° E)
0
180
360
540
720
900
ft
Data Zoom 14-5


SAN GERONIMO
PARK RD
PARK RD
SIR FRANCIS DRAKE BLVD
Lagunitas Creek
Lagunitas Creek
900
800
700
600
500
400
300
200
DELORME
Data use subject to license.
© DeLorme. DeLorme Topo USA® 7.0.
www.delorme.com
MN (14.6° E)
0
160
320
480
640
800
ft
Data Zoom 14-6


SIR FRANCIS DRAKE BLVD
SAN GERONIMO
SIR FRANCIS DRAKE BLVD
Lagunitas Creek
TAYLOR PARK RD
Lagunitas Creek
500
500
500
400
400
400
300
300
300
300
300
200
200
200
400
DELORME
Data use subject to license.
© DeLorme. DeLorme Topo USA® 7.0.
www.delorme.com
MN (14.6° E)
0 160 320 480 640 800 ft
Data Zoom 14-6

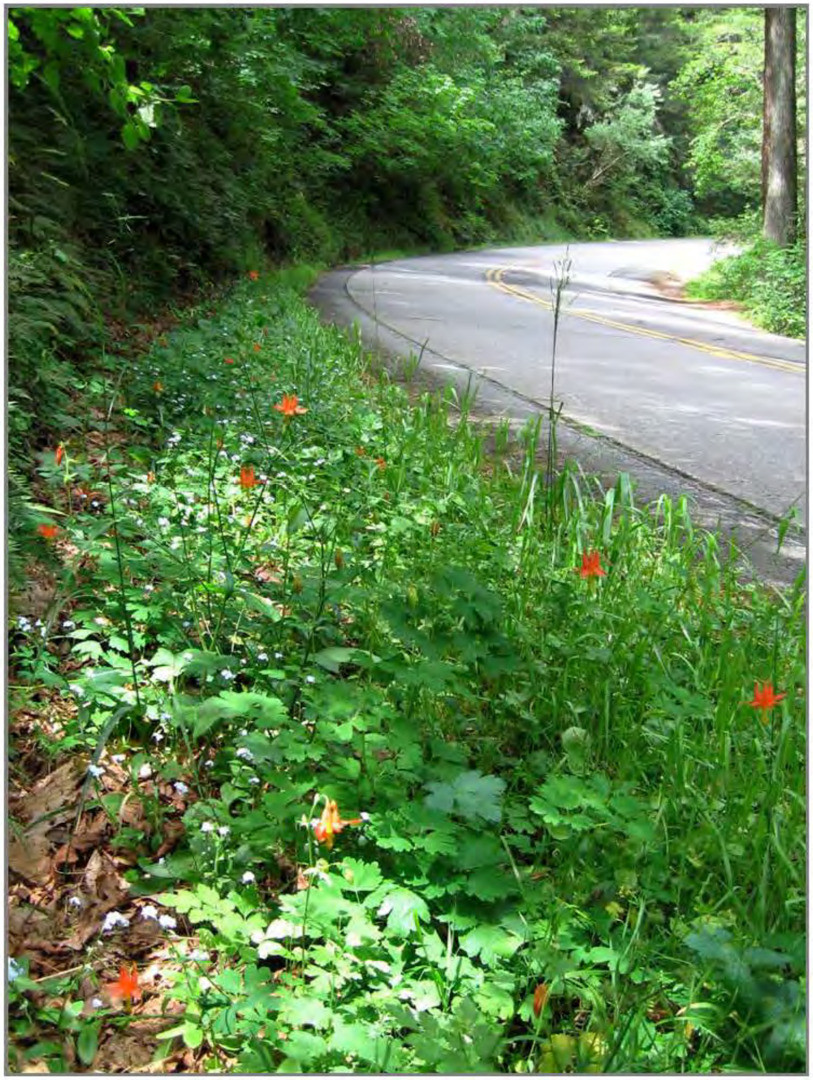

Jewell
Lagunitas Creek
TAYLOR PARK RD
SIR FRANCIS DRAKE BLVD
SAN GERONIMO
SIR FRANCIS DRAKE BLVD
TAYLOR PARK RD
Lagunitas Creek
TAYLOR PARK RD
Lagunitas Creek
Lagunitas Creek
300
400
500
600
200
700
100
200
DeLORME
Data use subject to license.
© DeLorme. DeLorme Topo USA® 7.0.
www.delorme.com
MN (14.6° E)
0 160 320 480 640 800 ft
Data Zoom 14-6

Appendix C

Photos

Plant Surveys of Proposed Project Area
Sir Francis Drake Blvd., Samuel P. Taylor State Park

1. Brittle fern and Woodland star at Location 1.



2. Roadside plant community featuring columbines at Location 2.

Molly Boyes Consulting
2008

Plant Surveys of Proposed Project Area
Sir Francis Drake Blvd., Samuel P. Taylor State Park

3. California polypods growing along Sir Francis Drake Blvd. near Location 2.

4. Vulnerable native plant community further west at Location 2.

5. Western coltsfoot growing in riparian zone near Location 3.

6. Stream orchid growing in riparian zone.

7. Southernmost population of this species of miterwort (Mitella ovalis) in the state found at the roadside spring at Location 4.

8. Mist maidens growing along road northeast of the roadside spring at Location 5.

10. Bottle-brush grass, a CNPS List 4 species, growing just west of Irving bridge.

9. Profusion of Mist maidens near the road (Location 5).

11. Native perennial grasslands such as this one near Madrone Group Camp (Location 6) are much diminished from their historical range in the state.

12. Acaena pinnatifida (Location 6) is an uncommon plant found in native perennial grasslands.

Plant Surveys of Proposed Project Area
Sir Francis Drake Blvd., Samuel P. Taylor State Park

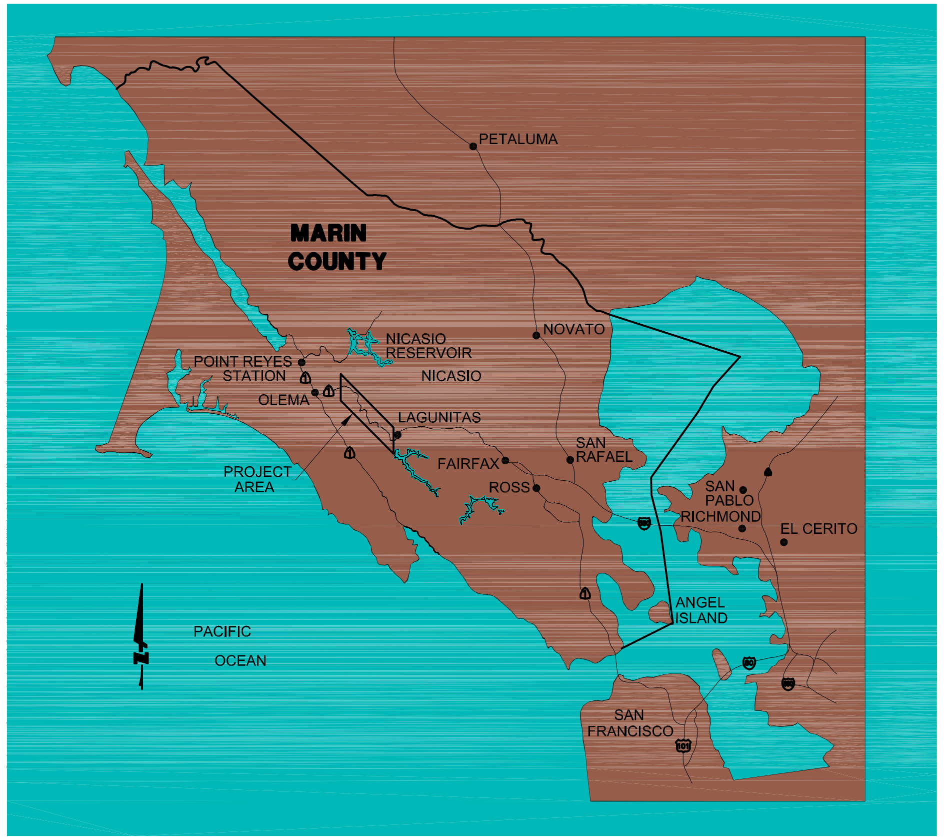
13. Coyote mint is also found in native perennial grassland.

14. Large population of red-ribbon clarkia at Location, near Jewel.

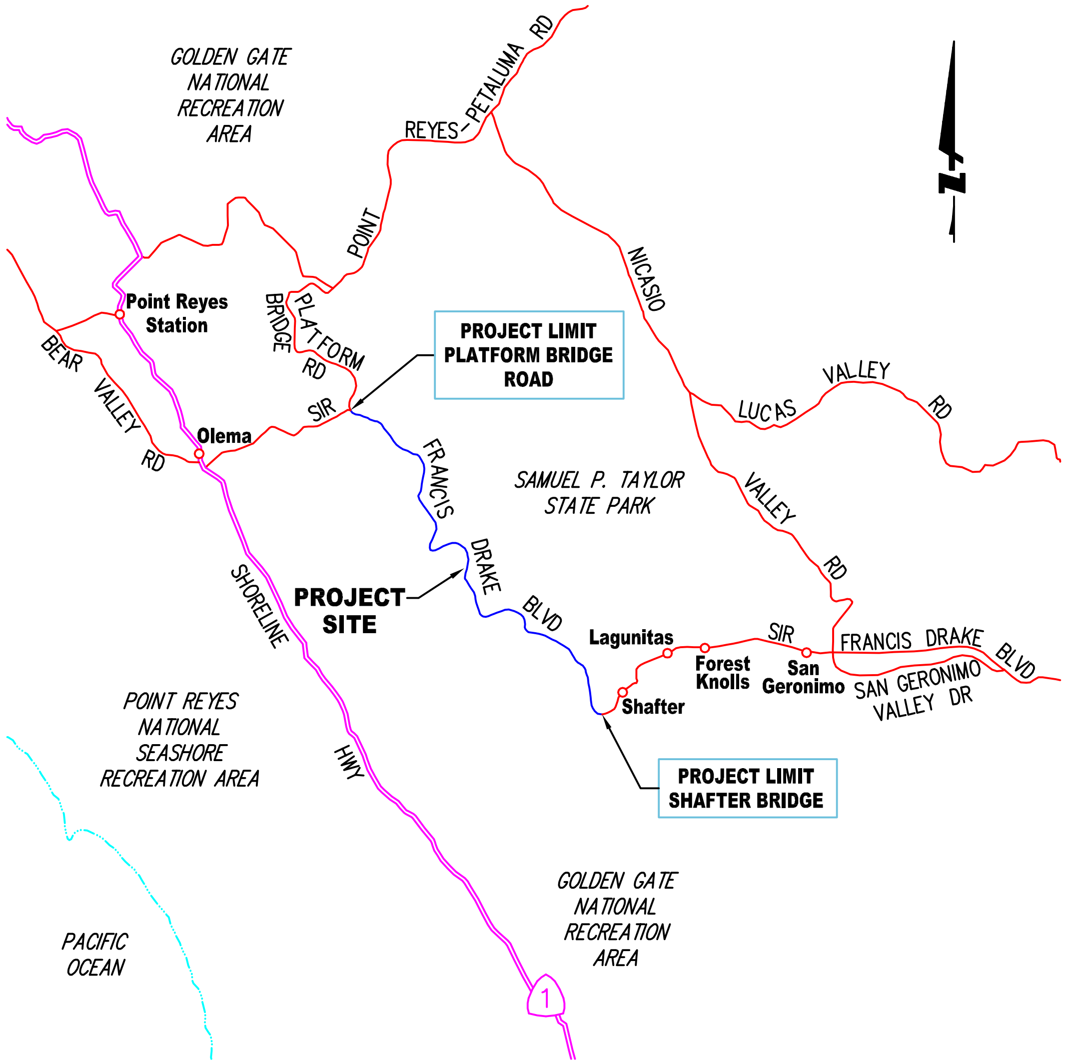
SIR FRANCIS DRAKE BOULEVARD
ROADWAY REHABILITATION PROJECT
BIOLOGICAL ASSESSMENT

APPENDIX G
DELINEATION OF WETLANDS AND OTHER WATERS OF THE U.S.
WETLAND IMPACTS

SIR FRANCIS DRAKE BOULEVARD WETLAND IMPACT EXHIBIT
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
MARIN COUNTY, CALIFORNIA



REGIONAL MAP



VICINITY MAP

	Existing	Impacted	
Wetland Number	Size acre	Size acre	Percent %
1	0.062	0.010	16%
2	0.066	0.035	53%
3	0.058	0.002	3%
4	0.116	0.027	23%
5	0.009	0.002	22%
6	0.010	0.000	0%
7	0.010	0.000	0%
8	0.006	0.000	0%
9	0.019	0.000	0%
10	0.018	0.002	11%
11	0.003	0.003	100%
12	0.003	0.000	0%
13	0.014	0.003	21%
14	0.002	0.001	50%
15	0.024	0.014	58%
16	0.004	0.000	0%
17	0.060	0.017	28%
18	0.014	0.001	7%
19	0.020	0.001	5%
20	0.009	0.005	56%
21	0.006	0.000	0%
22	0.036	0.013	36%
23	0.079	0.029	37%
24	0.010	0.000	0%
25	0.098	0.043	44%
26	0.049	0.018	37%
27	0.054	0.002	4%
28	0.043	0.000	0%
29	0.041	0.008	20%
Total	0.943	0.236	25%

Stream Number	Flow Type
1	Ephemeral
2	Perennial
3	Ephemeral
4	Intermittent
5	Intermittent
6	Ephemeral
7	Ephemeral
8	Perennial
9	Intermittent
10	Ephemeral
11	Ephemeral
12	Ephemeral
13	Intermittent
14	Perennial
15	Perennial
16	Ephemeral
17	Ephemeral
18	Ephemeral
19	Perennial
20	Intermittent
21	Perennial
22	Intermittent
23	Ephemeral
24	Ephemeral
25	Ephemeral
26	Intermittent
27	Ephemeral
28	Ephemeral
29	Intermittent
30	Ephemeral
31	Intermittent
32	Ephemeral

Culvert Number	Approx. STA	MP	Length Impacted
2	16+47	20.28	41
3	19+20	20.23	36
5	24+50	20.13	41
6	29+95	20.03	36
7	32+80	19.97	36
8	34+55	19.94	44
9	37+40	19.88	32
10	41+70	19.80	51
11	50+25	19.64	44
12	53+00	19.58	35
14	56+45	19.52	49
16	60+85	19.43	46
19	74+50	19.17	64
21	84+25	18.99	50
22	85+10	18.98	75
23	88+10	18.91	40
24	92+35	18.83	33
25	96+15	18.76	40
26	98+40	18.72	57
27	106+30	18.56	41
28	112+95	18.44	55
29	123+45	18.24	60
32	133+00	18.05	42
33	139+00	17.94	31
34	139+45	17.93	34
36	147+30	17.78	55
37	149+70	17.73	43
38	154+80	17.64	47
39	161+90	17.50	35
40	165+50	17.44	44
41	168+00	17.38	71
42	171+50	17.32	35
43	175+40	17.24	42
45	181+05	17.14	36
46	183+05	17.10	42
48	185+40	17.05	45
49	186+80	17.03	41
50	190+80	16.95	33
52	196+00	16.85	58
53	197+90	16.81	45
54	201+50	16.75	30
56	214+40	16.50	33
57	218+40	16.42	36
59	226+20	16.27	35
60	229+60	16.21	33
61	235+95	16.09	40
62	241+90	15.97	57
63	244+10	15.93	58
64	248+15	15.86	41
65	255+80	15.70	36
68	268+65	15.46	40
69	269+25	15.45	44
70	270+10	15.43	40
Total Impact			2,308

NOTE:
WETLAND AREAS AS DEFINED DURING WETLAND DELINEATION CONDUCTED IN MARCH-APRIL 2007 BY SYNTHESIS ENVIRONMENTAL PLANNING.

BKF
ENGINEERS / SURVEYORS / PLANNERS
2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)

SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT
COUNTY OF MARIN
CALIFORNIA

Revisions
No.

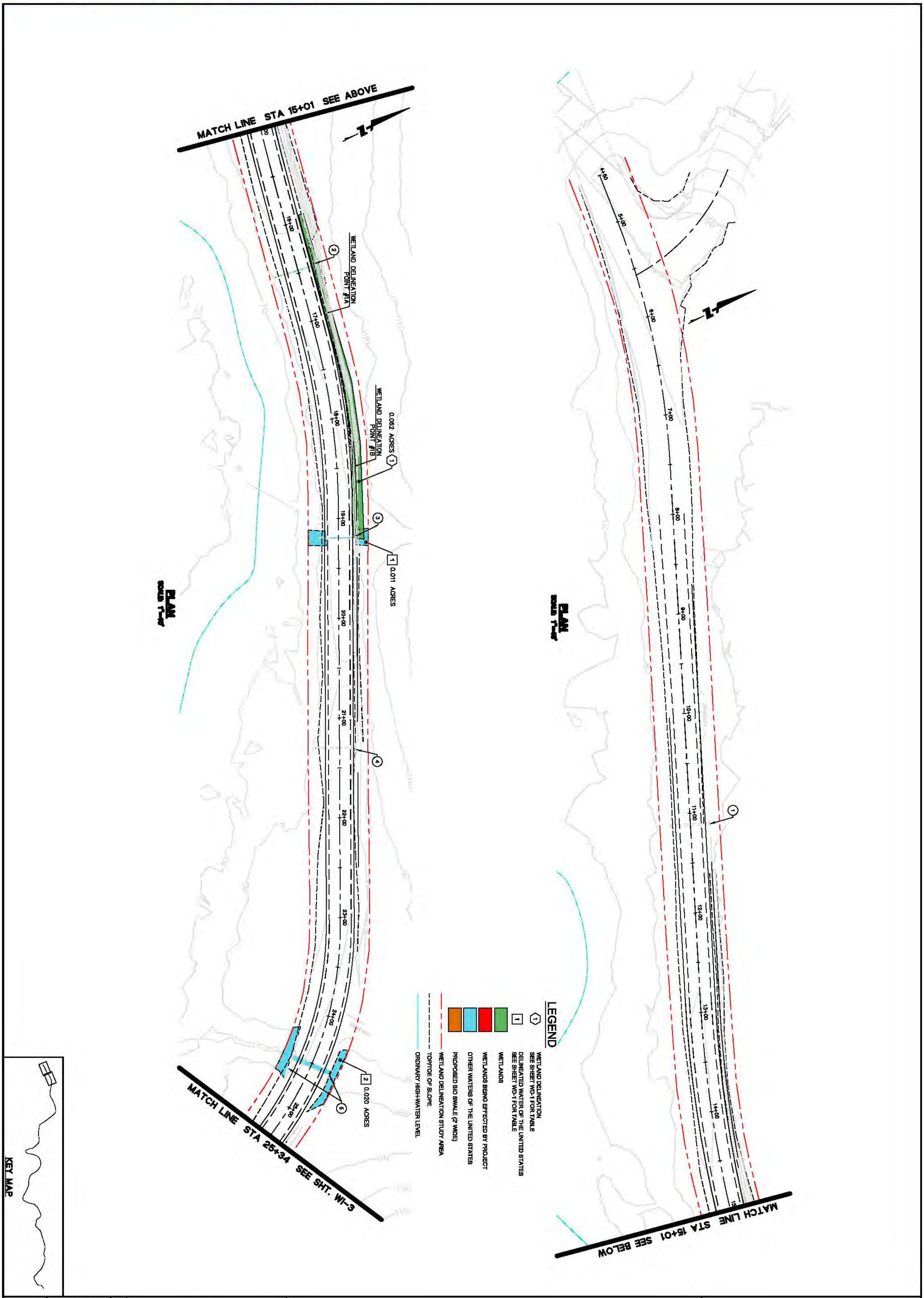
Date JULY 2009
Scale 1" = 40'
Design WC TEAM
Drawn WC TEAM
Approved RS
Job No 20065075

Drawing Number:
WI-1
1 OF 14

WETLAND IMPACT EXHIBIT 11/11/09

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-27 Wetland Impacts w Swales\01_Wetland Impacts.dwg
PLOT DATE: 11-11-09 PLOTTED BY: mile

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-27 Wetland Impacts w Swales\01_Wetland Impacts.dwg
PLOT DATE: 11-11-09 PLOTTED BY: mile



Drawing Number: WI-2 2 OF 14	Date JULY 2009	No.	Revisions
	Scale 1" = 40'		
	Design WC TEAM		
	Drawn WC TEAM		
	Approved RS		
	Job No 20065075		

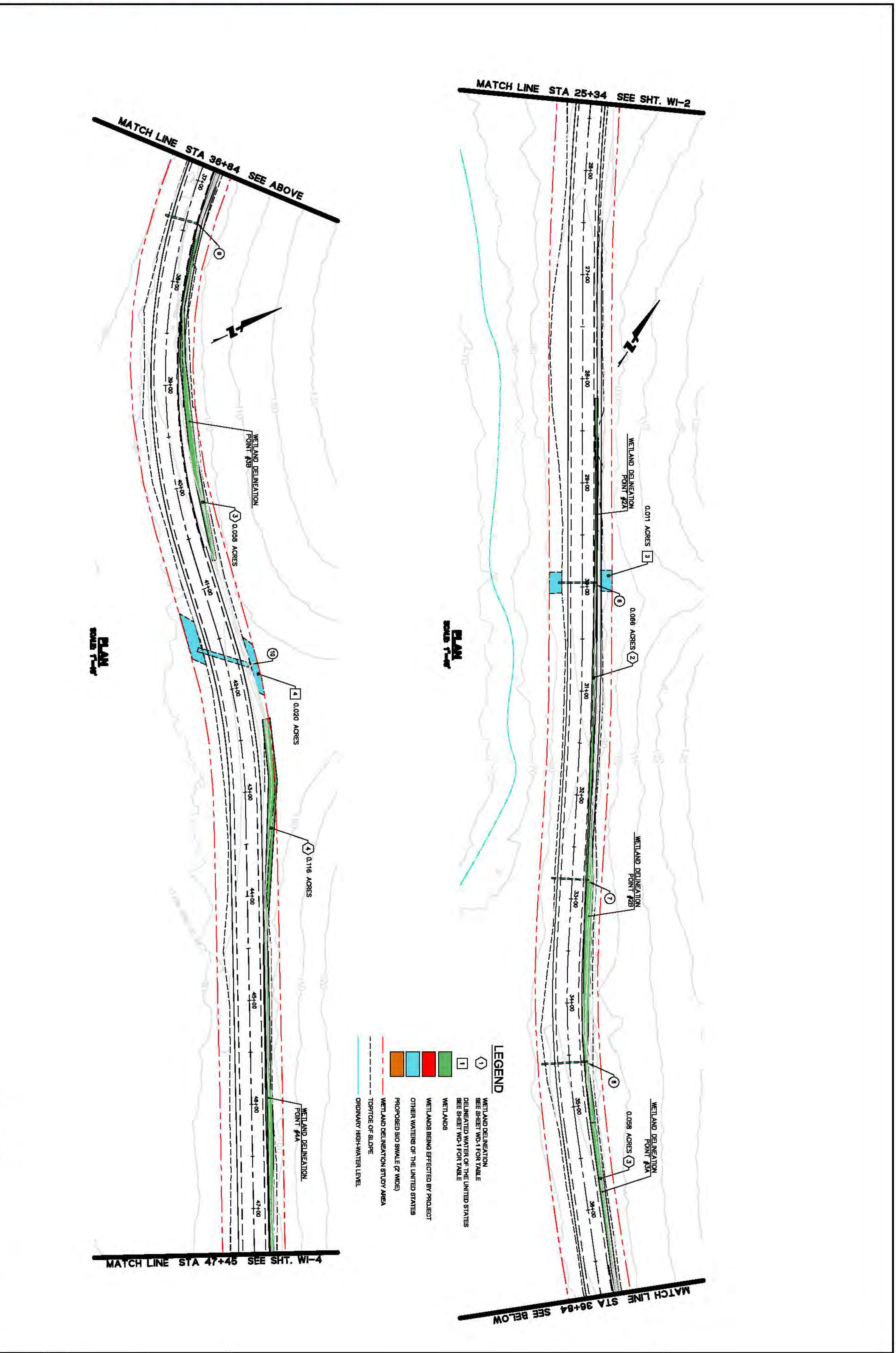
SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT (STA. 5+80 TO 25+34)

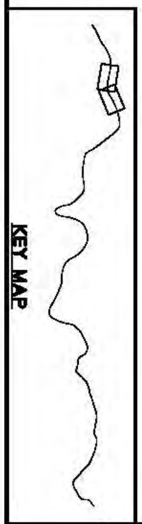
COUNTY OF MARIN
CALIFORNIA

BKF
ENGINEERS / SURVEYORS / PLANNERS
2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)

WETLAND IMPACT EXHIBIT 11/11/09

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-27 Wetland Impacts w Swales\01_Wetland Impacts.dwg
PLOT DATE: 11-11-09 PLOTTED BY: mile




KEY MAP

		No.	Revisions
Date	JULY 2009		
Scale	1" = 40'		
Design	WC TEAM		
Drawn	WC TEAM		
Approved	RS		
Job No	20065075		

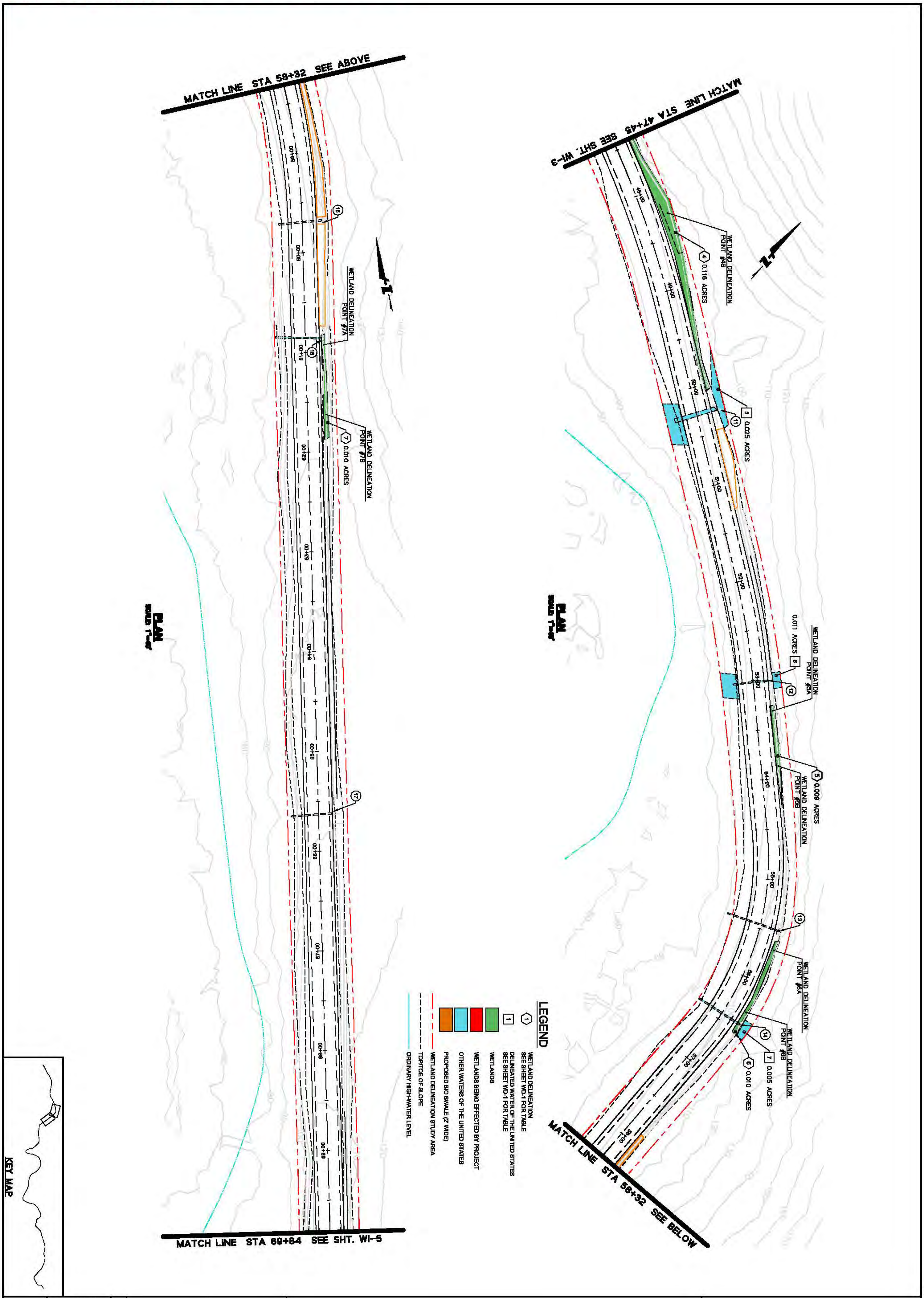
Drawing Number:
WI-3
3 OF 14

SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT (STA. 25+34 TO 47+45)
COUNTY OF MARIN CALIFORNIA

BKF
ENGINEERS / SURVEYORS / PLANNERS

2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-27 Wetland Impacts w Swales\01_Wetland Impacts.dwg
PLOT DATE: 11-11-09 PLOTTED BY: mile

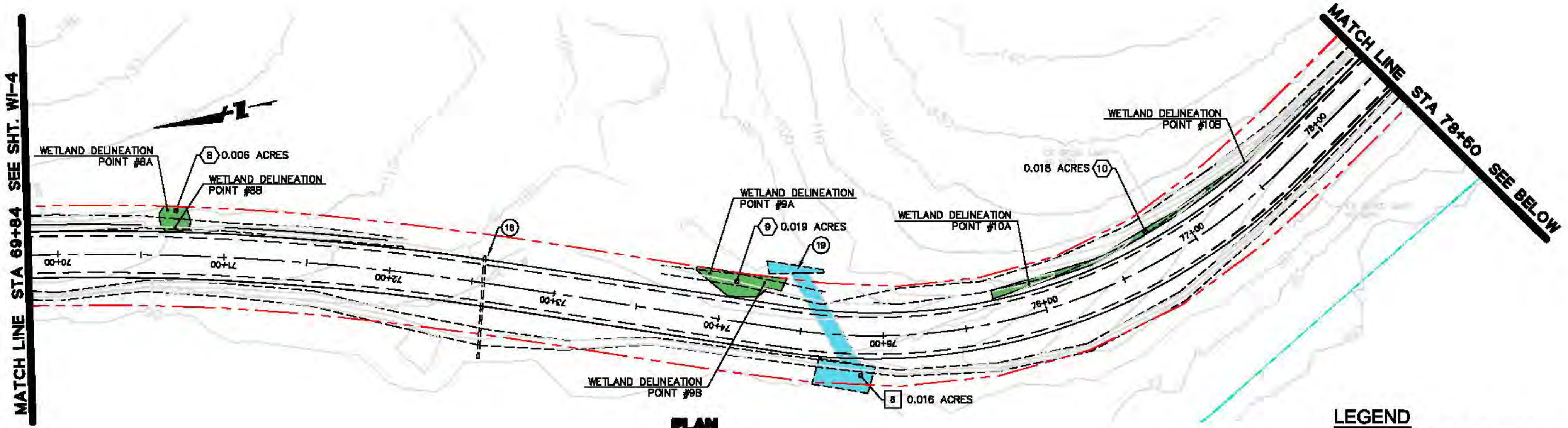


Drawing Number: WI-4 4 OF 14	Date JULY 2009	No.	Revisions
	Scale 1" = 40'		
	Design WC TEAM		
	Drawn WC TEAM		
	Approved RS		
	Job No 20065075		

SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT (STA. 47+45 TO 69+84)
COUNTY OF MARIN CALIFORNIA

BKF
ENGINEERS / SURVEYORS / PLANNERS

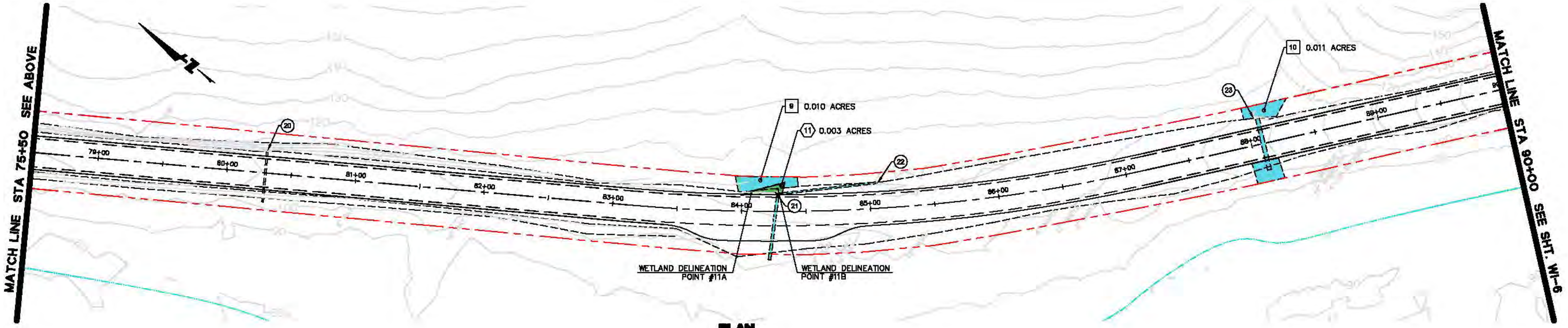
2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)



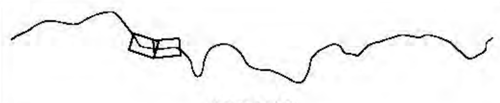
PLAN
SCALE: 1"=40'

LEGEND

⬡ 1	WETLAND DELINEATION SEE SHEET WD-1 FOR TABLE
☐ 1	DELINEATED WATER OF THE UNITED STATES SEE SHEET WD-1 FOR TABLE
🟩	WETLANDS
🟥	WETLANDS BEING EFFECTED BY PROJECT
🟦	OTHER WATERS OF THE UNITED STATES
🟧	PROPOSED BIO SWALE (2' WIDE)
— — —	WETLAND DELINEATION STUDY AREA
- - - - -	TOP/TOE OF SLOPE
———	ORDINARY HIGH-WATER LEVEL



PLAN
SCALE: 1"=40'



KEY MAP

BKF
ENGINEERS / SURVEYORS / PLANNERS
2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)

SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT (STA. 69+84 TO 90+00)

COUNTY OF MARIN
CALIFORNIA

No.	Revisions

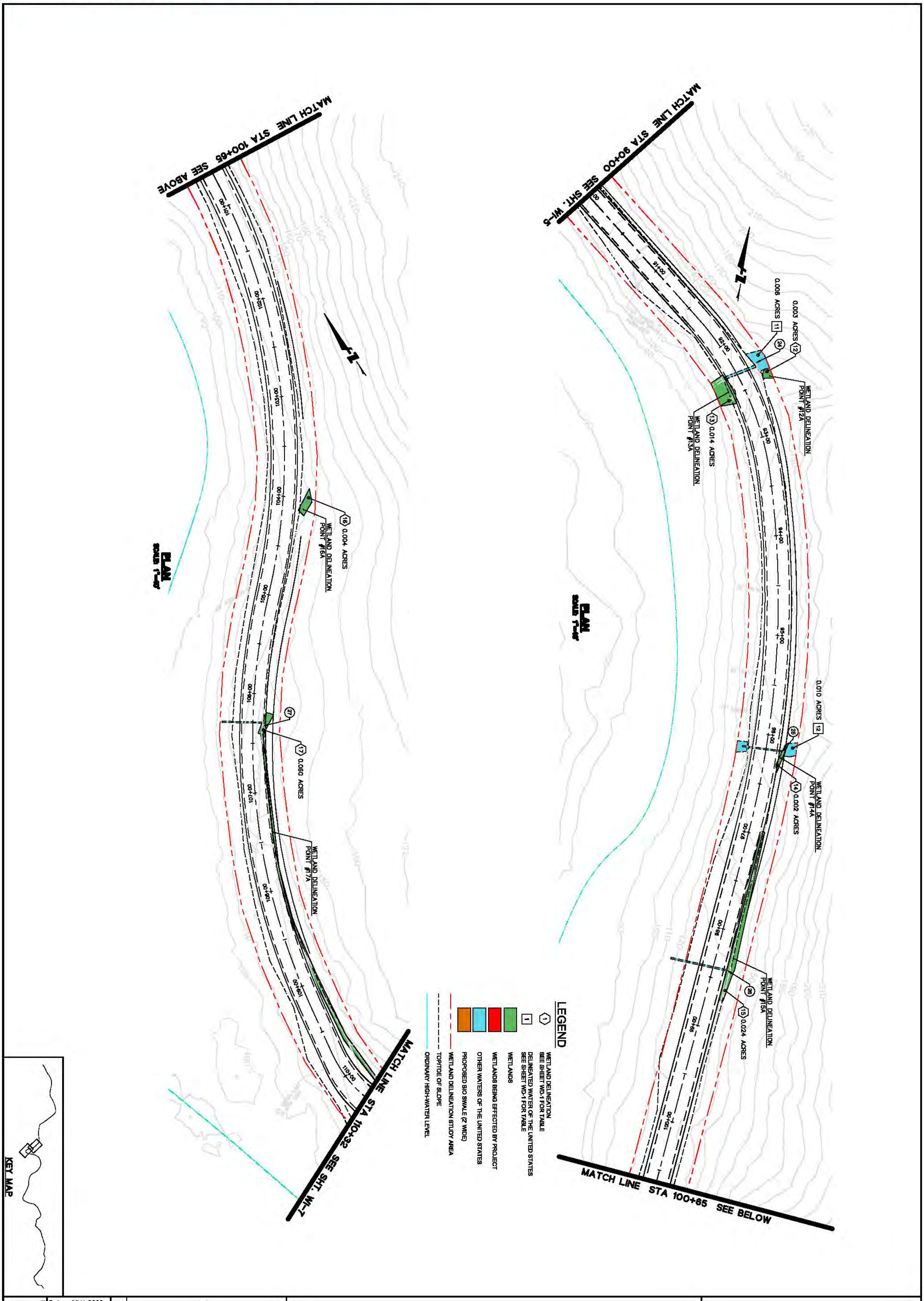
Date JULY 2009
Scale 1"=40'
Design WC TEAM
Drawn WC TEAM
Approved RS
Job No 20065075

Drawing Number:
WI-5
5 OF 14

WETLAND IMPACT EXHIBIT 11/11/09

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-27 Wetland Impacts w Swales\01_Wetland Impacts.dwg
PLOT DATE: 11-11-09 PLOTTED BY: mlle

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-27 Wetland Impacts w Swales\01_Wetland Impacts.dwg
PLOT DATE: 11-11-09 PLOTTED BY: mlle



Drawing Number:	Date JULY 2009	No.	Revisions
WI-6	Scale 1" = 40'		
6 OF 14	Design WC TEAM		
	Drawn WC TEAM		
	Approved RS		
	Job No 20065075		

SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT (STA. 90+00 TO 110+32)

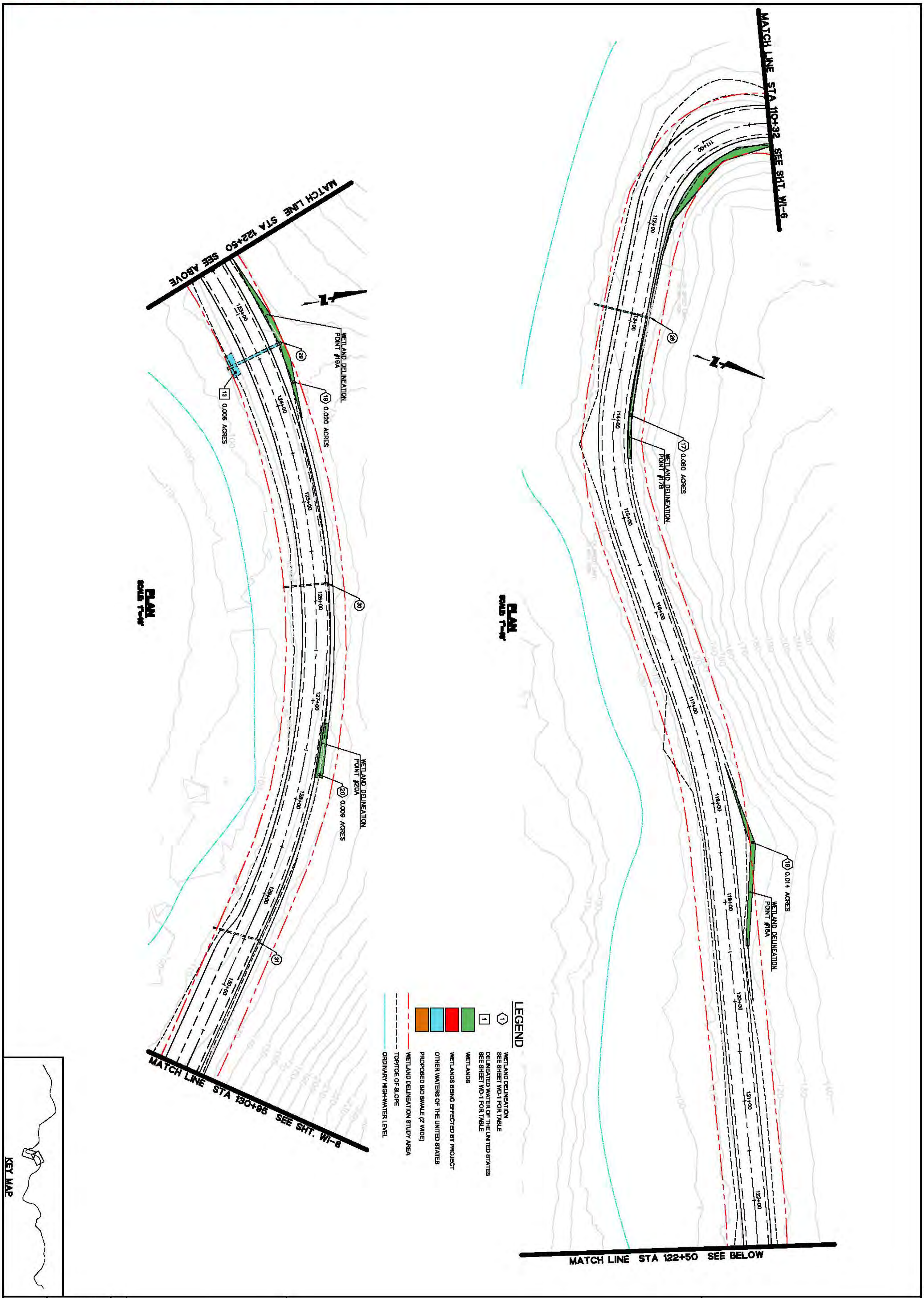
COUNTY OF MARIN CALIFORNIA

BKF
ENGINEERS / SURVEYORS / PLANNERS

2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)

WETLAND IMPACT EXHIBIT 11/11/09

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-27 Wetland Impacts w Swales\01_Wetland Impacts.dwg
PLOT DATE: 11-11-09 PLOTTED BY: mlle



Drawing Number: WI-7 7 OF 14	Date JULY 2009	No.	Revisions
	Scale 1" = 40'		
	Design WC TEAM		
	Drawn WC TEAM		
	Approved RS		
	Job No 20065075		

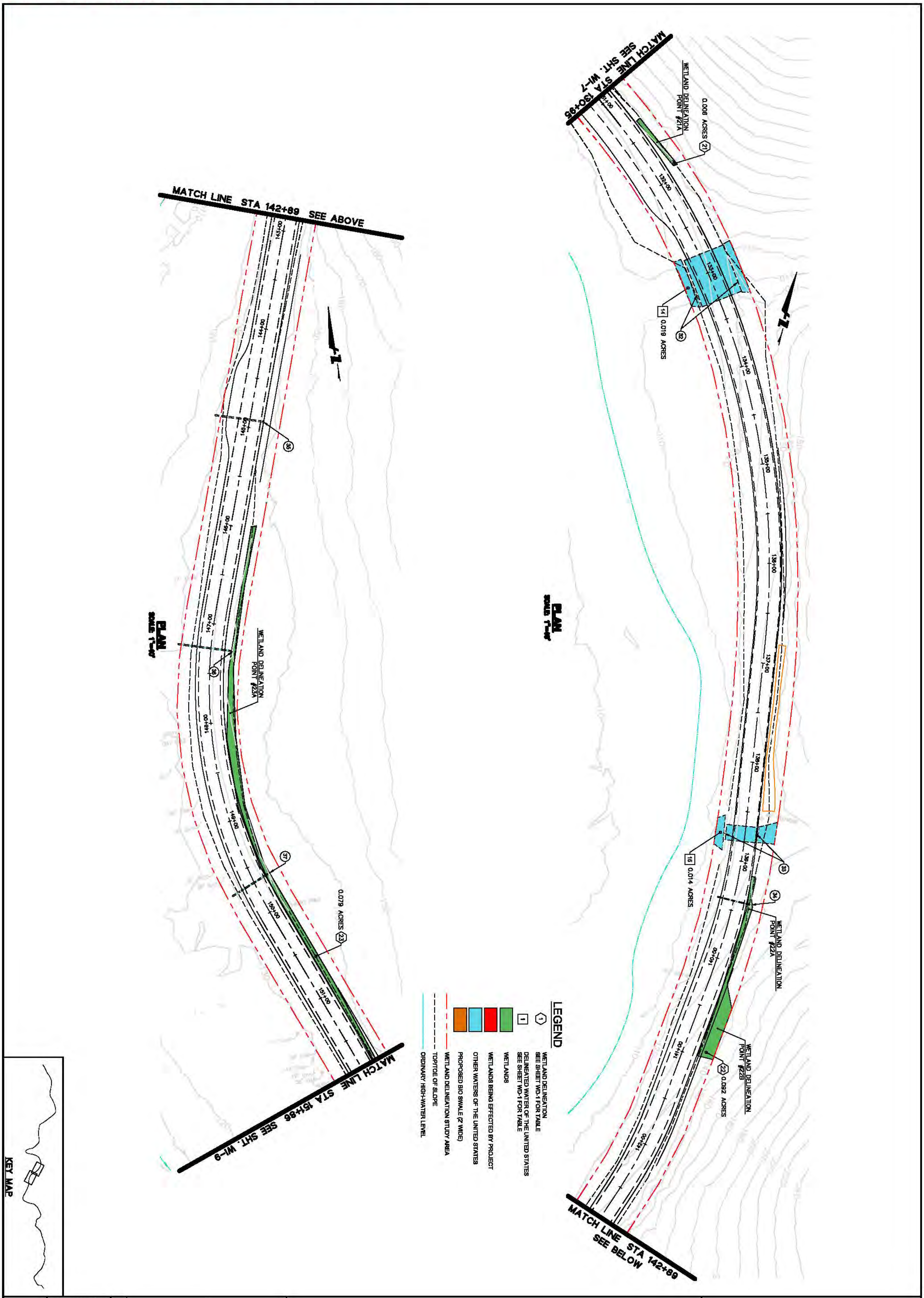
SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT (STA. 110+32 TO 130+95)

COUNTY OF MARIN CALIFORNIA

BKF
ENGINEERS / SURVEYORS / PLANNERS

2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-27 Wetland Impacts w Swales\01_Wetland Impacts.dwg
PLOT DATE: 11-11-09 PLOTTED BY: mile

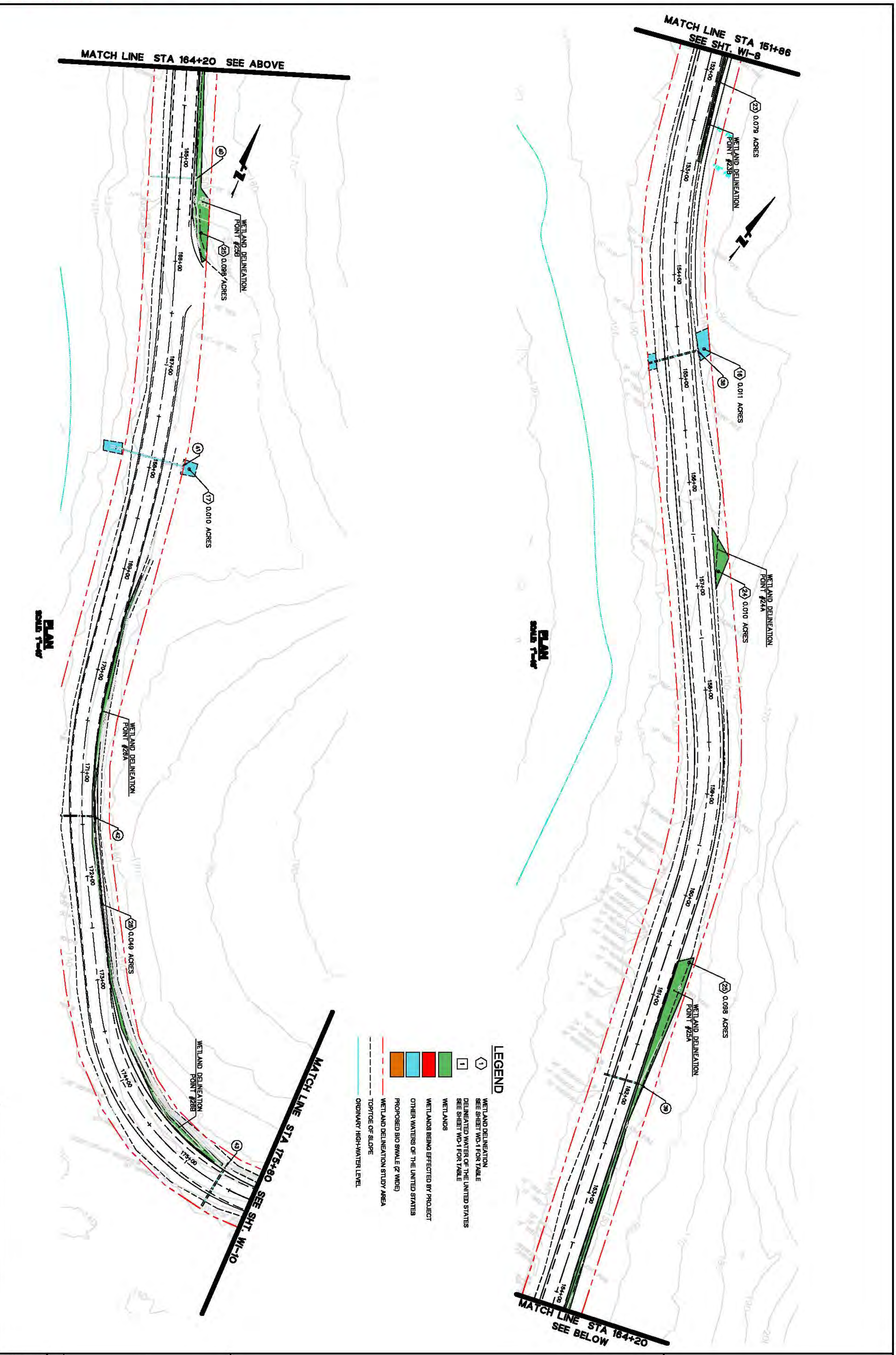


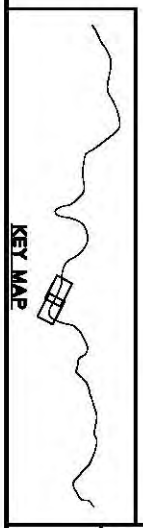
Drawing Number: WI-8 8 OF 14	Date JULY 2009	No.	Revisions
	Scale 1" = 40'		
	Design WC TEAM		
	Drawn WC TEAM		
	Approved RS		
	Job No 20065075		

SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT (STA. 130+95 TO 151+86)
COUNTY OF MARIN CALIFORNIA

BKF
ENGINEERS / SURVEYORS / PLANNERS
2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-27 Wetland Impacts w Swales\01_Wetland Impacts.dwg
PLOT DATE: 11-11-09 PLOTTED BY: mile




KEY MAP

Drawing Number: WI-9 9 OF 14	Date JULY 2009	No.	Revisions
	Scale 1" = 40'		
	Design WC TEAM		
	Drawn WC TEAM		
	Approved RS		
	Job No 20065075		

SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT (STA. 151+86 TO 175+80)

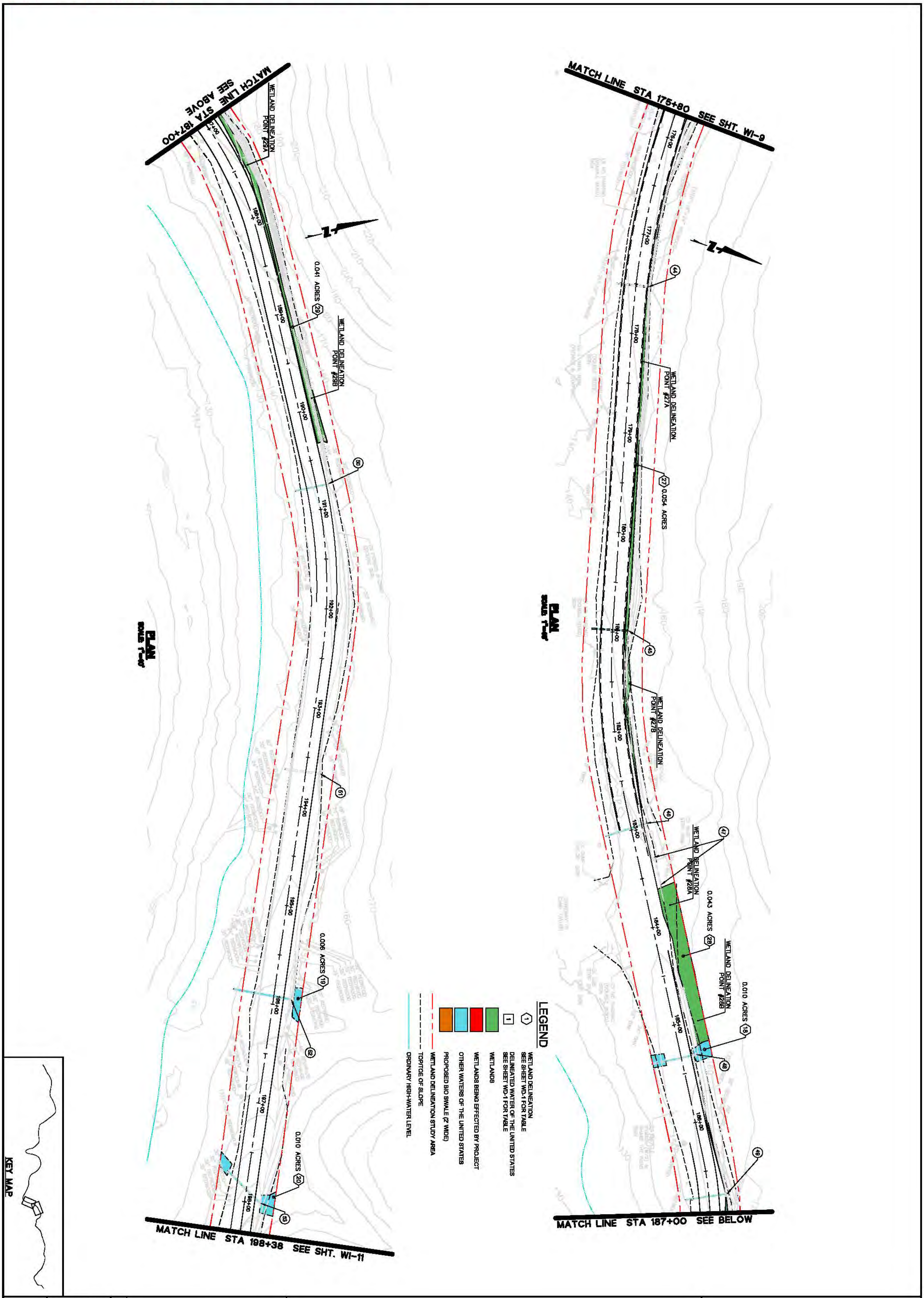
COUNTY OF MARIN
CALIFORNIA

BKF
ENGINEERS / SURVEYORS / PLANNERS

2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)

WETLAND IMPACT EXHIBIT 11/11/09

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-27 Wetland Impacts w Swales\01_Wetland Impacts.dwg
PLOT DATE: 11-11-09 PLOTTED BY: mile



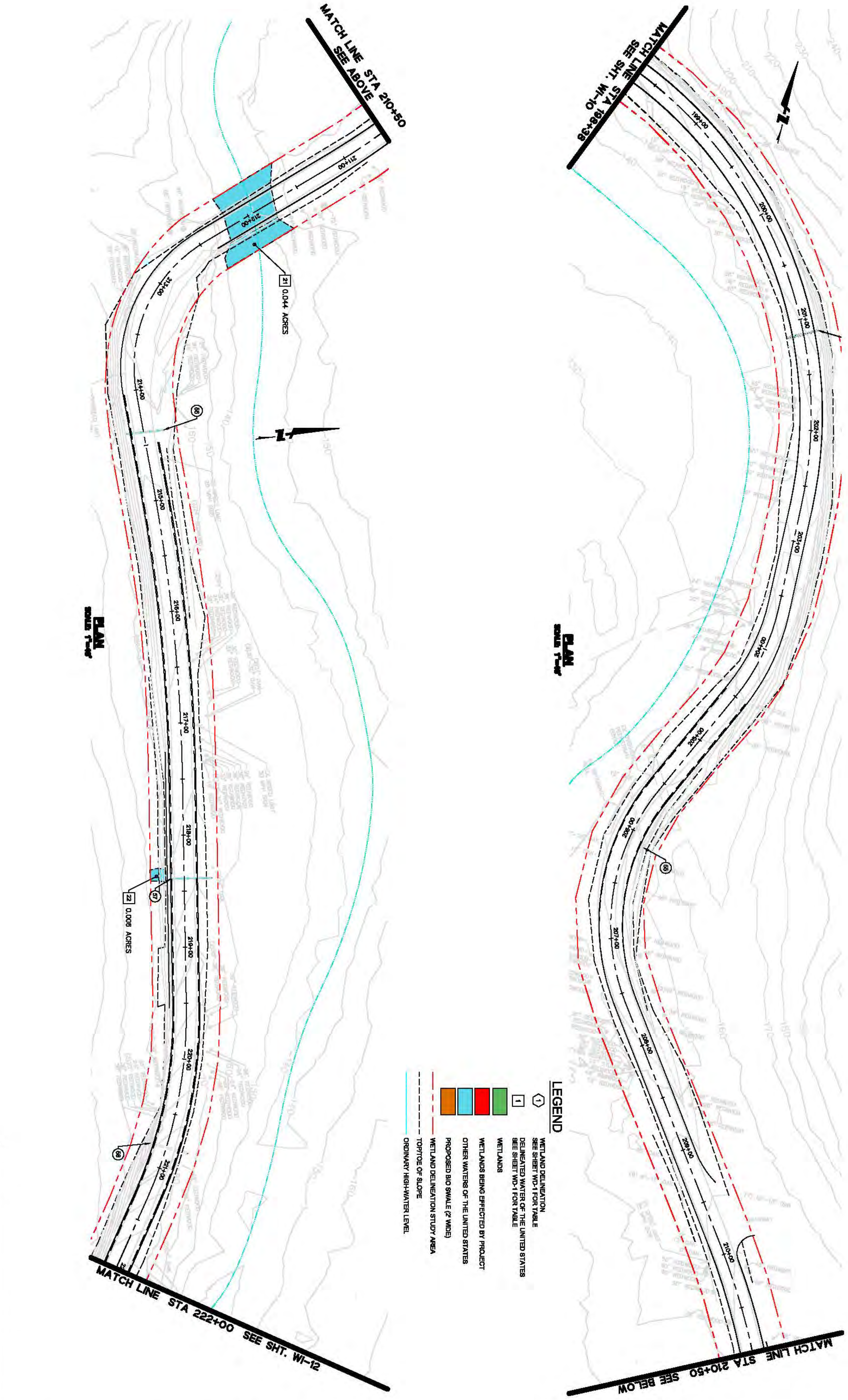
Drawing Number: WI-10 10 OF 14	Date JULY 2009	No.	Revisions
	Scale 1" = 40'		
	Design WC TEAM		
	Drawn WC TEAM		
	Approved RS		
	Job No 20065075		

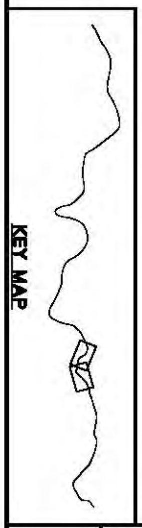
SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT (STA. 175+80 TO 198+38)

COUNTY OF MARIN
CALIFORNIA

BKF
ENGINEERS / SURVEYORS / PLANNERS
2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-27 Wetland Impacts w Swales\01_Wetland Impacts.dwg
PLOT DATE: 11-11-09 PLOTTED BY: mlle





Date	JULY 2009
Scale	1" = 40'
Design	WC TEAM
Drawn	WC TEAM
Approved	RS
Job No	20065075

Drawing Number:
WI-11
11 of 14

No.	Revisions

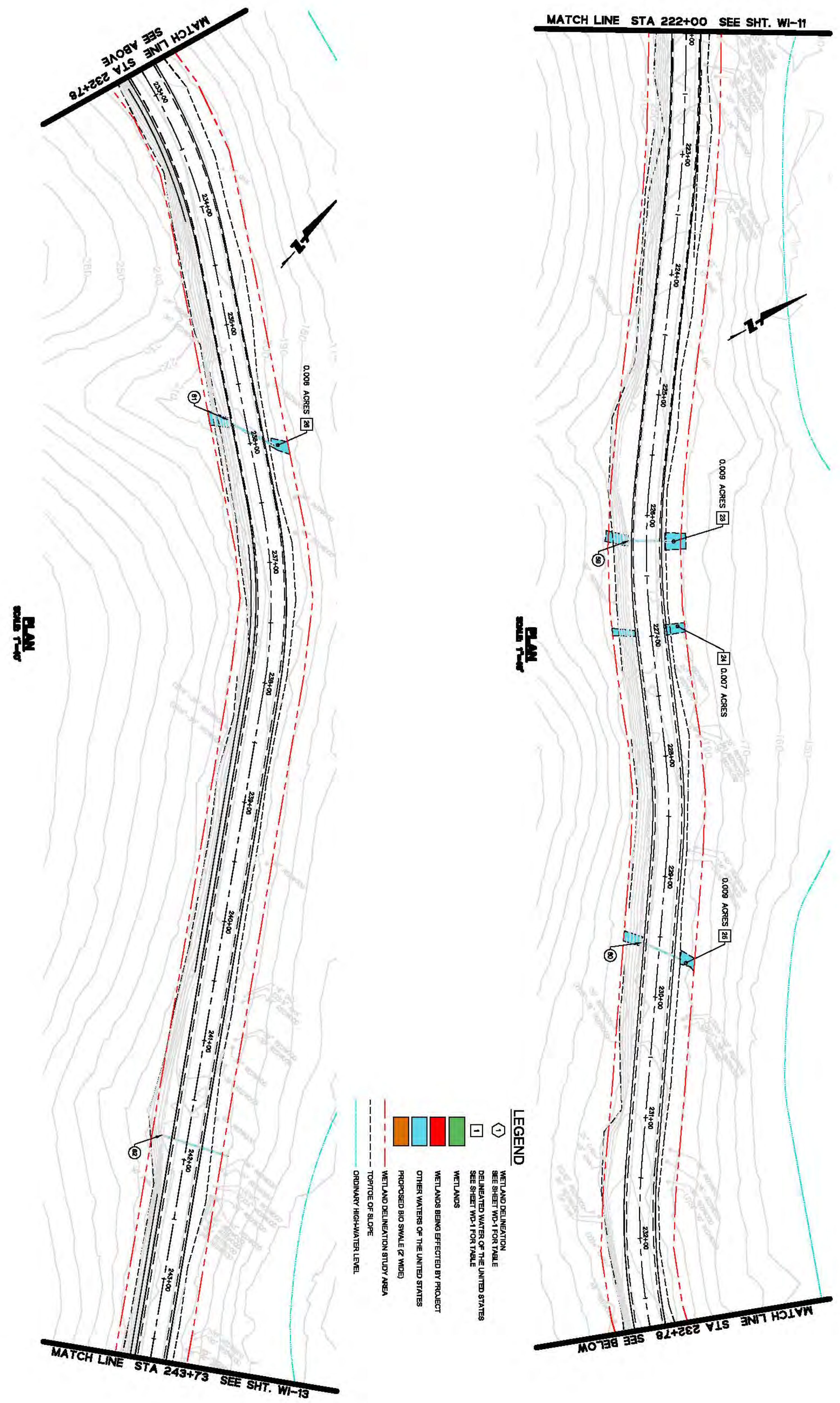
SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT (STA. 198+38 TO 222+00)

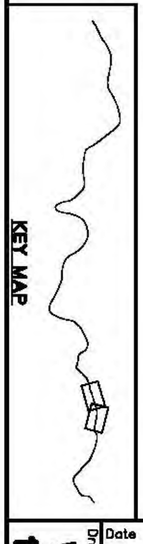
COUNTY OF MARIN CALIFORNIA

BKF
ENGINEERS / SURVEYORS / PLANNERS

2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-27 Wetland Impacts w Swales\01_Wetland Impacts.dwg
PLOT DATE: 11-11-09 PLOTTED BY: mlle





Date JULY 2009	No.	Revisions
Scale 1" = 40'		
Design WC TEAM		
Drawn WC TEAM		
Approved RS		
Job No 20065075		

Drawing Number:
WI-12
12 OF 14

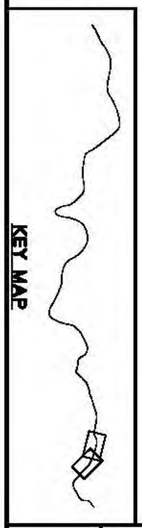
SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT (STA. 222+00 TO 243+73)
COUNTY OF MARIN CALIFORNIA

BKF
ENGINEERS / SURVEYORS / PLANNERS
2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)

DRAWING NAME: K:\Eng06\065075\DWG\EXHIBITS\2009-10-27 Wetland Impacts w Swales\01_Wetland Impacts.dwg
PLOT DATE: 11-11-09 PLOTTED BY: mlie

LEGEND

⬡	WETLAND DELINEATION SEE SHEET WD-1 FOR TABLE
☐	DELINEATED WATER OF THE UNITED STATES SEE SHEET WD-1 FOR TABLE
🟩	WETLANDS
🟥	WETLANDS BEING EFFECTED BY PROJECT
🟦	OTHER WATERS OF THE UNITED STATES
🟧	PROPOSED BIO SWALE (2' WIDE)
- - -	WETLAND DELINEATION STUDY AREA
- - -	TOP/TOE OF SLOPE
—	ORDINARY HIGH-WATER LEVEL


KEY MAP

Date	JULY 2009
Scale	1" = 40'
Design	WC TEAM
Drawn	WC TEAM
Approved	RS
Job No	20065075

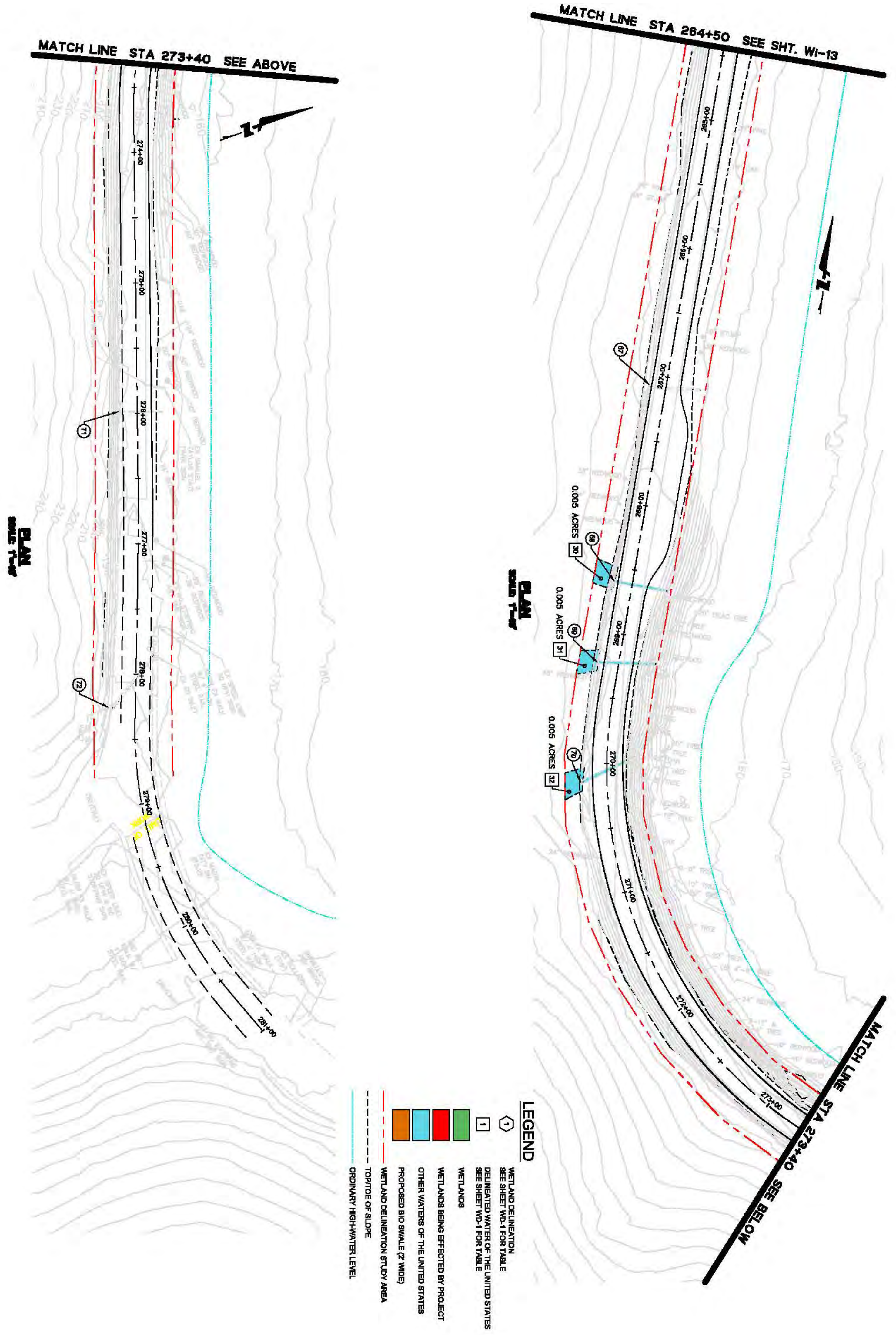
No.	Revisions

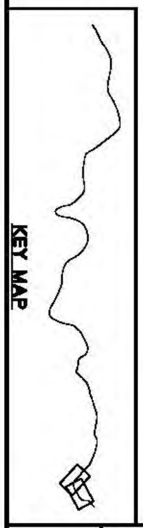
Drawing Number:
WI-13
13 of **14**

SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT (STA. 243+73 TO 264+50)
COUNTY OF MARIN CALIFORNIA

BKF
ENGINEERS / SURVEYORS / PLANNERS

2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)





Date	JULY 2009
Scale	1" = 40'
Design	WC TEAM
Drawn	WC TEAM
Approved	RS
Job No	20065075

Drawing Number:
WI-14
14 OF 14

No.	Revisions

SIR FRANCIS DRAKE BOULEVARD IMPROVEMENTS
(FROM SHAFTER BRIDGE TO PLATFORM BRIDGE ROAD)
WETLAND IMPACT EXHIBIT (STA. 264+50 TO 279+25)

COUNTY OF MARIN
CALIFORNIA

BKF
ENGINEERS / SURVEYORS / PLANNERS
2737 NORTH MAIN STREET
SUITE 200
WALNUT CREEK, CA 94596
925-940-2200 (TEL)
925-940-2299 (FAX)

SIR FRANCIS DRAKE BOULEVARD
ROADWAY REHABILITATION PROJECT
BIOLOGICAL ASSESSMENT

APPENDIX H
SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE PROJECT VICINITY

Special-Status Wildlife Species Evaluated at the Sir Francis Drake Improvement Project Site, Marin County, California

Species	Status* (Federal/State/ CNPS)	Habitat Requirements	Potential for Occurrence in Project Study Area
Invertebrates			
Callophrys mossii marinensis Marin elfin butterfly	--/--	Found only in the redwood forest areas of Marin County. Larvae collected and reared on *Sedum spathulifolium*. Normal flight occurs in April.	High potential. This species has been documented within the project study area near Shafter Bridge (CDFG 2009). Suitable habitat for this species is present within redwood forest found in the project study area.
Ischnura gemina San Francisco forktail damselfly	--/--	Endemic to the San Francisco Bay area. Found within small, marshy ponds and ditches with emergent and floating aquatic vegetation.	Moderate potential. Suitable habitat for this species is present within and adjacent to the project study area. No documented recordings of this species are found in the project vicinity.
Lichnanthe ursine Bumblebee scarab beetle	--/--	Inhabits coastal sand dunes from Sonoma County south to San Mateo County. Usually flies close to sand surface near the crest of dunes.	No potential. No appropriate habitat found within the project study area.
Speyeria zerene myrtleae Myrtle's silverspot butterfly	FE/--	Found in coastal bluff scrub, coastal prairie terraces, and associated non-native grasslands in western Marin and southwestern Sonoma Counties. Adult butterflies are typically found in areas that are sheltered from the wind, below 820 feet elevation, and within 3 miles of the coast.	Moderate potential. Suitable habitat for this species is present within and adjacent to the project study area. No documented recordings of this species are found in the project vicinity.
Syncaris pacifica California freshwater shrimp	FE/CE	Endemic to Marin, Napa, and Sonoma Counties. Found in low elevation, low gradient streams where riparian cover is moderate to heavy. Found in shallow pools away from main streamflow. In winter, found near undercut banks with exposed roots. In summer, found near leafy branches touching water.	High potential. This species has been documented in Lagunitas Creek within the project study area. Suitable habitat for this species is present within Lagunitas Creek and larger tributary streams flowing into Lagunitas Creek with moderate to heavy riparian vegetative coverage.
Vespericola marinensis Marin hesperian	--/--	Found in moist spots in coastal brush fields and chaparral vegetation in Marin County. Found under leaves of cow parsnip, around spring seeps, in leafmold along streams, in alder woods, and mixed evergreen forest.	High potential. Suitable habitat for this species is present within and adjacent to the project study area. This species has been observed in the project vicinity in Samuel P. Taylor State Park near CampTaylor.
Fish			
Eucyclogobius newberryi Tidewater goby	FE/CSC	Found in brackish water habitats along the California coast from Agua Hedionda lagoon, San Diego County to the mouth of the Smith River. Found in shallow lagoons and lower stream reaches. Require fairly still but not stagnant water and high oxygen levels.	No potential. No appropriate habitat found within the project study area.

Species	Status* (Federal/State/ CNPS)	Habitat Requirements	Potential for Occurrence in Project Study Area
Lavinia symmetricus Tomales roach	--/CSC	Streams tributary to Tomales Bay.	Moderate potential. Tomales roach have been documented in Lagunitas Creek (CDFG 2009). Suitable habitat for this species is present within Lagunitas Creek, a tributary to Tomales Bay. May utilize larger streams tributary to Lagunitas Creek as well.
Oncorhynchus kisutch Central California Coast coho salmon Evolutionarily Significant Unit (ESU)	FE/CE	Coho salmon have an anadromous life cycle. They hatch in freshwater streams, migrate to live for two years in the ocean, and then return to spawn in freshwater, almost always returning to the same river in which they were born. Returning adults typically enter freshwater rivers in the late fall, and spawning occurs throughout the fall and winter. Eggs hatch in the early spring, and juveniles then live in the river-bottom gravel for 10 weeks before emerging. After maturing for about a year in freshwater, coho migrate downstream to coastal estuaries and enter the ocean in the spring.	High potential. Coho salmon have been well documented in Lagunitas Creek (CDFG 2009, MMWD 2010). Suitable habitat for this species is present within Lagunitas Creek and larger tributary streams flowing into Lagunitas Creek.
Oncorhynchus mykiss irideus Central California Coast steelhead ESU	FT/--	Central California Coast steelhead have an anadromous life cycle. They hatch in freshwater streams, migrate to live up to 3 years in the ocean, and then return to breed, or spawn, in freshwater. Returning adults typically enter freshwater rivers to spawn from December through April. After hatching, the developing steelhead will remain in the gravel for another four to six weeks. Newly emerged fry move to shallow, protected areas of the stream (usually in the stream margins). Most juveniles can be found in riffles, although larger ones will move to pools or deep runs. After maturing for a period of 1 - 2 years in freshwater, steelhead migrate downstream to coastal estuaries and enter the ocean in the spring.	High potential. Steelhead have been well documented in Lagunitas Creek (CDFG 2009, MMWD 2010). Suitable habitat for this species is present within Lagunitas Creek and larger tributary streams flowing into Lagunitas Creek.
Oncorhynchus tshawytscha California Coastal chinook salmon ESU	FT/--	Chinook salmon have an anadromous life cycle. They hatch in freshwater streams, migrate to live up to 6 years in the ocean, and then return to spawn in freshwater. Returning adults typically enter freshwater rivers in the late fall and early winter. After feeding for up to 2 years in freshwater, chinook migrate downstream to coastal estuaries and enter the ocean in the spring. and early summer	High potential. Chinook salmon have been well documented in Lagunitas Creek (CDFG 2009, MMWD 2010). Suitable habitat for this species is present within Lagunitas Creek and larger tributary streams flowing into Lagunitas Creek.

Species	Status* (Federal/State/ CNPS)	Habitat Requirements	Potential for Occurrence in Project Study Area
Oncorhynchus keta Pacific Coast chum salmon ESU	--/CSC	Infrequently stray into Lagunitas Creek and spawning runs rarely occur; the creek is not believed to support a permanent population of this species.	High potential. Chum salmon have been occasionally observed in Lagunitas Creek but probably do not maintain a permanent population (Greg Andrew, MMWD *pers. com.*). Suitable habitat for this species is present within the lower and middle reaches of Lagunitas Creek.
Amphibians and Reptiles			
Clemmys marmorata marmorata Northwestern pond turtle	--/CSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams, and irrigation ditches with aquatic vegetation. Require basking sites and suitable upland habitat (sandy banks or grassy open fields) for egg-laying.	Moderate potential. Suitable habitat for this species is present within the project study area adjacent to SFDB.
Rana draytonii California red-legged frog	FT/CSC	Red-legged frogs require aquatic habitat for breeding but also use a variety of other habitat types including riparian and upland areas. Adults often utilize dense, shrubby or emergent vegetation closely associated with deep-water pools with fringes of cattails and dense stands of overhanging vegetation such as willows.	High potential. Documented sightings of this species are recorded on San Geronimo Creek south of Shafter Bridge on the eastern end of the project site. Suitable habitat for this species is present within Lagunitas Creek and other larger stream tributaries to Lagunitas Creek.
Rana boylii Foothill yellow-legged frog	--/CSC	Found in partly-shaded, shallow streams and riffles with a rocky substrate in a variety of habitats. Need at least some cobble-sized substrate for egg-laying. Require at least 15 weeks to attain metamorphosis.	High potential. Documented sightings of this species are recorded on San Geronimo Creek south of Shafter Bridge on the eastern end of the project site. Suitable habitat for this species is present within Lagunitas Creek and other stream tributaries to Lagunitas Creek.
Birds			
Charadrius alexandrinus nivosus Western snowy plover	FT/CSC	Nests on sandy beaches, salt pond levees, and shores of large alkali lakes. Require sandy, gravely or friable soils for nesting.	No potential. No appropriate habitat found within the project study area.
Dendroica petechia brewsteri Yellow warbler	--/CSC	Associated with riparian plant associations. Prefer willows, cottonwoods, aspens, sycamores, and alders for nesting and foraging activities. Also nest in montane shrubbery in open conifer forests.	Moderate potential. Suitable habitat for this species is present within Lagunitas Creek and other stream tributaries with associated mixed evergreen and riparian vegetative communities.
Geothlypis trichas sinuosae Saltmarsh common yellowthroat	--/CSC	Resident of the San Francisco Bay region in fresh and salt water marshes. Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, and willows for nesting.	No potential. No appropriate habitat found within the project study area.

Species	Status* (Federal/State/ CNPS)	Habitat Requirements	Potential for Occurrence in Project Study Area
Haliaeetus leucocephalus Bald eagle	FT/CE, Fully Protected	Nests and winters near ocean shores, lake margins and rivers. Nests in large, old-growth, or dominant live trees with open branches, especially Ponderosa pine. Roosts communally in winter.	No potential. No appropriate habitat found within the project study area.
Laterellus jamaicensis coturniculus California black rail	--/CT, Fully Protected	Mainly inhabits salt-marshes bordering larger bays. Occurs in tidal salt-marsh heavily grown to pickleweed. Also found in freshwater and brackish marshes.	No potential. No appropriate habitat found within the project study area.
Melospiza melodia samuelis San Pablo song sparrow	--/CSC	Resident of salt marshes along the north side of San Francisco and San Pablo Bays. Inhabits tidal sloughs in *Salicornia* marshes; nests in *Grindelia* bordering slough channels.	No potential. No appropriate habitat found within the project study area.
Pandion haliaetus Osprey	--/CSC	Nests along ocean shores, bays, fresh water lakes, and larger streams. Build large nests in tree tops within 15 miles of good fish-producing body of water.	Moderate potential. Suitable habitat for this species is present within and adjacent to Lagunitas Creek in the project study area adjacent to SFDB.
Pelecanus occidentalis californicus California brown pelican	FE/CE, Fully Protected	Breed in nesting colonies on islands without mammal predators. Typically build a nest of sticks on the ground. Dive from flight to capture surface-schooling marine fishes. In California, they feed primarily on Pacific mackerel, Pacific sardine and northern anchovy.	No potential. No appropriate habitat found within the project study area.
Sternula antillarum browni California least tern	FE/CE, Fully Protected	Nests along the coast from San Francisco Bay south to northern Baja California. Colonial breeder on bare or sparsely vegetated, flat substrates such as sand beaches, alkali flats, land fills, and paved areas.	No potential. No appropriate habitat found within the project study area.
Brachyramphus marmoratus Marbled murrelet	FT/CE	Feed on fish and invertebrates in the nearshore marine environment, but fly up to 50 miles inland to nest in conifer forests. Murrelets utilize forests with mature- or old-growth characteristics, including large trees, a generous amount of canopy closure, and complex under- and overstory structure. Nest trees must have trunk or branch formations, such as large horizontal branches, that can serve as nest platforms.	Low potential. Suitable habitat for this species is present within the project study area and vicinity. However, no documented nesting by this species has been recorded within Marin County.

Species	Status* (Federal/State/ CNPS)	Habitat Requirements	Potential for Occurrence in Project Study Area
Strix occidentalis caurina Northern spotted owl	FT/--	Northern spotted owls are very territorial and intolerant of habitat disturbance. They prefer old-growth forests with tree canopies that are high and open enough for the owls to fly between and underneath the trees. Preferred areas have large trees with broken tops, deformed limbs or large holes used as nesting sites. Each pair needs a large amount of land for hunting and nesting, and although they do not migrate, spotted owls may shift their ranges in response to seasonal changes that make hunting difficult.	High potential. Documented sightings and territories of this species are recorded in the project vicinity. Suitable habitat for this species is present within the project study area and vicinity.
Mammals			
Antrozous pallidus Pallid bat	--/CSC	Found in deserts, grasslands, shrublands, woodlands, and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	High potential. Sightings of this species have been documented under a bridge over Lagunitas Creek just west of the project site near Platform Bridge Road. Suitable habitat for this species is present within and adjacent to the project study area.
Aplodontia rufa phaia Point Reyes mountain beaver	--/CSC	Coastal area of Point Reyes in areas of springs of seepages. North-facing slopes of hills and gullies in areas overgrown with sword fern and thimbleberry.	Low potential. Sightings of this species have been documented near Shafter Bridge (CDFG 2009). Suitable habitat for this species is present within and adjacent to the project study area.
Corynorhinus townsendii Townsend's big-eared bat	--/CSC	Throughout California in a wide variety of habitats. Most common in mesic sites. Roosts in the open, hanging from walls and ceilings. Roosting sites limiting. Extremely sensitive to human disturbance.	High potential. Sightings of this species have been documented under a bridge over Lagunitas Creek just west of the project site near Platform Bridge Road. Suitable habitat for this species is present within and adjacent to the project study area.
Taxidea taxus American badger	--/CSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Require sufficient food, friable soils and open, uncultivated ground. Prey on burrowing rodents and dig their own burrows.	Moderate potential. Suitable habitat for this species is present within and adjacent to the project study area. No documented recordings of this species are found in the project vicinity.

***Status**

FE = Federally listed as Endangered
FT = Federally listed as Threatened
FC = Federal Candidate Species
CE = State listed as Endangered
CT = State listed as Threatened
CR = State designated as Rare

CNPS 1b = Plants that are rare, threatened or endangered in California and elsewhere
CNPS 2 = Plants that are rare, threatened, or endangered in California but common elsewhere
CNPS 3 = Plants about which we need more information – review list
CNPS 4 = Plants of limited distribution – watch list
CSC = California Species of Concern

Special-Status Plant Species Evaluated at the Sir Francis Drake Improvement Project Site, Marin County, California

Species	Status* (Federal/State/ CNPS)	Habitat Requirements	Potential for Occurrence in Project Study Area
Abronia umbellata var. *breviflora* Pink sand verbena	--/--/1b	Coastal dunes and coastal strand. Foredunes and interdunes with sparse cover. Elevational range: 0 to 12 meters. Blooming period: June through October.	No potential. No habitat for this species is present in the project study area.
Alopecurus aequalis var. *sonomensis* Sonoma alopecurus	FE/--/1b	Freshwater marshes and swamps, riparian scrub. Found in wet areas, marshes, and riparian banks with other wetland species. Elevational range: 5 to 360 meters. Blooming period: May through July.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Amorpha californica var. *napensis* Napa false indigo	--/--/1b	Broadleaved upland forest, chaparral, and cismontane woodland. Found in openings in forest, woodland, or chaparral. Elevational range: 150 to 2,000 meters. Blooming period: April through July.	High potential. Potential habitat for this species is present within the project study area adjacent to SFDB. Plant species has been observed in the project vicinity.
Amsinckia lunaris Bent-flowered fiddleneck	--/--/1b	Coastal bluff scrub, cismontane woodland, and valley and foothill grassland. Elevational range: 3 to 500 meters. Blooming period: March through June.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Arctostaphylos hookeri var. *Montana* Mt. Tamalpais Manzanita	--/--/1b	Chaparral, and valley and foothill grassland. Found on serpentine slopes. Elevational range: 160 to 760 meters. Blooming period: February through April.	High potential. Potential habitat for this species is present within the project study area adjacent to SFDB. Plant species has been observed in the project vicinity.
Arctostaphylos virgata Marin Manzanita	--/--/1b	Broadleafed upland forest, closed-cone coniferous forest, chaparral, and north coast coniferous forest. Found on sandstone or granitic soil. Elevational range: 60 to 700 meters. Blooming period: January through March.	High potential. Potential habitat for this species is present within the project study area adjacent to SFDB. Plant species has been observed in the project vicinity.
Astragalus pycnostachyus var. *pycnostachyus* Coastal Marsh Milk-vetch	--/--/1b	Coastal dunes, coastal salt marshes, and coastal scrub. Found on mesic sites in dunes or along streams or coastal salt marshes. Elevational range: 0 to 30 meters. Blooming period: April through October.	No potential. No habitat for this species is present in the project study area.
Campanula californica Swamp Harebell	--/--/1b	Bogs, fens, closed-cone coniferous forest, coastal prairie, meadows, freshwater marsh, and north coast coniferous forest. Elevational range: 1 to 405 meters. Blooming period: June through October.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Carex lyngbyei Lyngbye's sedge	--/--/2	Brackish and freshwater marshes and swamps. Elevational range: 0 meters. Blooming period: May through August.	No potential. Project study area occurs outside of the elevational range of this species.

Species	Status* (Federal/State/ CNPS)	Habitat Requirements	Potential for Occurrence in Project Study Area
Castilleja affinis var. *neglecta* Tiburon Indian paintbrush	FE/CT/1b	Valley and foothill grassland on rocky serpentine soils. Elevational range: 60 to 400 meters. Blooming period: April through June.	High potential. Potential habitat for this species is present within the project study area adjacent to SFDB. Plant species has been observed in the project vicinity.
Castilleja ambigua var. *humboldtiensis* Humboldt Bay owl's clover	--/--/1b	Coastal salt marsh and swamps. Elevational range: 0 to 3 meters. Blooming period: April through August.	No potential. No habitat for this species is present in the project study area.
Ceanothus gloriosus var. *porrectus* Mt. Vision ceanothus	--/--/1b	Closed-cone coniferous forest, coastal prairie, coastal scrub, and valley and foothill grassland. Elevational range: 25 to 305 meters. Blooming period: February through May.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Cirsium andrewsii Franciscan thistle	--/--/1b	Coastal bluff scrub, broadleaved upland forest, coastal scrub, and coastal prairie. Elevational range: 0 to 150 meters. Blooming period: March through July.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Cirsium hydrophilum var. *vaseyi* Mt. Tamalpais thistle	--/--/1b	Broadleaved upland forest, chaparral, meadows, and seeps. Elevational range: 265 to 620 meters. Blooming period: May through August.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Cordylanthus maritimus var. *palustris* Point Reyes bird's-beak	--/--/1b	Coastal salt marsh and swamp. Elevational range: 0 to 15 meters. Blooming period: June through October.	No potential. No habitat for this species is present in the project study area.
Dirca occidentalis Western leatherwood	--/--/1b	Broadleafed upland forest, chaparral, closed-cone coniferous forest, cismontane woodland, north coast conifer forest, and riparian forest. Found on brushy slopes and mesic sites, mostly in mixed evergreen and foothill woodland communities. Elevational range: 30 to 550 meters. Blooming period: January through April.	High potential. Potential habitat for this species is present within the project study area adjacent to SFDB. Species has been observed in the project vicinity.
Entosthodon kochii Koch's cord-moss	--/--/1b	Cismontane woodland. Elevational range: 180 to 1,000 meters. Blooming period: none.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Eriogonum luteolum var. *caninum* Tiburon buckwheat	--/--/3	Chaparral, coastal prairie, and valley and foothill grassland. Found on sepentine soils. Elevational range: 10 to 500 meters. Blooming period: May through September.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.

Species	**Status* (Federal/State/ CNPS)**	**Habitat Requirements**	**Potential for Occurrence in Project Study Area**
Fritillaria lanceolata var. *tristulis* Marin checker lily	--/--/1b	Coastal bluff scrub, coastal scrub, and coastal prairie. Elevational range: 15 to 150 meters. Blooming period: February through April.	High potential. This species has been observed south of the project study area in Samuel P. Taylor State Park.
Fritillaria liliacea Fragrant fritillary	--/--/1b	Coastal scrub, valley and foothill grassland, coastal prairie, and cismontane woodland. Elevational range: 3 to 410 meters. Blooming period: February through April.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Gilia capitata var. *chamissonis* Dune gilia	--/--/1b	Coastal dunes and coastal scrub. Elevational range: 2 to 200 meters. Blooming period: April through July.	No potential. No habitat for this species is present in the project study area.
Gilia capitata var. *tomentosa* Woolly-headed gilia	--/--/1b	Coastal bluff scrub. Elevational range: 15 to 155 meters. Blooming period: May through July.	No potential. No habitat for this species is present in the project study area.
Grindelia hirsutula var. *maritime* San Francisco gumplant	--/--/1b	Coastal bluff scrub, coastal scrub, and valley and foothill grassland. Found on in sandy or serpentine soils. Elevational range: 15 to 400 meters. Blooming period: June through September.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Hesperevax sparsiflora var. *brevifolia* Short-leaved evax	--/--/2	Coastal bluff scrub and coastal dunes. Elevational range: 0 to 215 meters. Blooming period: March through June.	No potential. No habitat for this species is present in the project study area.
Hesperolinon congestum Marin western flax	FT/CT/1b	Chaparral and valley and foothill grassland. Found in serpentine barrens and in serpentine grassland and chaparral. Elevational range: 5 to 370 meters. Blooming period: April through July.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Horkelia marinensis Point Reyes horkelia	--/--/1b	Coastal dunes, coastal prairie, and coastal scrub. Elevational range: 5 to 350 meters. Blooming period: May through September.	No potential. No habitat for this species is present in the project study area.
Layia carnosa Beach layia	FE/CE/1b	Coastal dunes and coastal scrub. Elevational range: 0 to 60 meters. Blooming period: March through July.	No potential. No habitat for this species is present in the project study area.
Lessingia hololeuca Woolly-headed lessingia	--/--/3	Broadleafed upland forest, coastal scrub, lower montane coniferous forest, valley and foothill grassland. Found on clay and serpentine soils. Elevational range: 15 to 305 meters. Blooming period: June through October.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.

Species	**Status* (Federal/State/ CNPS)**	**Habitat Requirements**	**Potential for Occurrence in Project Study Area**
Lilaeopsis masonii Mason's lilaeopsis	--/CR/1b	Freshwater and brackish marshes and swamps, riparian scrub. Elevational range: 0 to 10 meters. Blooming period: April through November.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Lilium maritimum Coast lily	--/--/1b	Closed-cone coniferous forest, coastal prairie, coastal scrub, broadleaved upland forest, north coast coniferous forest, and freshwater marsh and swamp. Elevational range: 5 to 335 meters. Blooming period: May through August.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Microseris paludosa Marsh microseris	--/--/1b	Closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland. Elevational range: 5 to 300 meters. Blooming period: April through July.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Navarretia rosulata Marin County navarretia	--/--/1b	Closed-cone coniferous forest and chaparral. Found In serpentine and rocky soils. Elevational range: 200 to 635 meters. Blooming period: May through July.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Phacelia insularis var. *continentis* North coast phacelia	--/--/1b	Coastal bluff scrub and coastal dunes. Elevational range: 10 to 160 meters. Blooming period: March through May.	No potential. No habitat for this species is present in the project study area.
Pleuropogon hooverianus North coast semaphore grass	--/CT/1b	Broadleaved upland forest, meadows and seeps, and north coast coniferous forest. Elevational range: 10 to 671 meters. Blooming period: April through August.	High potential. Potential habitat for this species is present within the project study area adjacent to SFDB. Plant species has been observed in the project vicinity.
Polygonum marinense Marin knotweed	--/--/3	Freshwater marshes and swamps. Coastal salt marshes and brackish marshes. Elevational range: 0 to 10 meters. Blooming period: April through October.	No potential. Project study area occurs outside of the elevational range of this species.
Quercus parvula var. *tamalpaisensis* Tamalpais oak	--/--/1b	Lower montane coniferous forest. Elevational range: 100 to 750 meters. Blooming period: March through April.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Rhynchospora californica California beaked-rush	--/--/1b	Bogs, fens, marshes, swamps, lower montane coniferous forest, meadows, and seeps. Elevational range: 45 to 1,010 meters. Blooming period: May through July.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Sidalcea calycosa var. *rhizomata* Point Reyes checkerbloom	--/--/1b	Marshes and swamps. Elevational range: 5 to 75 meters. Blooming period: April through September.	No potential. Project study area occurs outside of the elevational range of this species.

Species	Status* (Federal/State/ CNPS)	Habitat Requirements	Potential for Occurrence in Project Study Area
Sidalcea hickmanii var. viridis Marin checkerbloom	--/--/1b	Chaparral on serpentine or vocanic soils. Sometimes appears after burns. Elevational range: 50 to 430 meters. Blooming period: May through June.	No potential. No habitat for this species is present in the project study area.
Streptanthus batrachopus Tamalpais jewel-flower	--/--/1b	Closed-cone coniferous forest and chaparral. Found In serpentine soils. Elevational range: 305 to 650 meters. Blooming period: April through June.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Streptanthus glandulosus var. *pulchellus* Mt. Tamalpais jewel-flower	--/--/1b	Chaparral and valley and foothill grassland. Elevational range: 150 to 800 meters. Blooming period: May through July.	High potential. Potential habitat for this species is present within the project study area adjacent to SFDB. Plant species has been observed in the project vicinity.
Trifolium amoenum Showy Indian clover	FE/--/1b	Valley and foothill grassland and coastal bluff scrub. Sometimes found on serpentine soil, open sunny sites, and swales. Elevational range: 5 to 415 meters. Blooming period: April through June.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Triphysaria floribunda San Francisco owl's-clover	--/--/1b	Coastal prairie, coastal scrub, and valley and foothill grassland. Usually found on serpentine soils. Elevational range: 10 to 160 meters. Blooming period: April through June.	Moderate potential. Potential habitat for this species is present within the project study area adjacent to SFDB.
Triquetrella californica Coastal triquetrella	--/--/1b	Coastal bluff scrub and coastal scrub. Elevational range: 10 to 100 meters. Blooming period: None.	No potential. No habitat for this species is present in the project study area.

***Status**

FE = Federally listed as Endangered
FT = Federally listed as Threatened
FC = Federal Candidate Species
CE = State listed as Endangered
CT = State listed as Threatened
CR = State designated as Rare

CSC = California Species of Concern
CNPS 1b = Plants that are rare, threatened or endangered in California and elsewhere
CNPS 2 = Plants that are rare, threatened, or endangered in California but common elsewhere
CNPS 3 = Plants about which we need more information – review list
CNPS 4 = Plants of limited distribution – watch list

SIR FRANCIS DRAKE BOULEVARD
ROADWAY REHABILITATION PROJECT
BIOLOGICAL ASSESSMENT

APPENDIX I
DESCRIPTION OF PETERS DAM RETAINING WALL REPLANTING SITE; DESCRIPTION OF LAGUNITAS CREEK SALMON WINTER HABITAT ENHANCEMENT PROGRAM

MMWD Revegetation Site - Lagunitas Creek Below Peters Dam Retaining Wall

This site is at the location of a drilled-pier retaining wall structure, immediately downstream from the Peters Dam plunge pool. The retaining wall was constructed to protect the 27-inch pipeline that conveys water from Kent Lake to the San Geronimo Treatment Plant. During the New Years Eve storm of 2005, extremely high flow over the Peters Dam spillway and down Lagunitas Creek caused a landslide of a 160 foot section of the stream bank and a portion of the access road to the base of Peters Dam. The retaining wall successfully protected the pipeline and access road but the stream bank between the retaining wall and channel of Lagunitas Creek remains slumping and largely unvegetated (see photo).

The streambank stabilization project will entail plantings of native trees and shrubs on the eroded stream bank. This will require importing soil amendments to provide a planting medium. The area is fairly open and exposed to sunlight so willows should grow at this site, given sufficient irrigation. Other plantings can include redwood and alder saplings. It should be possible to install a temporary irrigation system, given a water supply and power is available nearby at the stream release structure, just upstream.

MARIN MUNICIPAL
WATER DISTRICT

220 Nellen Avenue Corte Madera CA 94925-1169
www.marinwater.org

Lagunitas Creek Salmon Winter Habitat Enhancement

Marin Municipal Water District (MMWD)
2009

Problem Statement

The Lagunitas Limiting Factors Analysis (Stillwater Sciences 2008) identified winter habitat as the limiting factor for the coho salmon population in Lagunitas Creek. Fall juvenile and spring smolt survey data indicate dramatic declines in the numbers of juvenile coho during the winter months. Whether these declines are due to in-stream mortality or early emigration of coho smolts to the ocean (prior to smolt surveys commencing) is under investigation, but it is hypothesized that winter habitat in Lagunitas Creek is limited during either high flow or base flow periods.

Habitat Enhancement Concept

Survival of juvenile coho salmon through the winter could be improved by enhancing high flow refuge habitat both in- and off-channel, and by enhancing pool habitat in Lower Lagunitas Creek to allow for higher densities of coho at winter base flows. Winter habitat enhancement may be achieved through one or all of three approaches and would likely benefit steelhead as well as coho salmon:

1. Within the State Park reach of Lagunitas Creek (downstream of Shafter Bridge), install large wood structures that would provide backwater eddies as flow refuge;
2. Within the National Park/Tocaloma reach of the creek, create side channels and backwaters within the floodplain that salmonids could access during high flow events; and/or
3. Within the National Park/Tocaloma reach, install cross-channel, large wood structures at creek constrictions that would back up water and inundate the floodplain at lower flows, as well as provide in-stream cover and deepen pools.

Winter habitat enhancement work within the National Park/Tocaloma reach should also consider flow refuge enhancement for California freshwater shrimp, which may also be limited by winter habitat but which may very well require a different set of design criteria.

Approach

Accomplishing the goals of this program, especially the off-channel enhancement within the National Park/Tocaloma reach, will be approached in a two-phase planning study:

1) Assessment - Evaluate the feasibility of enhancing floodplain and/or in-channel habitat throughout the study area to increase the winter carrying capacity of coho salmon; and
2) Design - Develop site specific designs to enhance floodplain and/or in-channel habitat; ideally to a level of detail that the projects could move to construction.

Assessment Needs

It is anticipated that the assessment will need detailed hydraulic modeling and engineering design work, developed in collaboration with a biological understanding of the needs of the fish and practical aspects of providing habitat enhancement. The assessment will require expertise in engineering, hydrology, geomorphology, fisheries biology, and environmental restoration. Detailed topographic mapping (i.e., a LIDAR survey) of the creek and a thalweg longitudinal profile survey will be useful for both the concept and design assessment phases.

Contacts: Gregory Andrew (gandrew@marinwater.org) or Eric Ettlinger (eettlinger@marinwater.org)

Figure 1: Lagunitas Creek Watershed - Winter Habitat Enhancement Assessment

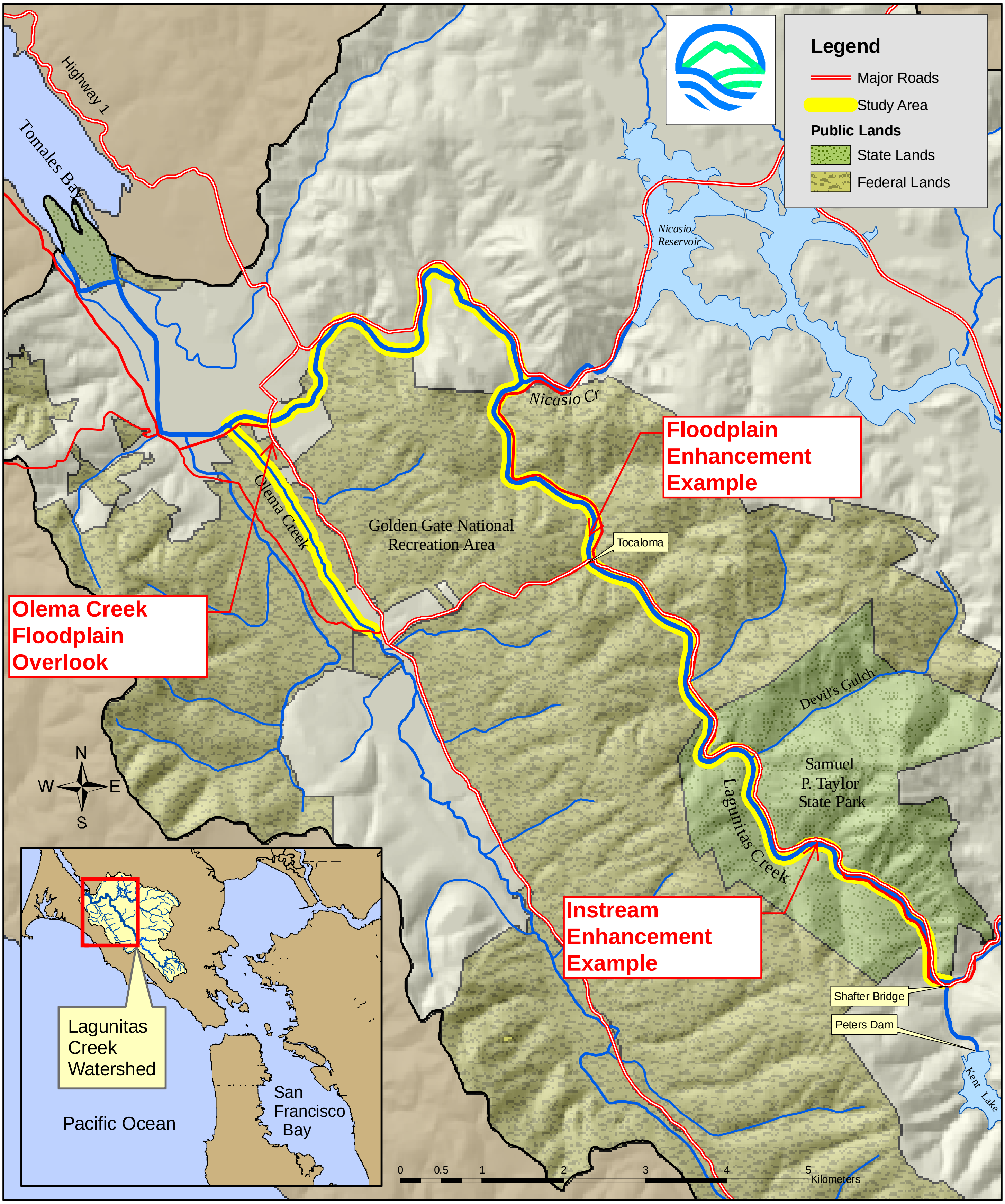


Figure 2. Winter Habitat Enhancement Study Area

Figure 3:

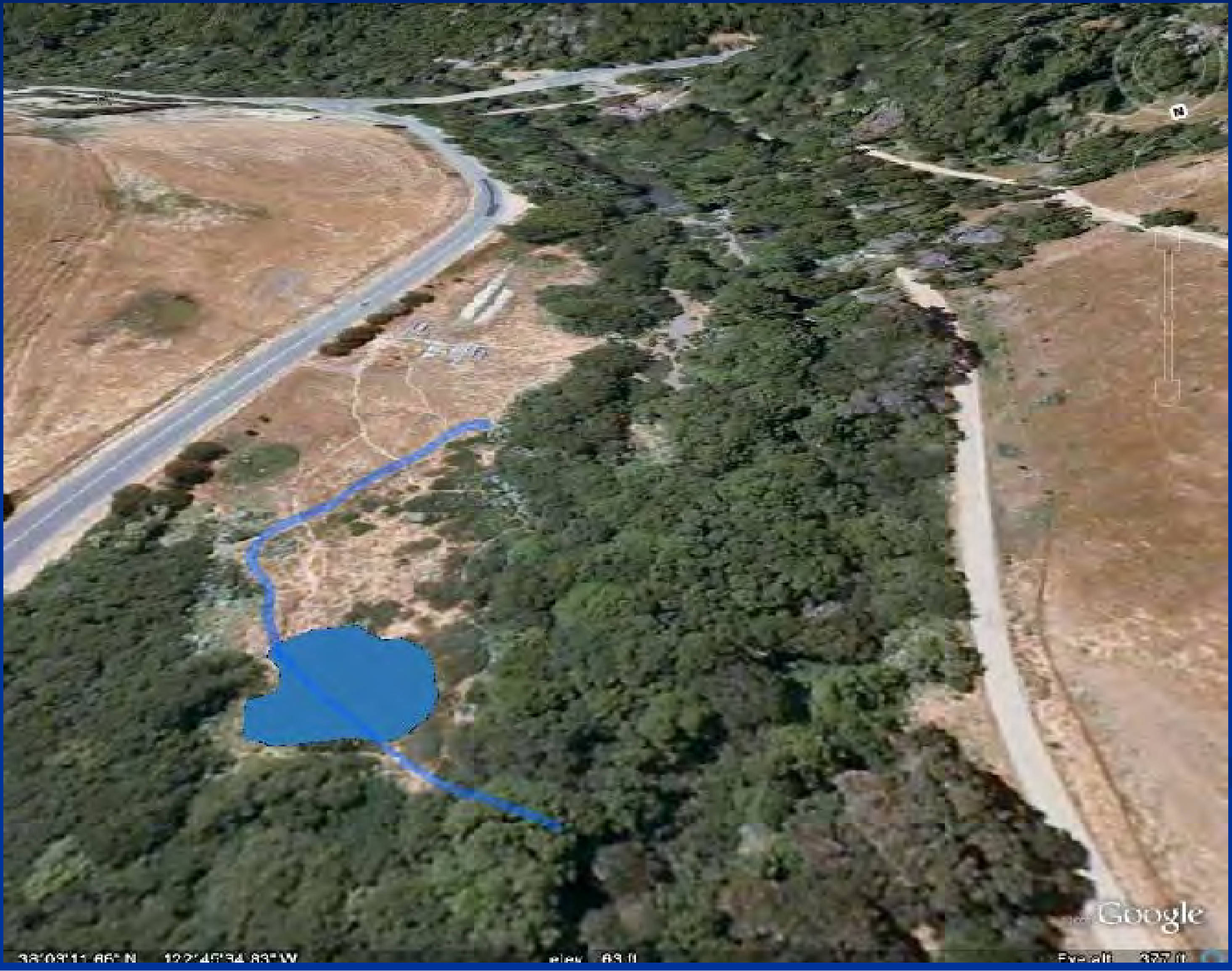
Example Winter Habitat Enhancement Approaches

Lagunitas Creek Salmonid Winter Habitat Assessment

Instream Habitat Enhancement:
Wood for High Water Flow Refuge

Floodplain Enhancement: Side Channel

Floodplain Enhancement: Side Channel w/Pool



Floodplain Enhancement
Log Creek Constrictions

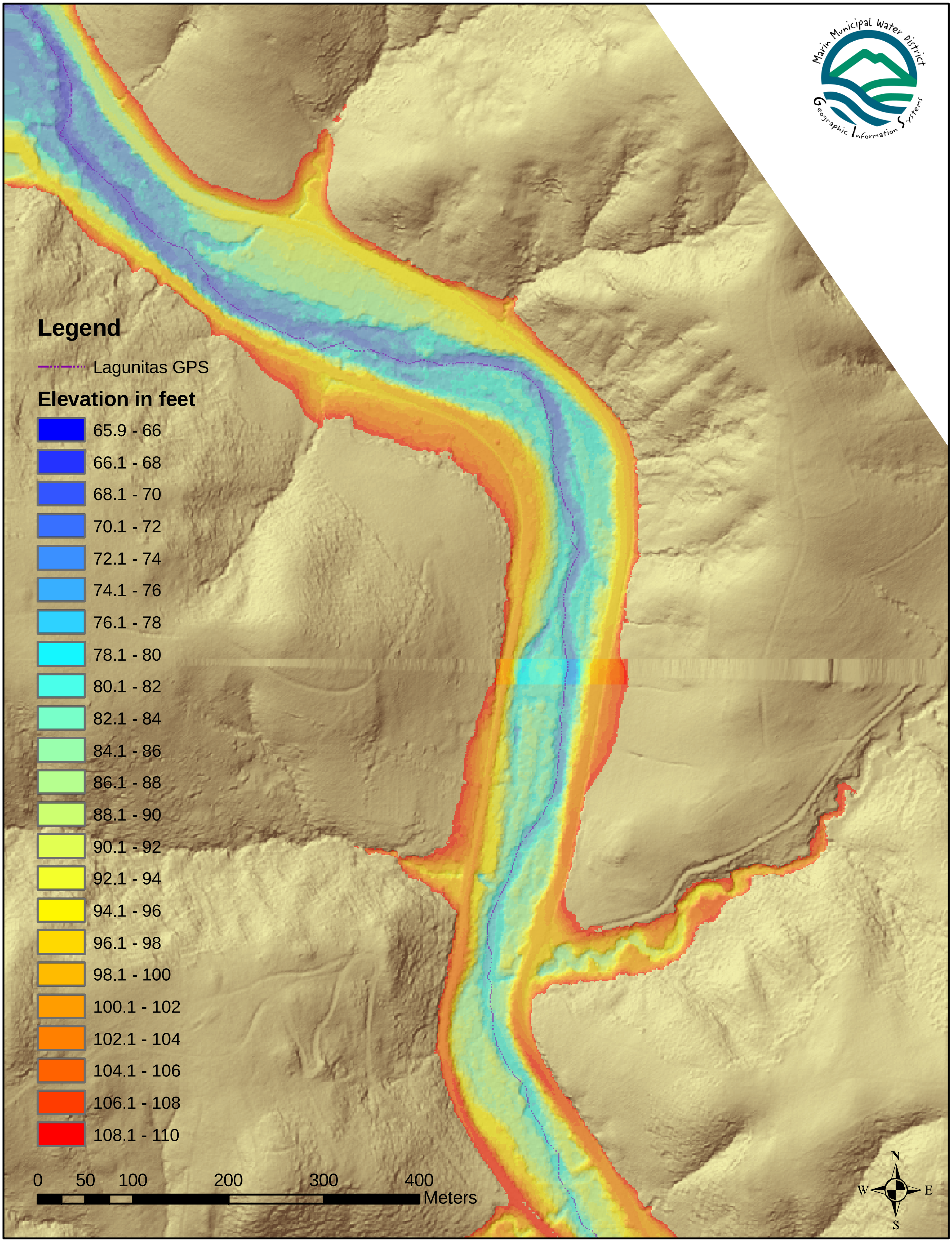


Figure 4. Example Topography Map based on LIDAR Data; Winter Habitat Enhancement

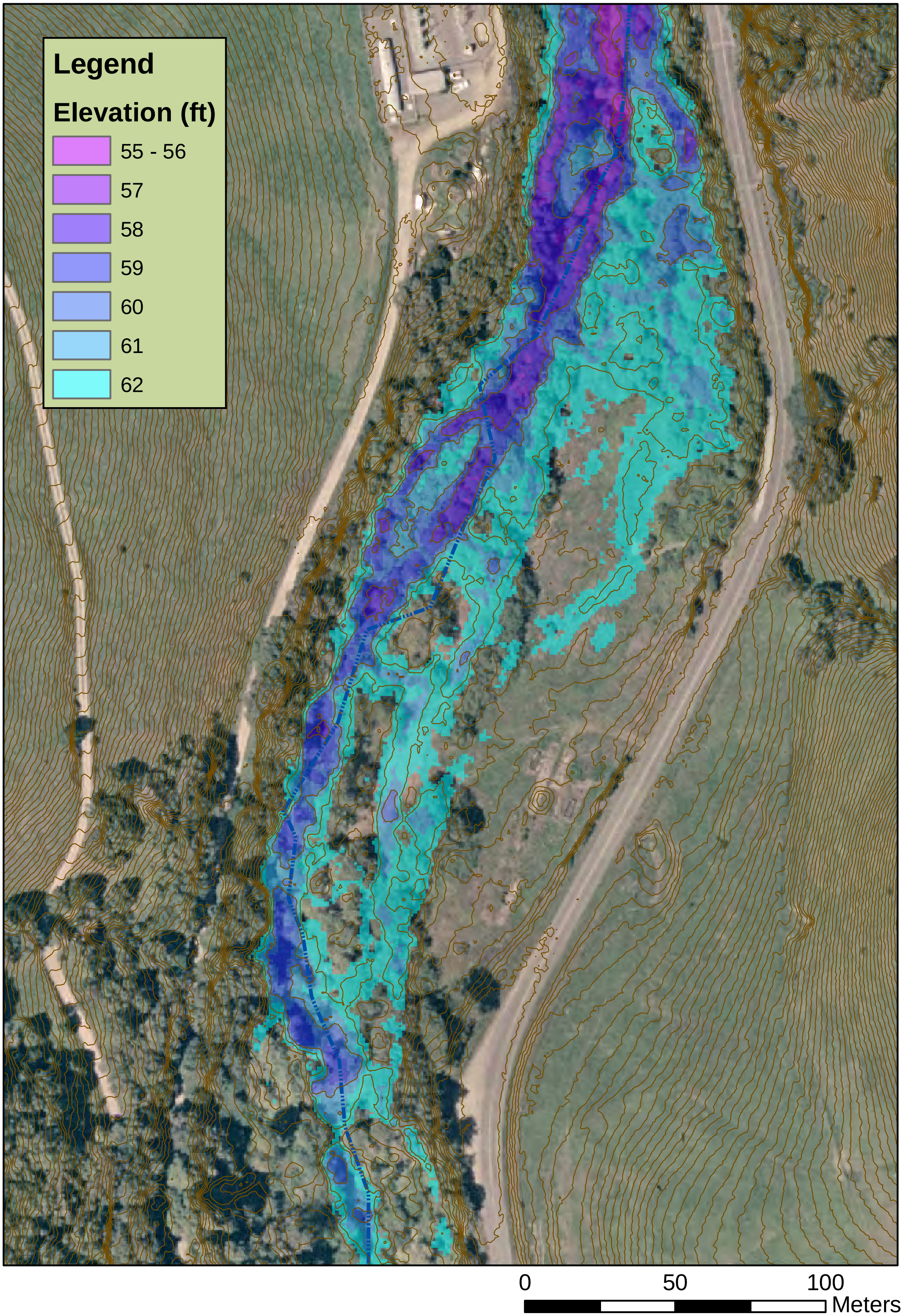


Figure 4a: Example LIDAR Mapping Data at Floodplain Enhancement Site.

LAGUNITAS CREEK WINTER HABITAT ENHANCEMENT ASSESSMENT PROJECT

MARIN MUNICIPAL WATER DISTRICT

IN COLLABORATION WITH NATIONAL PARK SERVICE

2009

EXCERPT FROM FISH & GAME FRGP GRANT APPLICATION

Section 4: Project Objectives

1. Background information:

Lagunitas Creek drains much of west central Marin County, California and is the largest watershed in the county, encompassing 109 square miles of drainage area (see Figure 1). It originates on Mt. Tamalpais and flows eight miles through four reservoirs operated by the MMWD. Kent Lake is the fourth reservoir along the main stem of Lagunitas Creek. From Kent Lake, Lagunitas Creek flows about 12 miles before emptying into Tomales Bay. Olema Creek is the second largest tributary to Lagunitas Creek and it supports a significant portion of the coho and steelhead populations of the watershed. Lagunitas Creek and Olema Creek meet in the estuary, at the newly restored Giacomini Wetlands, where a vast area of former dairy pasture has been re-opened to tidal action and restores vital estuary habitat. The largest tributary to Lagunitas Creek is Nicasio Creek; MMWD also operates Nicasio Reservoir in this tributary, with about one mile of stream that flows from the dam of Nicasio Reservoir to Lagunitas Creek. Other major tributaries to Lagunitas Creek include: San Geronimo Creek, Devil's Gulch, Cheda Creek, and McIsaac Creek, all of which also support salmonids.

Lagunitas Creek is an important stream for spawning and rearing coho salmon (Oncorhynchus kisutch), which is federally listed as endangered, and steelhead trout (O. mykiss), which is federally listed as threatened. Extensive and long-term monitoring of the populations of coho and steelhead have been conducted in the watershed, along with repeated habitat typing surveys, streambed monitoring, and targeted sediment studies. The population monitoring provided the basis for the hypotheses and conclusions of the limiting factors analysis (Stillwater Sciences 2008). That limiting factors analysis provides the rationale and motivation for an effort to improve winter habitat for the benefit of coho and other salmonids in the creek.

The confluence of Lagunitas Creek with Olema Creek is located in the estuarine portion of the watershed, at the southern end of Tomales Bay. The 14.5 square mile Olema Creek watershed supports coho salmon and steelhead. The National Park Service, with support through DFG monitoring grants have conducted intensive life-cycle monitoring in Olema Creek, including adult, juvenile and smolt monitoring since 2003. In addition, the National Park Service completed the 550 acre Giacomini Wetland Restoration project in 2008, which has significantly added to overwinter/estuarine habitat within the Lagunitas/Olema Creek watershed.

Along Lagunitas Creek, most of the floodplain is not connected to the channel under normal, bank-full flows. The floodplain is only innudated under some of the higher winter storm flows. A preliminary review of a very recent LIDAR fly-over survey does reveal some potential floodplain channels and these need further investigation for what flow condictions they become connected to the main channel.

Problem Statement
The Lagunitas Limiting Factors Analysis (Stillwater Sciences 2008) identified winter habitat as the limiting factor for both coho salmon and steelhead populations in the Lagunitas Creek watershed. Fall juvenile and spring smolt survey data indicate dramatic declines in the numbers of juvenile coho during the winter months. Whether these declines are due to in-stream mortality or early emigration of coho smolts to the ocean (prior to smolt surveys commencing) is under investigation, but it is hypothesized that winter habitat in Lagunitas Creek is limited during either high flow or base flow periods.

Winter Habitat Enhancement Concept

Survival of juvenile coho salmon through the winter could be improved by enhancing high flow refuge habitat both in- and off-channel, and by enhancing pool and run habitats in Lower Lagunitas Creek and Olema Creek (see Figure 2) to allow for higher densities of coho at winter base flows. Winter habitat enhancement may be achieved through one or all of three approaches described below (see Figure 3):

1. Within the State Park reach of Lagunitas Creek (downstream of Shafter Bridge), install large wood structures that would provide backwater eddies as flow refuge;
2. Within Lower Lagunitas Creek (the National Park/Tocaloma reach downstream to Highway 1) and Lower Olema Creek, create or reconnect side channels and backwaters within the floodplain that salmonids could access during high flow events; and/or
3. Within Lower Lagunitas Creek and Olema Creek, install cross-channel, large wood structures at creek constrictions that would back up water and inundate the floodplain at lower flows, as well as provide in-stream cover and deepen pools.

The purpose of the proposed project is to evaluate existing overwinter habitat within the project area, with the goal of enhancing and expanding high flow refuge habitat, identify viable opportunities to implement projects such as those listed above, and execute preliminary designs for specific implementation projects. While the purpose of the effort is to enhance habitat for coho, it will likely benefit steelhead and other salmonids as well. Winter habitat enhancement work within the National Park/Tocaloma reach of Lagunitas Creek and lower Olema Creek should also consider flow refuge enhancement for California freshwater shrimp, which may also be limited by winter habitat but which may very well require a different set of design criteria.

Approach

Accomplishing the goals of this project will be approached in a two-phase assessment and design effort:

1) Overwinter Habitat Assessment - Evaluate existing juvenile salmonid winter habitat in Lagunitas Creek and lower Olema Creek, prioritize winter habitat needs and identify opportunities for winter habitat enhancement to increase the winter carrying capacity of coho salmon and steelhead; and
2) Overwinter Habitat Enhancement Design - Develop site specific designs to enhance floodplain and in-channel habitat; with drawings prepared to a level of detail that the projects can move to construction.

Assessment Needs

The assessment will require detailed hydraulic modeling and engineering design work. The overwinter habitat assessment phase will require hydraulic modeling in conjunction with field assessment at various winter flows (including base flow). The design phase will require some site specific survey data. The modeling and engineering design work will be developed in collaboration with a biological understanding of the needs of the fish and practical aspects of providing habitat enhancement. The assessment will require expertise in engineering, hydrology, geomorphology, fisheries biology, and environmental restoration. Detailed topographic mapping (i.e., a LIDAR survey) of the creek, a thalweg longitudinal profile survey and some cross-sectional surveys will be useful for both the overwinter habitat assessment design phases. LIDAR surveys for Olema Creek and Lower Lagunitas Creek have been completed (see Figure 4) and will be a tremendous tool for this assessment. A longitudinal profile survey of upper Lagunitas Creek (Shafter Bridge down to Devil’s Gulch) has already been completed; that long-profile survey will need to be completed for the remaining section of the project study area (Devil’s Gulch to Highway 1 and lower Olema Creek).

2. List task information:

Coho Priority Task #BM-LA-06: Commit ongoing resources and support of stewardship in the basin to include riparian enhancement and protection, sediment source reduction, habitat typing and surveying, coho salmon surveys and counts, water conservation, outreach and education, effectiveness monitoring of projects, and planning and assessment of potential restoration projects to benefit coho salmon.

The project will investigate and develop plans to enhance and restore winter habitat for coho, in particular, and other salmonids, in order to address the key limiting factor controlling the population size of coho in Lagunitas Creek – juvenile rearing through the overwinter period. CDFG, the State Water Board, and MMWD are identified as the three potential leads to implement this task. Funding of this proposal would be a collaborative effort by CDFG & MMWD. The National Park Service and California State Parks will also be collaborating on this project.

3. Need for the project:

This project will evaluate and develop plans to enhance winter habitat for coho and other salmonids in Lagunitas Creek and Olema Creek. Winter habitat has been hypothesized to be the primary limiting factor for both coho salmon and steelhead. Coho abundance has been observed to decline dramatically between the fall and smolt outmigration. The Limiting Factors Assessment (Stillwater 2008) estimated a winter carrying capacity of only 7,000 juvenile coho. Juvenile steelhead also suffer high rates of mortality (over 90%) during their first winter, likely due to limited winter habitat. The winter carrying capacity for juvenile steelhead was estimated at less than 5,000 juvenile steelhead.

Enhancing winter habitat for these species is the highest priority conservation action in the Lagunitas Creek watershed. Habitat enhancement projects will be implemented after existing winter habitat has been quantified, habitat needs have been prioritized, and detailed enhancement site designs have been developed.

4. Limiting factors to salmonids remediated by proposed project:	☐ Water quantity	(lack of flow, diversions, runoff)
	☐ Water quality	(temperature, chemistry, turbidity)
	☒ Riparian dysfunction roughness,	(lack of shade, excessive nutrients, elements)
	☐ Excessive sediment yield	(pool and gravel quality)
	☐ Spawning requirements	(gravel, resting areas-pools)
	☒ Rearing requirements	(velocity, lack of shelter, pools)
	☐ Estuary / lagoon issues	(closure during migration periods)
	☐ Fish passage	(emigration and immigration)

5. Limiting factor remediation:

This project will address the single most important limiting factor to the coho population in Lagunitas Creek – rearing requirements during the over winter period. This project will assess existing conditions, identify opportunities to enhance and expand overwinter habitat, and develop site specific plans to enhance and increase flow refuge habitat and winter base flow habitat (cover, feeding, and rearing habitat). The overwinter habitat assessment phase of the project will look broadly at all opportunites to enhance winter habitat and to then identify where and what specific type(s) of winter habitat would be the most practical and have the highest potential for success. The design phase will focus on developing site specific construction designs and drawings that will allow the winter habitat enhancement effort to move to implemention.

6. Additional objectives:

This project will be focused on enhancing winter habitat for the benefit of coho and it will simultaneously address habitat enhancement for steelhead and the small numbers of Chinook and chum salmon that have been documented to occur in Lagunitas Creek.

In addition, this assessment will likely consider winter/spring habitat enhancement for California freshwater shrimp.

Section 5: Project Tasks and Results

1. *Detailed project tasks*:

Task 1: Collect Information on Other Winter and Floodplain Habitat Enhancement Projects
A review of existing plans and completed floodplain and winter habitat enhancement projects, for coastal streams in the western U.S. will be conducted. This effort will gather information on other projects for lessons that can be learned about the successes and failures as well as the complexities of implementing similar projects.

Task 2: Compile Existing Data for the Project
The tremendous amount of survey, monitoring, and habitat data that has already been collected on Lagunitas Creek and Olema Creek will be brought forward for the project team to have at their disposal. There have already been several reviews and evaluations of the available data. This task will ensure the data is available to the project team. These data sets include: stream flow records, coho and steelhead population monitoring survey data (juvenile, smolt, and spawner data as well as some fry emergence data), habitat typing surveys, streambed and sediment studies, as well as topographic, GIS, and LIDAR survey data sets.

Task 3: Complete Longitudinal Channel Bed Elevation Survey
The LIDAR surveys that have been completed for Lower Lagunitas Creek and Olema Creek did not penetrate the water column to capture the stream bed elevation. This will be critical information for completing the assessment. A longitudinal channel bed elevation survey (long-profile survey) has been completed for the mainstem of San Geronimo Creek and Lagunitas Creek, from Woodacre downstream to Devil's Gulch. A long-profile survey is a stream bed elevation survey through the thalweg of the channel. For this assessment, the long-profile survey will be completed for the main stem of Lagunitas Creek, from Devil's Gulch downstream to the Highway 1 Bridge at Point Reyes Station. A long-profile will also be completed for Olema Creek, from the Bear Valley Road Bridge (in the Town of Olema) downstream to the confluence with Lagunitas Creek (at the Giacomini Wetland Restoration site). A select number of cross-sectional stream profiles will also be surveyed to assist with the hydraulic modeling task of this project.

Task 4: Overwinter Habitat Assessment

Task 4a: Conduct Hydraulic Modeling and Quantify Existing Winter Habitat
This task will entail developing and running a hydraulic model to characterize present flow and flooding regimes through Lagunitas Creek and to predict flow and flooding regimes at potential winter habitat enhancement sites. The modeling effort will include the following:

- Adapt the LIDAR and streambed elevation data for a two-dimensional hydraulic model;
- Construct a 2-D hydraulic model for the study area;
- Field observe and collect other data at various winter flows and sites and use the data to constrain the hydraulic model and develop a rationale for the general accuracy of the model

results and reliability for predicting habitat enhancement benefits of potential projects;

- Use the model to quantify existing winter habitat at both winter base flows and during relatively high-frequency floods; and
- Use the model to identify constraints on both floodplain and in-channel habitat.

Task 4b: Identify Feasible Winter Habitat Enhancement Approaches
Based on the results of the hydraulic modeling, lessons learned from enhancement efforts in other watersheds, and knowledge of salmonid biology, identify potential winter habitat enhancement opportunities. It will be an open-ended evaluation of all enhancement options. The hydraulic model developed in Task 4a could assist the project team in identifying locations of potential habitat enhancement projects that appear most practical and beneficial in terms of habitat enhancement success, construction feasibility, construction cost, impacts, and other factors. Some of the approaches that have already been identified are depicted in Figure 3 and they include:

- Installing large wood structures that would provide backwater eddies as flow refuge (focused within the State Park reach and within the base flow channel of lower Lagunitas Creek and Olema Creek;
- Creating side channels and backwater habitats within the floodplain that salmonids could access during high flow events (focused within Lower Lagunitas Creek, especially the National Park/Tocaloma reach, and Lower Olema Creek, downstream of the town of Olema);
- Installing cross-channel large wood structures at creek constrictions that would back up water and inundate the floodplain at lower flows, as well as provide in-stream cover and deepen pools (focused within Lower Lagunitas Creek, especially the National Park/Tocaloma reach);
- Configuring and/or connecting floodplain channels to include connected parallel side channels, side channels with pool habitat, and/or oxbow channels;
- Creating opportunities for backwater refuge habitat at the mouth of tributary streams where they enter Lagunitas Creek;
- Using the LIDAR data and site visits to identify existing and historic or relic floodplain side channels that would be enhanced with minimal modifications; and
- Providing the full complement of salmonid rearing habitat features (woody debris cover, undercut banks, etc.) in any created floodplain channels.

We will prepare hydrology/hydraulic design reports documenting model results and other methods of evaluating the likely project benefits.

Task 4c: Identify Large Woody Debris (LWD) Habitat Enhancement Sites
Opportunities to enhance winter habitat through the State Park reach will be identified during a field survey of the creek, conducted by the project team. We will be seeking locations for installation and anchoring of LWD structures above the low-flow channel where backwater eddy habitat can be created.

Task 4d: Identify Base Flow Habitat Enhancement Opportunities
Coupling existing habitat typing survey data, LIDAR and long-profile data, hydraulic modeling and field survey observations, the project team will identify where in-channel, base flow habitat enhancement could be achieved.

Task 4e: Select Overwinter Habitat Enhancement Sites and Designs
The project team will finalize the Overwinter Habitat Assessment phase of the project and select the sites and conceptual designs to pursue for further consideration to move forward into the Habitat Enhancement Design phase.

Task 4f: Complete Overwinter Habitat Assessment Report
The Habitat Assessment phase of the project will be documented through a draft and final Overwinter Habitat Assessment Report that will pull together and summarize the effort completed during this first phase of the project.

Task 5 Overwinter Habitat Enhancement Design

Task 5a: Conduct Site Specific Topographic Surveys

Detailed topographic surveys of habitat enhancement project sites will be needed for the design drawings. These surveys will be targeted at specific elevation data needs to compliment and fill data gaps not available from the exiting topographic data set or LIDAR data set for the study area. These will be limited theodolite site surveys, used to develop topographic site plans for each project.

Task 5b: Complete Construction Drawings

Prepare permit- and construction-level engineering designs drawings of the selected winter habitat enhancement project sites. The plans will be prepared at 50% completion draft drawings and then final drawings, suitable for bid and construction. We anticipate preparing design drawings for 4-6 floodplain enhancement sites, a similar number of in-channel, base flow habitat enhancement sites, and up to 10 large wood debris habitat enhancement sites.

Task 6: Contract Management

Contract oversight will be conducted by the Marin Municipal Water District. All reporting and billing will be timely and pursuant to contract and regulatory guidelines. MMWD will sub-contract with a qualified engineering consulting firm to complete the assessment project.

2. *Deliverables*:

Proposed project activities will begin in Fall (September) of 2010 and will continue through spring of 2012 but the majority of the assessment will be completed by 2011. The proposed work will occur according to the following schedule:

Fall 2010	-Finalize Work Plan and access agreements; select contractor through competative bid.
Fall 2011	-Complete Overwinter Habitat Assessment phase and Habitat Assessment Report.
Winter 2011	-Complete 50% Design Drawings.
Spring 2012	-Complete Final Design Drawings.
Summer 2012	-Complete all final CDFG contract requirements and billings.

3. *Deliverables*:

1) Overwinter Habitat Assessment Report.
2) Overwinter Habitat Enhancement Design Drawings (50% and Final Design Drawings).

SIR FRANCIS DRAKE BOULEVARD ROADWAY REHABILITATION PROJECT BIOLOGICAL ASSESSMENT

APPENDIX J

MEMORANDUM OF UNDERSTANDING FOR WOODY DEBRIS MANAGEMENT IN RIPARIAN AREAS OF THE LAGUNITAS CREEK WATERSHED

MEMORANDUM OF UNDERSTANDING
Among the
MARIN MUNICIPAL WATER DISTRICT,
COUNTY OF MARIN,
MARIN COUNTY OPEN SPACE DISTRICT,
CALIFORNIA DEPARTMENT OF PARKS AND RECREATION,
NATIONAL PARK SERVICE, and
MARIN COUNTY RESOURCE CONSERVATION DISTRICT
For
WOODY DEBRIS MANAGEMENT
In RIPARIAN AREAS of the LAGUNITAS CREEK WATERSHED

Final: February 1, 2007

This Memorandum of Understanding, dated February 1, 2007, is by and between the Marin Municipal Water District (MMWD); the County of Marin (County), acting through the Marin County Board of Supervisors (Supervisors); the Marin County Open Space District; the California Department of Parks and Recreation (State Parks); the National Park Service (NPS); and the Marin County Resource Conservation District (MCRCD).

RECITALS

WHEREAS, the parties to this Memorandum of Understanding (hereafter "Agreement") own, manage, or have an interest in the management of lands and waters within the 103-square mile Lagunitas Creek watershed, the largest watershed in Marin County; and

WHEREAS, the Lagunitas Creek watershed supports populations of threatened and endangered species listed under the federal and state Endangered Species Acts, including coho salmon, steelhead trout, California freshwater shrimp, and California red-legged frog; and

WHEREAS, the construction of roads, trails, structures and dams (including Peters Dam) and past practices of tree removal from the creek and its riparian areas, have reduced the amount of naturally occurring woody debris in Lagunitas Creek; and

WHEREAS, trees in the vicinity of creeks will, over time, be delivered to the stream channel under natural conditions; and

WHEREAS, the riparian forest provides shade and stream temperature control, increases streambank stability, provides opportunities for overhanging banks and cavities, enhances food production, and improves habitat complexity; and

WHEREAS, the riparian forest is the source of natural woody debris in the system for recruitment of woody debris into the stream channel; and

WHEREAS, woody debris creates and maintains beneficial instream habitat for coho and steelhead by increasing pools, providing cover and refuge, providing foraging sites, and providing flow diversity by varying water velocity and depth; and

WHEREAS, riparian vegetation and woody debris create and maintain beneficial instream habitat for California freshwater shrimp by extending roots into the water column which shrimp attach to and feed from and by creating deep water habitat along the shoreline which shrimp require; and

WHEREAS, all parties to this Agreement recognize that proper management of woody debris in riparian areas under their ownership, jurisdiction, or influence within the Lagunitas Creek watershed can enhance habitat for coho salmon, steelhead trout, and California freshwater shrimp; and

WHEREAS, it is the goal of all parties to this Agreement to enhance coho salmon, steelhead trout and California freshwater shrimp habitat within the Lagunitas Creek watershed, specifically focusing on salmon bearing streams, by supporting the self-sustaining natural recruitment of woody debris; and

WHEREAS, it is the intent of all parties to this Agreement to encourage a cooperative relationship among the parties to implement a consistent approach to the management of woody debris in riparian areas of the salmon bearing streams in the Lagunitas Creek watershed; and

WHEREAS, all parties to this Agreement acknowledge that implementation of this Agreement and its associated Best Management Practices should be supported and funded wherever possible as resources permit.

AGREEMENT

NOW, THEREFORE, the parties to this Agreement agree to:

1. Come to an understanding of the guidelines regarding the management and prioritization of naturally occurring woody debris and potential woody debris (i.e. standing trees), in riparian areas, <u>for stream habitat enhancement,</u> as outlined in the *Best Management Practices for Woody Debris in Riparian Areas of Salmon Bearing Streams in the Lagunitas Creek Watershed*.

2. Protect the natural source areas for future wood recruitment within riparian areas and, as resources permit, identify and undertake riparian reforestation projects needed to enhance habitat complexity.

3. Incorporate bioengineering techniques, such as the use of large woody debris and willow brush mattresses, into streambank stabilization structures in order to further promote the presence of wood in the channel and encourage a forested bank as a source of future recruitment.

4. Identify specific large and/or long-term woody debris enhancement projects on each agency’s stretch of the creek that cannot be funded within each agency’s annual budget.

5. Meet, at least annually, with all other agency project managers responsible for this woody debris MOU, as convened by MMWD, to develop strategies, and identify funding mechanisms, to accomplish specific large and/or long-term woody debris enhancement projects by means of phasing, sharing staff or equipment, and cooperative grant-seeking; for problem solving, idea sharing and potential project coordination to support natural woody debris recruitment through minimal intervention and natural riparian forest regeneration; to review existing, or consider new habitat complexity enhancement techniques; and to discuss other matters pertinent to fulfilling the goals of this Agreement. MMWD will provide a summary of this meeting to the Lagunitas Technical Advisory Committee that will include a compilation of any monitoring reports from or communication with the signatory agencies.

6. Meet, at least annually, among each agency's own maintenance staff responsible for woody debris management, as convened by each agency, for training, problem solving, and idea sharing to support natural woody debris recruitment through minimal intervention and natural riparian forest regeneration; to review existing, or consider new habitat complexity enhancement techniques; to review any monitoring reports; and discuss other matters pertinent to fulfilling the goals of this Agreement.

7. Support the transport by MMWD of large woody debris from above Peters Dam to Lagunitas Creek downstream of the dam in an effort to mitigate the effects of the dam on natural woody debris recruitment.

8. Support making woody debris available to other parties for use in biotechnical and other stream habitat enhancement projects within the Lagunitas Creek watershed.

9. Provide the other parties to this Agreement with on-going information relevant to woody debris management in riparian areas of the Lagunitas Creek watershed. This may include maps and data about individual sites, and training or other educational information.

10. Act consistently with this Agreement when developing policies, plans, or projects; when exercising regulatory authority or conducting environmental review; or when otherwise conducting work related to woody debris in the Lagunitas Creek watershed; and encourage others to do so.

11. Implement the actions in this Agreement in compliance with all applicable federal, state, and local environmental laws and regulations.

12. Acknowledge the fact that nothing in this Agreement negates any laws, regulations, or policies; including previous agreements related to woody debris management.

13. Recognize that the terms of this Agreement are subject to the availability of funding, personnel and other essential resources, and that each party has the sole authority and responsibility regarding decisions and matters in its own jurisdiction.

This Agreement has no termination date and may be revised as necessary. Each party to this Agreement may withdraw from this Agreement upon written notice to all other parties.

The parties agree that this Agreement does not constitute any legal admission or opinion as to the subject matter, nor does it confer any additional legal rights, liabilities or obligations between the parties or to third parties that do not already exist in law.

Marin Municipal Water District

President, Board of Directors
Attest:

County of Marin

Charles McGlashan, President Pro-Tem
Attest: Diane Patterson

California Department of Parks and Recreation

Superintendent, Marin District Parks
Attest: Darlene Neal

National Park Service

Superintendent, Point Reyes NS
Attest:

Marin County Resource Conservation District

Hank Corda
President, Board of Directors
Attest:

Marin County Open Space District

Charles McGlashan, President Pro-Tem
Attest: Sharon McNamee

Best Management Practices for Woody Debris in Riparian Areas of Salmon Bearing Streams of the Lagunitas Creek Watershed
Final: February 1, 2007

The natural recruitment of woody debris into a creek is a long-term and self-sustaining process which supports habitat diversity and species abundance. The best way to promote this process is to allow nature to take its course with minimal disturbance. That being stated, it is acknowledged that the lands of the Lagunitas Creek watershed serve purposes beyond the preservation of nature, including, but not limited to, residences, watershed protection and management for water supply, recreation, transportation, and agriculture.

The following best management practices are understood and agreed on by all parties to be used as guidelines for the development of a self-sustaining system for the natural recruitment and treatment of woody debris in coho bearing streams of the Lagunitas Creek watershed. For further information, please call one of the Marin Municipal Water District resource professionals listed in Appendix C.

PRIORITIZATION

<u>The highest priority use for woody debris and potential woody debris (standing trees) in the riparian corridor is for stream habitat enhancement.</u>

DEFINITIONS

Downed Wood - Any fallen tree or woody pieces of any size in one of the three Zones described below (includes Large Woody Debris, Small Woody Debris and Debris Jams).

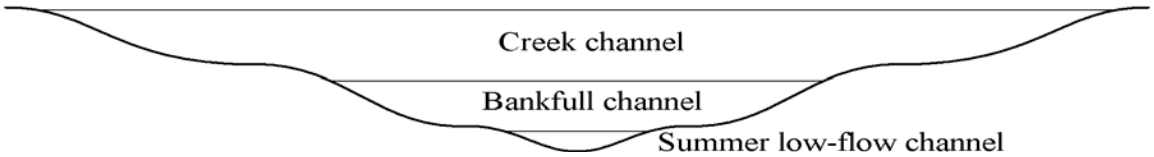
Large Woody Debris - downed wood in one of the three Zones described below that is:

a) greater than 12 inches in diameter, at any point, and at least ten feet long including rootball, if attached; or
b) of any size when attached to a rootball or stump greater than three feet in diameter.

Standing Trees - Live or dead trees in one of the three Zones described below (i.e. potential large woody debris).

ZONES

Creek Channel Zone - The area between the left and right banks of a creek including the wet channel, gravel bars, and vegetated islands. In many cases this is larger than what is traditionally known as the "bankfull" channel (see drawing).



Recruitment Zone – the area on either side of the creek channel which includes the floodplain (the area adjacent to the creek channel that could be inundated by high stream flows of any magnitude and transport woody debris into the creek) and extends 200 feet upslope beyond the floodplain. (See Appendix A for a general guide to the area in question.)

Kent Lake Zone –the area around Kent Lake where large woody debris can be collected for use as stream habitat enhancement.

BEST MANAGEMENT PRACTICES

The treatment of “Standing Trees,” “Downed Wood” and “Large Woody Debris” is here divided into four categories:

1) Standing Trees in the Recruitment Zone,

2) Downed Wood in the Recruitment Zone,

3) Wood in the Creek Channel, and

4) Wood in the Kent Lake Zone.

STANDING TREES IN THE RECRUITMENT ZONE:

Standing trees greater than six (6) inches diameter at breast height (DBH) for conifers and twelve (12) inches DBH for non-conifers, and within the recruitment zone as defined above, and including the uphill sides of roads and trails, should not be felled.

However, a standing tree of this size and in this zone may occasionally cause concern for safety because it is diseased or old. If so, a registered professional forester or similarly accredited professional should determine in writing that the tree poses an imminent threat to public safety and recommend a course of action. If such a tree must be cut, and is downhill from a road or trail, every effort should be made to fell it toward the creek and leave it as intact as possible. If such a tree is on the uphill side of a road or trail, it should be placed as intact as possible at a safe and accessible site until its usefulness as stream enhancement can be determined; if it is determined that the tree is not useful for this purpose, it shall be moved to the downslope side of the road/trail and released in a safe manner. If none of the above is possible, see “Unusual Situations and Emergencies.”

DOWNED WOOD IN THE RECRUITMENT ZONE

Downed wood, within the recruitment zone, should not be cut or moved.

However, downed wood in this zone may occasionally block access to a road or trail. If so, a step by step process to determine the best course of action should be followed:

1) Treat wood that is lying partly in the creek channel as ‘Wood in the Creek Channel’ which is discussed in the next section, or

2) Move wood, intact, out of the way and towards the creek, or

3) Cut the minimal number of branches to clear the obstruction, or

4) For trails, reroute the path around the wood, or

5) For trails, cut steps into the wood or construct steps over the wood to provide access.

If none of the above is a possible way forward, then see “Unusual Situations and Emergencies.”

WOOD IN THE CREEK CHANNEL

Any and all wood in the creek channel (standing trees, downed wood, large woody debris, small woody debris and debris jams) should not be cut or moved.

However, a piece of wood or a debris jam in the creek channel may occasionally cause concern for public facilities by way of threatening bank stability, public safety or obstruction of roads or trails. If so, see “Unusual Situations and Emergencies.” Moving or removing such wood may require consultation with, or a permit from, the US Army Corps of Engineers, the SF Bay Regional Water Quality Control Board, and/or a Lake or Streambed Alteration Agreement from the California Department of Fish and Game.

WOOD IN THE KENT LAKE ZONE

Any and all wood in the Kent Lake Zone should be assessed for its potential as large woody debris, which should be prioritized for stream habitat enhancement using above guidelines modified to facilitate transport.

UNUSUAL SITUATIONS AND EMERGENCIES

Any discrepancy between the Woody Debris MOU, including these Best Management Practices, and an agency’s preferred plan of action should be resolved through the following steps:

1) Identify the problem and its urgency;
2) If the problem is an immediate emergency or professional consultation is unavailable (see #3) before the problem is likely to become an immediate emergency, then follow the Fish4C guidelines (Appendix B); if otherwise, then
3) Call for a team of appropriately qualified professionals (Appendix C), consisting of a minimum of at least one individual from each of at least two signatory or resource agencies to make a recommendation.
4) Clarify the plan of action.
5) Document the problem, consultation (if any) and course of action taken.
6) Contact the MMWD Fisheries Department at (415) 945-1193 and provide the following information: the size and type of log relocated, presence of a rootball, and final location of log.

FURTHER READING

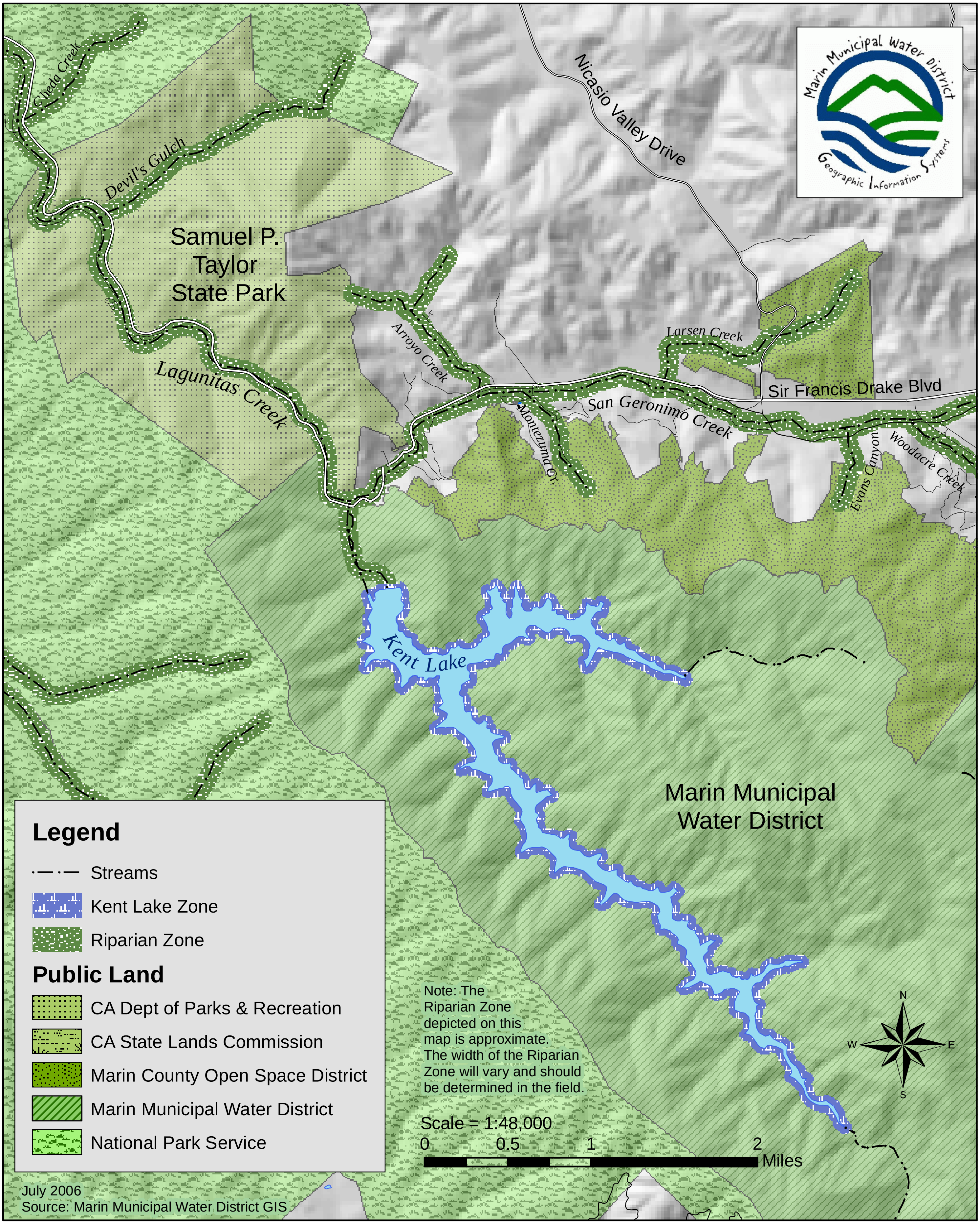
The Ecology and Management of Wood in World Rivers, eds. Gregory, Boyer and Gurnell. This book is a collection of papers on the importance, function and management of wood in rivers and the riparian corridor. MMWD Fisheries Department has a copy of this book.

Guidelines for Protecting Aquatic Habitat and Salmon Fisheries for County Road Maintenance (Dec 2004). FishNet4C. This document has a section on woody debris with accompanying best management practices for creeks alongside roads. It can be downloaded at:
http://www.fishnet4c.org/projects_roads_manual.html

APPENDIX A

Maps of the Lagunitas Creek Watershed

Kent Lake Zone and Riparian Zone of Coho Bearing Streams
- Lagunitas Creek Woody Debris MOU -

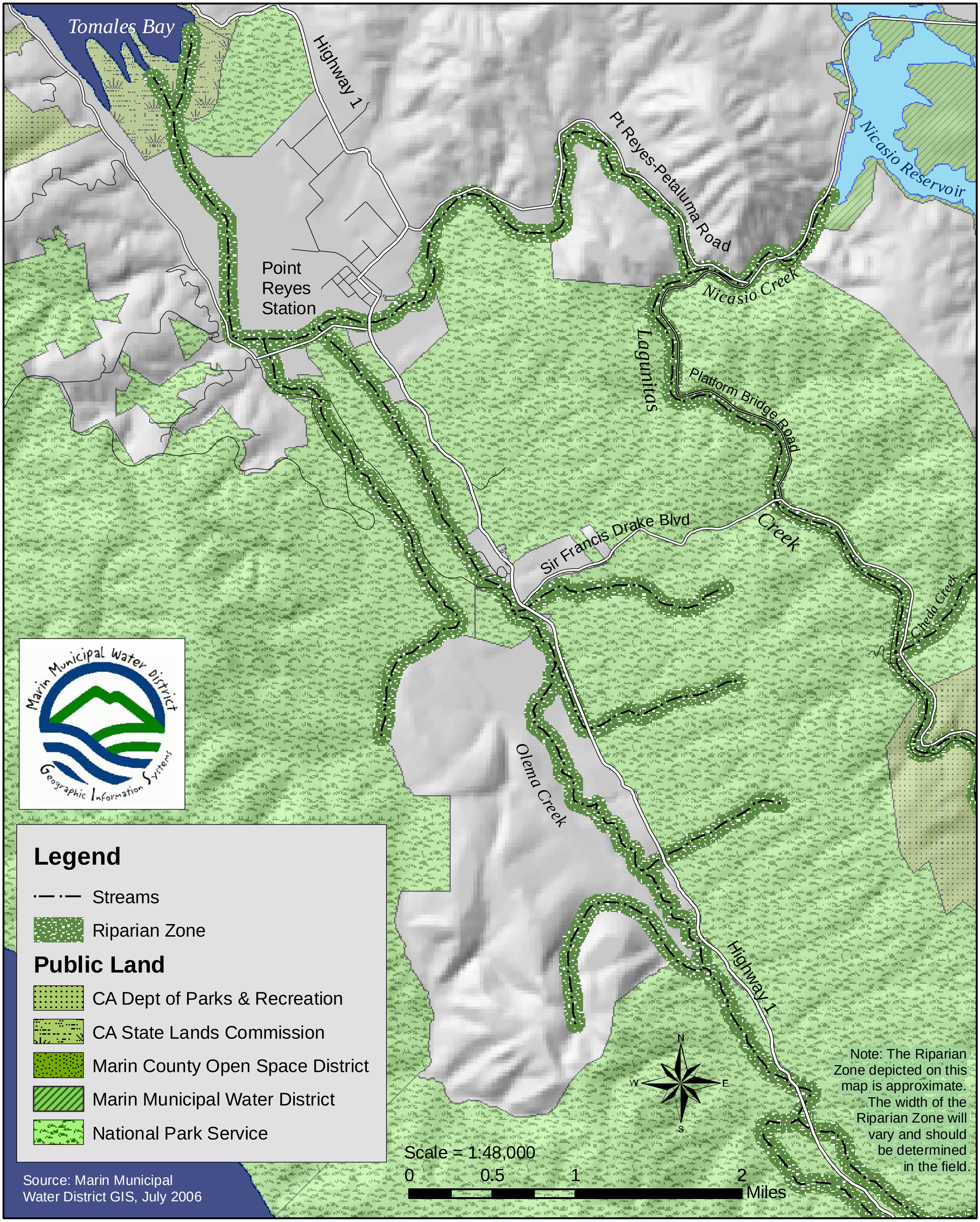


Note: The Riparian Zone depicted on this map is approximate. The width of the Riparian Zone will vary and should be determined in the field.

Scale = 1:48,000

July 2006
Source: Marin Municipal Water District GIS

Riparian Zone of Coho Bearing Streams
- Lagunitas Creek Woody Debris MOU -



Source: Marin Municipal Water District GIS, July 2006

Note: The Riparian Zone depicted on this map is approximate. The width of the Riparian Zone will vary and should be determined in the field.

APPENDIX B

FishNet4C Guidelines for Managing Woody Debris

6.3 WOODY DEBRIS

DESCRIPTION

A healthy salmon stream is chock full of large wood- big logs and rootwads, that dig into the banks and help form the channel's complexity.- making pools and providing food and shelter. Wood is a key link in the ecosystem of salmon. Restorationists and public agencies have taken on the task of placing large woody debris structures into creeks to benefit salmon. While restoration certainly helps***, our goal in this section is to provide guidelines on how to keep wood in the creek in the first place.***

Large Woody Debris (LWD), is defined as stumps, rootwads and logs having an average diameter greater than 6 inches and a length greater than 10 feet. When we refer to woody debris management it is best to think about ***modification***, rather than removal, whenever feasible. Removal of wood from creeks has such a negative impact on salmon, that as a general practice, it should not be done unless there is a very real threat to county property or public safety. Best Management practices outlined below will help guide crews in avoiding or minimizing this impact.

One of the very best ways to allow wood to stay in the creek is to maintain culverts and bridges that pass the 100-year flood flows. This ensures that large debris flows will also pass, creating more natural channel conditions overall. See *6.2 Culvert Cleaning, Repair and Replacement*.

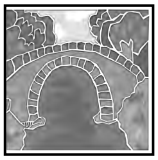
Note*:* The maintenance practices covered in this section *do not* include traditional channel maintenance or flood control activities. For information on flood control or channel maintenance BMPs, please refer to Flood Control Facility Maintenance Manual developed by the Bay Area Stormwater Management Agencies Association (BASMAA, June 2000).

ENVIRONMENTAL CONCERNS

- ✓ Loss of instream habitat due to wood removal.
- ✓ Harm to instream aquatic habitat or aquatic species.
- ✓ Harm to riparian areas and riparian species.
- ✓ Alteration of natural channel function or shape or destabilization of stream banks.
- ✓ Water pollution from equipment operation.
- ✓ Alteration of stream hydraulics and diversion of stream energies that may cause downstream erosion or structural damage.

BMP OBJECTIVES

- ✓ Preserve and protect important woody debris in creeks to the extent possible.
- ✓ Prevent potential water pollution from equipment operations.



BEST MANAGEMENT PRACTICES

1) Only remove (as opposed to modify) logs and debris from streams as a "last resort" when accumulation of debris poses a threat to road stability and bridges, culverts or other instream structures.

2) Have both a biologist and an engineer conduct a full review of the situation. The biologist should be familiar with the life histories and habitat needs of federally listed plants and animals in the area and be able to identify any of the life stages of these species. If in doubt as to the best way to handle large woody debris in a stream, consult with DFG personnel.

3) If log jams immediately threaten, or are damaging the integrity of roads, bridges, other public facilities during high flows, consider opportunities to ***modify*** the debris jam to halt damage and direct flow toward a more desirable path.

4) Take precautions to ensure that modifications of logs or debris jams will not cause damage downstream to culverts and other structures.

5) Limit modifications and/or removal to materials that extend higher than approximately two feet above the streambed (i.e. above knee height) to preserve some instream habitat features, *unless* the log or debris jam is immediately upstream and threatening a culvert or bridge, or if permit conditions require otherwise.

6) When modifying log jams, leave trees, logs and/or stumps in the longest lengths and diameters practicable for removal and hauling. If logs must be cut from fallen trees, leave as much as possible of the main trunk (12 feet plus is desirable) attached to the rootball and only cut branches obstructing flow. Log jams create suitable habitat for California red-legged frogs and San Francisco garter snakes and so where applicable this should be considered before removing or modifying any logjams.

7) Whenever feasible, incorporate LWD removed from water bodies into streambank repairs or cribbing at a nearby location, and/or transport any removed LWD to an approved storage site and make available for later use (e.g. in stream restoration activities).

BMP TOOLBOX

Planning and Prevention BMPs

- ✓ Seasonal Planning

PERMITS

6.3 WOODY DEBRIS	
Activity or Condition	**Required permit or limitation**
Removing or modifying large woody debris	Consult with DFG biologists

APPENDIX C

Professional Resource Contacts

Marin Municipal Water District

Eric Ettlinger, Aquatic Ecologist	(415) 945-1193
Gregory Andrew, Fishery Program Manager	(415) 945-1191
Michael Swezy, Resource Specialist	(415) 945-1190

County of Marin

Liz Lewis, Stormwater Program Administrator	(415) 499-7226
Kallie Kull, Senior Planner	(415) 499-6532

California Department of Parks and Recreation

Dave Boyd, State Park Resource Ecologist	(707) 769-5665 x223

National Park Service

Brannon Ketcham, Hydrologist	(415) 464-5192

San Francisco Bay Regional Water Quality Control Board

Leslie Ferguson, Civil Engineer	(510) 622-2344

California Department of Fish and Game

Bill Cox, Fisheries Biologist	(707) 823-1001

This page intentionally left blank.

APPENDIX F

TREE INVENTORY

This page intentionally left blank.

HORTICULTURAL Associates

Consultants in Horticulture and Arboriculture

TREE INVENTORY

SIR FRANCIS DRAKE BOULEVARD
Between Shafter Bridge and Platform Bridge Road
MARIN COUNTY, CALIFORNIA

PREPARED FOR:

Mr. Cord Hute
Synthesis Environmental Planning
6 Carmen Court
Novato, CA 94945

PREPARED BY:

John C. Meserve
Member, American Society of Consulting Arborists
International Society of Arboriculture WCISA #478

FEBRUARY 7, 2008

HORTICULTURAL *Associates*

Consultants in Horticulture and Arboriculture
P.O Box 1261, Glen Ellen, CA 95442

February 7, 2008

Mr. Cord Hute
Synthesis Environmental Planning
6 Carmen Court
Novato, CA 94945

Re: Completed *Tree Inventory* for Sir Francis Drake Boulevard, Marin County

Cord,

Enclosed you will find our completed *Tree Inventory* for the designated section of Sir Francis Drake Boulevard between Shafter Bridge and Platform Bridge Road. As you directed, we have included trees within ±20 feet of the side of the paved roadway, except where steep up or down grades are present. All trees 6" or greater were included in the inventory for a total of 1,368 trees.

The enclosed chart documents a tree identification number, botanical name, common name, estimated trunk diameter in inches, estimated height, estimated dripline radius, health and structure. A *Key* is attached to the chart which provides definitions for the numbers utilized to describe health and structure.

The purpose of this inventory is intended to provide you with basic observations of size, health, and structure for each tree. A wide range of natural conditions are present at this site, including dead, dying, and unstable trees, as well as healthy trees. Recommendations have only been provided for those trees which currently appear to be significant hazards, or are dead. These trees could pose hazards to those using Sir Francis Drake Boulevard, and action is recommended. This inventory, however, is intended to be a cursory review of each tree and no in-depth analysis of tree structure has occurred or been requested. Limb and trunk failure will most likely occur in the future and this assessment is in no way intended to provide information in the detail necessary to reduce these failures.

Each tree was identified in the field with a numbered aluminum tag affixed to the trunk at approximately eye level. The tree tag number corresponds to the data for the same number in the *Tree Inventory* chart.

It is our understanding that your surveyor will locate numbered trees in the field, and provide a site plan illustrating each numbered tree. Location data will be utilized with tree observation data as a planning tool for your environmental review.

Please feel free to contact me if further discussion would be helpful.

Sincerely,

John C. Meserve
Member, American Society of Consulting Arborists
International Society of Arboriculture, WCISA # 478

JOHN C. MESERVE
WC-0478

~ Voice 707-935-3911 Fax 707-935-7103 ~

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
1	*Sequoia sempervirens*	coast redwood	40	60	20	4	4	
2	*Sequoia sempervirens*	coast redwood	95+19+50	100	30	4	3	
3	*Sequoia sempervirens*	coast redwood	95	120	35	4	3	
4	*Lithocarpus densiflorus*	tanbark oak	19+10	35	20	2	2	SOD infected, remove
5	*Sequoia sempervirens*	coast redwood	30	70	20	4	4	
6	*Sequoia sempervirens*	coast redwood	35	70	20	4	4	
7	*Sequoia sempervirens*	coast redwood	55	100	24	3	3	
8	*Sequoia sempervirens*	coast redwood	12	20	14	3	2	
9	*Sequoia sempervirens*	coast redwood	80	120	30	4-3	4	
10	*Alnus rhombifolia*	white alder	10+11	38	25	3	4	
11	*Sequoia sempervirens*	coast redwood	19	20	12	3-2	4	
12	*Sequoia sempervirens*	coast redwood	51	90	18	3	4	
13	*Sequoia sempervirens*	coast redwood	13	45	10	4	4	
14	*Acer macrophyllum*	big leaf maple	9	25	14	2	4	
15	*Sequoia sempervirens*	coast redwood	90	110	25	4	4	
16	*Sequoia sempervirens*	coast redwood	38	70	20	4-3	3	
17	*Lithocarpus densiflorus*	tanbark oak	13	40	18	1	2	SOD infected, remove
18	*Sequoia sempervirens*	coast redwood	55+12	100	28	4	4	
19	*Umbellularia californica*	California bay	18	40	20	3	4	
20	*Sequoia sempervirens*	coast redwood	100	120	30	4	4	
21	*Sequoia sempervirens*	coast redwood	22	50	18	4	4	
22	*Sequoia sempervirens*	coast redwood	35	100	22	4	4	
23	*Sequoia sempervirens*	coast redwood	40	100	28	4	4	
24	*Umbellularia californica*	California bay	20+13	55	35	4	4	
25	*Acer macrophyllum*	big leaf maple	6.5	25	15	3	4	
26	*Acer macrophyllum*	big leaf maple	7+3+6	28	18	3	4	
27	*Sequoia sempervirens*	coast redwood	21+6	55	18	4	4	
28	*Umbellularia californica*	California bay	20	40	18	3	4	
29	*Lithocarpus densiflorus*	tanbark oak	22	40	22	1	2	SOD infected, remove
30	*Umbellularia californica*	California bay	19+19+28	50	30	3	3	

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
31	*Sequoia sempervirens*	coast redwood	12	28	13	4	4	
32	*Sequoia sempervirens*	coast redwood	32+7.5	60	20	4	4	
33	*Umbellularia californica*	California bay	16	50	34	4	4	
34	*Sequoia sempervirens*	coast redwood	30	45	18	3	3	
35	*Sequoia sempervirens*	coast redwood	50	60	28	4-3	3	
36	*Pseudotsuga menziesii*	Douglas fir	49	90	30	3-2	1	structurally unstable, remove
37	*Acer macrophyllum*	big leaf maple	12+11+12+10	40	34	2	3	
38	*Umbellularia californica*	California bay	9.5+9+10.5	30	20	2	2	structurally unstable, remove
39	*Lithocarpus densiflorus*	tanbark oak	8.5	20	13	1	1	structurally unstable, remove
40	*Sequoia sempervirens*	coast redwood	35	75	28	3	3	
41	*Pseudotsuga menziesii*	Douglas fir	58	120	30	3	2	structurally unstable, remove
42	*Umbellularia californica*	California bay	9	30	15	4	2-3	structurally unstable, remove
43	*Sequoia sempervirens*	coast redwood	41	100	28	4	3	
44	*Sequoia sempervirens*	coast redwood	14	32	12	3	4	
45	*Sequoia sempervirens*	coast redwood	49	100	26	4	3	
46	*Sequoia sempervirens*	coast redwood	60+60	100	28	4	2	
47	*Sequoia sempervirens*	coast redwood	32.5	90	24	4	3	
48	*Lithocarpus densiflorus*	tanbark oak	10.5	35	15	3	2	structurally unstable, remove
49	*Pseudotsuga menziesii*	Douglas fir	50	100	35	3-2	2	structurally unstable, remove
50	*Umbellularia californica*	California bay	15	20	11	2	2	
51	*Umbellularia californica*	California bay	18	40	20	3-2	3	
52	*Lithocarpus densiflorus*	tanbark oak	13.5	40	20	2	2	structurally unstable, remove
53	*Sequoia sempervirens*	coast redwood	30	70	18	4-3	4	
54	*Sequoia sempervirens*	coast redwood	19.5	45	15	4	4	
55	*Sequoia sempervirens*	coast redwood	40	70	20	4	4	
56	*Lithocarpus densiflorus*	tanbark oak	22	45	18	1	1	structurally unstable, remove
57	*Sequoia sempervirens*	coast redwood	50	95	30	4-3	3	
58	*Sequoia sempervirens*	coast redwood	10	38	15	3	4	
59	*Sequoia sempervirens*	coast redwood	46	95	25	4-3	4	
60	*Sequoia sempervirens*	coast redwood	15.5	50	16	3	4	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
61	*Sequoia sempervirens*	coast redwood	45+10.5	95	30	4-3	4	
62	*Acer macrophyllum*	big leaf maple	8	35	16	3	3	
63	*Acer macrophyllum*	big leaf maple	8.5	35	30	1	2	
64	*Acer macrophyllum*	big leaf maple	9.5	30	25	3	3	
65	*Acer macrophyllum*	big leaf maple	9	35	25	3	3	
66	*Acer macrophyllum*	big leaf maple	12.5	40	30	3	3	
67	*Acer macrophyllum*	big leaf maple	7.3	30	26	1	2	
68	*Sequoia sempervirens*	coast redwood	44.5	95	30	3	3	
69	*Sequoia sempervirens*	coast redwood	39	90	24	3	3	
70	*Sequoia sempervirens*	coast redwood	28	90	28	3	3	
71	*Sequoia sempervirens*	coast redwood	12	60	1	1	1	structurally unstable, remove
72	*Sequoia sempervirens*	coast redwood	19	35	14	3-2	2	structurally unstable, remove
73	*Sequoia sempervirens*	coast redwood	11	50	1	1	1	
74	*Sequoia sempervirens*	coast redwood	23	90	19	2	2	structurally unstable, remove
75	*Sequoia sempervirens*	coast redwood	22	60	12	2	2	structurally unstable, remove
76	*Sequoia sempervirens*	coast redwood	8+26+46+18	120	26	4-3	3	
77	*Sequoia sempervirens*	coast redwood	15	50	12	3-2	3	
78	*Sequoia sempervirens*	coast redwood	54+7.5	100	28	4-3	3	
79	*Sequoia sempervirens*	coast redwood	24	75	20	3	3	
80	*Sequoia sempervirens*	coast redwood	31	90	25	4-3	3	
81	*Sequoia sempervirens*	coast redwood	31	90	28	4	3	
82	*Sequoia sempervirens*	coast redwood	29	90	24	4	3	
83	*Sequoia sempervirens*	coast redwood	14+55	90	30	4-3	3	
84	*Sequoia sempervirens*	coast redwood	75	80	30	4	3	
85	*Sequoia sempervirens*	coast redwood	43	75	20	4	3	
86	*Sequoia sempervirens*	coast redwood	11.5+36	80	18	4-3	3	
87	*Sequoia sempervirens*	coast redwood	25.5+38	80	26	4	3	
88	*Sequoia sempervirens*	coast redwood	50	85	28	4-3	3	
89	*Acer macrophyllum*	big leaf maple	12.5	40	16	3	3	
90	*Sequoia sempervirens*	coast redwood	39+17	75	18	3	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
91	*Sequoia sempervirens*	coast redwood	47	75	16	3	3	
92	*Sequoia sempervirens*	coast redwood	23.5+13	65	14	3	3	
93	*Sequoia sempervirens*	coast redwood	57	85	20	1	1	structurally unstable, remove
94	*Sequoia sempervirens*	coast redwood	22.5	70	16	3	3	
95	*Sequoia sempervirens*	coast redwood	43	90	20	3-2	3	
96	*Sequoia sempervirens*	coast redwood	28+38+11	90	20	3	3	
97	*Sequoia sempervirens*	coast redwood	37+11+15+40	90	20	3	3	
98	*Sequoia sempervirens*	coast redwood	15	50	16	3	4	
99	*Sequoia sempervirens*	coast redwood	17	50	18	3	3	
100	*Sequoia sempervirens*	coast redwood	69	90	30	4	3	
101	*Sequoia sempervirens*	coast redwood	64	90	30	4-3	3	
102	*Acer macrophyllum*	big leaf maple	10+7.5	25	15	3	4	
103	*Alnus rhombifolia*	white alder	11+40+20	45	30	3	3-2	
104	*Umbellularia californica*	California bay	8	25	16	3-2	4	
105	*Umbellularia californica*	California bay	23+19+10	40	32	4	3	
106	*Acer macrophyllum*	big leaf maple	16	38	17	3-2	2	structurally unstable, remove
107	*Acer macrophyllum*	big leaf maple	22	40	20	3	2	structurally unstable, remove
108	*Umbellularia californica*	California bay	19+21	40	20	3	3	
109	*Acer macrophyllum*	big leaf maple	14.5	38	17	3	3	
110	*Umbellularia californica*	California bay	20	40	25	3	2	
111	*Umbellularia californica*	California bay	20.5+17.5	45	35	3	3	
112	*Umbellularia californica*	California bay	6.5	18	12	4-3	4	
113	*Acer macrophyllum*	big leaf maple	13.5	38	14	2	2	structurally unstable, remove
114	*Sequoia sempervirens*	coast redwood	71	95	25	2	1	structurally unstable, remove
115	*Sequoia sempervirens*	coast redwood	40.5	80	18	4	3	
116	*Sequoia sempervirens*	coast redwood	18.5	60	15	4	3	
117	*Sequoia sempervirens*	coast redwood	16	55	14	4	3	
118	*Sequoia sempervirens*	coast redwood	34.5+36.5	85	26	4	3	
119	*Sequoia sempervirens*	coast redwood	31	80	22	3	3	
120	*Sequoia sempervirens*	coast redwood	49	90	25	3	3	

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
121	*Umbellularia californica*	California bay	18	55	17	3	2	structurally unstable, remove
122	*Sequoia sempervirens*	coast redwood	37.5+25+19.5+12	80	20	4	3	
123	*Sequoia sempervirens*	coast redwood	7	18	13	4	4	
124	*Umbellularia californica*	California bay	12+18.5+16	60	20	3-2	3	
125	*Umbellularia californica*	California bay	18+9+7+12+7+6	50	18	3-2	3	
126	*Sequoia sempervirens*	coast redwood	11.5+27+9+10	50	18	4-3	3	
127	*Umbellularia californica*	California bay	9.5	30	16	3	4	
128	*Umbellularia californica*	California bay	9.5	28	15	4-3	4	
129	*Acer macrophyllum*	big leaf maple	8.5	20	12	3	4	
130	*Acer macrophyllum*	big leaf maple	10	35	24	3	3	
131	*Umbellularia californica*	California bay	19	50	20	3	3-2	
132	*Umbellularia californica*	California bay	35	50	38	3	3	
133	*Sequoia sempervirens*	coast redwood	31+9+32	65	24	3	3	
134	*Sequoia sempervirens*	coast redwood	16.5	40	17	3	3	
135	*Sequoia sempervirens*	coast redwood	31	90	20	4	3	
136	*Sequoia sempervirens*	coast redwood	31+8	90	20	4	3	
137	*Sequoia sempervirens*	coast redwood	20.5+13	65	18	4	3	
138	*Sequoia sempervirens*	coast redwood	45	85	24	3	3	
139	*Sequoia sempervirens*	coast redwood	32	70	24	4-3	3	
140	*Sequoia sempervirens*	coast redwood	23.5	80	24	4	3	
141	*Sequoia sempervirens*	coast redwood	8.5	30	14	4	3	
142	*Sequoia sempervirens*	coast redwood	44.5	90	24	3	3	
143	*Umbellularia californica*	California bay	19+20+17	50	40	3	2	
144	*Sequoia sempervirens*	coast redwood	11	30	15	3	4	
145	*Umbellularia californica*	California bay	13+12	28	30	3	3	
146	*Umbellularia californica*	California bay	25	55	28	4-3	3	
147	*Lithocarpus densiflorus*	tanbark oak	14	50	14	2	2	SOD infected, remove
148	*Lithocarpus densiflorus*	tanbark oak	12.5+13.5	45	14	1	1	SOD infected, remove
149	*Umbellularia californica*	California bay	18+9.5+14.5+16	60	28	4-3	3-2	
150	*Umbellularia californica*	California bay	14	60	24	4	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
151	*Umbellularia californica*	California bay	13.5	28	16	3	2	
152	*Umbellularia californica*	California bay	12.5+24+16+15+19.5	60	30	4-3	2	
153	*Pseudotsuga menziesii*	Douglas fir	16.5	50	18	3	3	
154	*Umbellularia californica*	California bay	10+14	36	14	4	4	
155	*Pseudotsuga menziesii*	Douglas fir	34	80	24	3-2	3	
156	*Umbellularia californica*	California bay	21+19	70	26	3	2	
157	*Sequoia sempervirens*	coast redwood	9.5+6+6	25	16	4	3	
158	*Sequoia sempervirens*	coast redwood	20.5+17	50	19	4	3	
159	*Sequoia sempervirens*	coast redwood	20.5	70	17	4	3	
160	*Sequoia sempervirens*	coast redwood	10+16.5	65	16	4	3	
161	*Umbellularia californica*	California bay	7+16+16.5+16.5	55	30	4-3	3-2	remove 1 decayed trunk
162	*Umbellularia californica*	California bay	17.5	50	28	4	3	
163	*Sequoia sempervirens*	coast redwood	16.5	50	14	3	4	
164	*Sequoia sempervirens*	coast redwood	9.5	38	16	4	3	
165	*Umbellularia californica*	California bay	19	45	22	3	3	
166	*Acer macrophyllum*	big leaf maple	9	28	15	3	4	
167	*Acer macrophyllum*	big leaf maple	8	30	18	4-3	4	
168	*Umbellularia californica*	California bay	17	40	35	4	4	
169	*Sequoia sempervirens*	coast redwood	39+30	85	28	4-3	3	
170	*Sequoia sempervirens*	coast redwood	29+21.5	75	18	4	3	
171	*Pseudotsuga menziesii*	Douglas fir	32	95	30	3-2	3	
172	*Pseudotsuga menziesii*	Douglas fir	47	100	30	1	1	structurally unstable, remove
173	*Pseudotsuga menziesii*	Douglas fir	30	70	30	3	3	
174	*Umbellularia californica*	California bay	20+10.5	50	30	4-3	2	
175	*Umbellularia californica*	California bay	26	60	50	3	3-2	
176	*Umbellularia californica*	California bay	16+14+14+12.5	60	35	3	3	
177	*Sequoia sempervirens*	coast redwood	15	50	17	4-3	4	
178	*Sequoia sempervirens*	coast redwood	42.5+42	95	26	4-3	3	
179	*Sequoia sempervirens*	coast redwood	28+45	95	28	4-3	3	
180	*Umbellularia californica*	California bay	15+17	50	30	4-3	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
181	*Sequoia sempervirens*	coast redwood	9.5+38+33+35	75	28	4-3	3	
182	*Sequoia sempervirens*	coast redwood	19.5+23	50	20	3	3	
183	*Sequoia sempervirens*	coast redwood	35	45	20	4-3	3	
184	*Pseudotsuga menziesii*	Douglas fir	42	75	15	1	1	structurally unstable, remove
185	*Acer macrophyllum*	big leaf maple	6.5+5+6+5+4	20	18	3	3	
186	*Sequoia sempervirens*	coast redwood	42	80	28	4	3	
187	*Sequoia sempervirens*	coast redwood	14	45	60	3	4	
188	*Sequoia sempervirens*	coast redwood	31	70	18	3	3	
189	*Sequoia sempervirens*	coast redwood	25	70	20	3-2	3	
190	*Sequoia sempervirens*	coast redwood	30.5	80	20	3	3	
191	*Sequoia sempervirens*	coast redwood	35	80	20	3	3	
192	*Sequoia sempervirens*	coast redwood	41	80	20	3	3	
193	*Sequoia sempervirens*	coast redwood	17.5	60	14	3-2	4	
194	*Pseudotsuga menziesii*	Douglas fir	47	120	24	3	3	
195	*Umbellularia californica*	California bay	15+19.5+21.5	45	20	3	3	
196	*Acer macrophyllum*	big leaf maple	13	50	22	3	4	
197	*Pseudotsuga menziesii*	Douglas fir	45.5	120	30	3-2	3	
198	*Pseudotsuga menziesii*	Douglas fir	20.5	75	16	2	3	
199	*Umbellularia californica*	California bay	14+6+5	55	26	3	4	
200	*Umbellularia californica*	California bay	28+12	60	28	4-3	3	
201	*Pseudotsuga menziesii*	Douglas fir	57	120	30	3	3	
202	*Umbellularia californica*	California bay	11	20	16	3-2	2	
203	*Umbellularia californica*	California bay	10+16.5	45	35	3	3-2	
204	*Umbellularia californica*	California bay	18.5	60	30	3	3	
205	*Umbellularia californica*	California bay	20.5+17.5+16.5+16+14	70	38	3	3	
206	*Lithocarpus densiflorus*	tanbark oak	17	60	16	4-3	3	
207	*Lithocarpus densiflorus*	tanbark oak	15+9.5+17	60	17	2	3	
208	*Umbellularia californica*	California bay	26+22	60	35	4-3	3	
209	*Umbellularia californica*	California bay	17+19	60	35	3	3	
210	*Lithocarpus densiflorus*	tanbark oak	8	26	12	2	4	

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
211	*Umbellularia californica*	California bay	15+16	40	28	3	3	
212	*Umbellularia californica*	California bay	15+22	48	32	4-3	3	
213	*Sequoia sempervirens*	coast redwood	48.5	95	25	3	3	
214	*Pseudotsuga menziesii*	Douglas fir	49	95	25	3	3-2	
215	*Pseudotsuga menziesii*	Douglas fir	49	95	28	3	3	
216	*Umbellularia californica*	California bay	9+5.5	25	18	2	3	
217	*Umbellularia californica*	California bay	10+14+16+10.5+10	45	32	3-2	3-2	
218	*Acer macrophyllum*	big leaf maple	6.2	20	11	3	4	
219	*Umbellularia californica*	California bay	14+14+14	60	38	4-3	3	
220	*Sequoia sempervirens*	coast redwood	45+12	95	20	4	3	
221	*Sequoia sempervirens*	coast redwood	14.5	60	19	3	4	
222	*Sequoia sempervirens*	coast redwood	9+40+40+30+35+12	100	26	4	3	
223	*Umbellularia californica*	California bay	15+9+5	60	32	4-3	3	
224	*Umbellularia californica*	California bay	17+11.5	40	30	4-3	3	
225	*Umbellularia californica*	California bay	12.5+10	40	28	4-3	3	
226	*Umbellularia californica*	California bay	16+8+10+13	48	32	4-3	3	
227	*Umbellularia californica*	California bay	18+8.5+8	38	28	4-3	3	
228	*Umbellularia californica*	California bay	9	20	18	3	3	
229	*Umbellularia californica*	California bay	11+6	48	18	4	4	
230	*Umbellularia californica*	California bay	8+4.5	45	15	4	4	
231	*Umbellularia californica*	California bay	8+11+9	35	20	3	3	
232	*Pseudotsuga menziesii*	Douglas fir	25	48	17	3	4	
233	*Umbellularia californica*	California bay	17+9	38	20	3	3	
234	*Umbellularia californica*	California bay	12+6+6	35	20	3	3	
235	*Acer macrophyllum*	big leaf maple	6+9+5	20	12	1	1	structurally unstable, remove
236	*Umbellularia californica*	California bay	7	18	20	4	3	
237	*Umbellularia californica*	California bay	16+9	40	30	4	4	
238	*Umbellularia californica*	California bay	9	12	20	4	4	
239	*Umbellularia californica*	California bay	7.5	20	17	4	3	
240	*Pseudotsuga menziesii*	Douglas fir	38	75	20	3	3	

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
241	*Umbellularia californica*	California bay	14	40	20	3	3	
242	*Sequoia sempervirens*	coast redwood	31+16	75	20	4	3	
243	*Pseudotsuga menziesii*	Douglas fir	40	80	30	3	3	
244	*Pseudotsuga menziesii*	Douglas fir	18	60	20	2-1	1	structurally unstable, remove
245	*Sequoia sempervirens*	coast redwood	28.5+11.5	80	20	4	3	
246	*Sequoia sempervirens*	coast redwood	32	75	20	4	3	
247	*Sequoia sempervirens*	coast redwood	36	90	30	4-3	3	
248	*Sequoia sempervirens*	coast redwood	12	30	13	3	3	
249	*Sequoia sempervirens*	coast redwood	29	75	20	3	3	
250	*Sequoia sempervirens*	coast redwood	33	85	20	4-3	3	
251	*Sequoia sempervirens*	coast redwood	32.5	80	24	3	3	
252	*Sequoia sempervirens*	coast redwood	15.5	60	24	3	3	
253	*Sequoia sempervirens*	coast redwood	25	60	20	3	3	
254	*Sequoia sempervirens*	coast redwood	38	70	20	4-3	3	
255	*Umbellularia californica*	California bay	13+14	50	24	3	3	
256	*Pseudotsuga menziesii*	Douglas fir	39	90	28	4-3	3	
257	*Acer macrophyllum*	big leaf maple	14+16.5	40	30	3	3-2	remove decayed limb over road
258	*Sequoia sempervirens*	coast redwood	40+20+19+40+35	90	28	4-3	3	
259	*Lithocarpus densiflorus*	tanbark oak	13	40	18	3-2	2	structurally unstable, remove
260	*Lithocarpus densiflorus*	tanbark oak	12	40	16	3	3	
261	*Pseudotsuga menziesii*	Douglas fir	40	90	22	4-3	3	
262	*Umbellularia californica*	California bay	14	35	22	3	2	structurally unstable, remove
263	*Pseudotsuga menziesii*	Douglas fir	40	70	8	1	1	structurally unstable, remove
264	*Umbellularia californica*	California bay	8	20	17	4	4	
265	*Sequoia sempervirens*	coast redwood	60+6	100	30	4	3	
266	*Sequoia sempervirens*	coast redwood	45+48	90	30	4	3	
267	*Umbellularia californica*	California bay	18+10+15+15	50	35	3	3	
268	*Sequoia sempervirens*	coast redwood	32	70	20	3	3	
269	*Sequoia sempervirens*	coast redwood	26	70	17	3	3	
270	*Sequoia sempervirens*	coast redwood	25.5	60	24	4-3	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
271	*Sequoia sempervirens*	coast redwood	30	60	24	3	3	
272	*Sequoia sempervirens*	coast redwood	20	60	26	3	3	
273	*Sequoia sempervirens*	coast redwood	10	30	15	3	3	
274	*Sequoia sempervirens*	coast redwood	34	60	26	3	3	
275	*Umbellularia californica*	California bay	17	45	30	3	3	
276	*Sequoia sempervirens*	coast redwood	39	80	24	4-3	3	
277	*Sequoia sempervirens*	coast redwood	32+25.5	70	24	4-3	3	
278	*Acer macrophyllum*	big leaf maple	15	38	24	3-2	3	
279	*Lithocarpus densiflorus*	tanbark oak	9+9	38	20	2	2	SOD infected, remove
280	*Lithocarpus densiflorus*	tanbark oak	13.5+13+9	38	20	2	2	SOD infected, remove
281	*Lithocarpus densiflorus*	tanbark oak	11	28	16	1	1	SOD infected, remove
282	*Pseudotsuga menziesii*	Douglas fir	15	60	20	3-2	3	
283	*Pseudotsuga menziesii*	Douglas fir	39	90	28	4-3	3	
284	*Acer macrophyllum*	big leaf maple	16	38	26	3	3	
285	*Umbellularia californica*	California bay	7	30	18	3	4	
286	*Lithocarpus densiflorus*	tanbark oak	7	25	14	3	4	
287	*Acer macrophyllum*	big leaf maple	7	20	20	2	3	
288	*Sequoia sempervirens*	coast redwood	30	70	24	3	3	
289	*Sequoia sempervirens*	coast redwood	28+12+13	80	20	4-3	3	
290	*Pseudotsuga menziesii*	Douglas fir	14	40	18	3	3	
291	*Lithocarpus densiflorus*	tanbark oak	12	35	13	3	4	
292	*Arbutus menziesii*	madrone	7	20	15	3	4	
293	*Acer macrophyllum*	big leaf maple	6+7	20	14	3	4	
294	*Sequoia sempervirens*	coast redwood	32+25	70	20	3	3	
295	*Sequoia sempervirens*	coast redwood	32+8	65	18	3	3	
296	*Pseudotsuga menziesii*	Douglas fir	12.5	45	15	3	3	
297	*Sequoia sempervirens*	coast redwood	41	90	20	3	3	
298	*Sequoia sempervirens*	coast redwood	9	40	16	3	3	
299	*Sequoia sempervirens*	coast redwood	32+16+8	90	24	4-3	3	
300	*Sequoia sempervirens*	coast redwood	27	60	15	3	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
301	*Sequoia sempervirens*	coast redwood	65	90	25	4-3	3	
302	*Sequoia sempervirens*	coast redwood	32	70	20	3	3	
303	*Sequoia sempervirens*	coast redwood	10.5	30	14	3	4	
304	*Sequoia sempervirens*	coast redwood	9	30	14	3	3	
305	*Sequoia sempervirens*	coast redwood	34	85	20	4-3	3	
306	*Sequoia sempervirens*	coast redwood	32	60	20	3	3	
307	*Sequoia sempervirens*	coast redwood	39	65	18	3	3	
308	*Sequoia sempervirens*	coast redwood	19	65	16	3	4	
309	*Sequoia sempervirens*	coast redwood	18	65	16	3	3	
310	*Sequoia sempervirens*	coast redwood	19	65	16	3	3	
311	*Sequoia sempervirens*	coast redwood	20	65	19	4	3	
312	*Lithocarpus densiflorus*	tanbark oak	13+12+10	35	16	3-2	3-2	remove decayed limb over road
313	*Lithocarpus densiflorus*	tanbark oak	13+13	35	20	3	4	
314	*Lithocarpus densiflorus*	tanbark oak	7	25	12	2	3	
315	*Lithocarpus densiflorus*	tanbark oak	13.3	40	17	2	2	SOD infected, remove
316	*Sequoia sempervirens*	coast redwood	40+60	90	25	4-3	3	
317	*Lithocarpus densiflorus*	tanbark oak	10	30	16	1	1	structurally unstable, remove
318	*Pseudotsuga menziesii*	Douglas fir	12.5	40	20	3	2	
319	*Umbellularia californica*	California bay	8.5+4	30	20	4	2	
320	*Sequoia sempervirens*	coast redwood	22+24+16+11	60	25	3	3	
321	*Sequoia sempervirens*	coast redwood	27	50	20	4	3	
322	*Sequoia sempervirens*	coast redwood	14.5+20	50	16	3	3	
323	*Sequoia sempervirens*	coast redwood	17+26	70	22	3	3	
324	*Sequoia sempervirens*	coast redwood	38	70	22	3	3	
325	*Sequoia sempervirens*	coast redwood	17.5+42+42	90	22	3	3	
326	*Sequoia sempervirens*	coast redwood	38+13.5	80	18	3	3	
327	*Sequoia sempervirens*	coast redwood	40	80	18	3	3	
328	*Umbellularia californica*	California bay	9+9+12.5	45	30	3	3	
329	*Umbellularia californica*	California bay	20+20	50	30	3	3-2	remove decayed limb over road
330	*Umbellularia californica*	California bay	18+15+19	40	22	2	2	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
331	*Umbellularia californica*	California bay	22	60	28	3-2	3	
332	*Umbellularia californica*	California bay	22	55	26	3-2	2	
333	*Acer macrophyllum*	big leaf maple	14.5+15	40	20	2	3	
334	*Sequoia sempervirens*	coast redwood	90	90	20	4-3	3	
335	*Sequoia sempervirens*	coast redwood	47	90	25	4-3	3	
336	*Sequoia sempervirens*	coast redwood	40+14+20+15+26+22+15	80	22	3	3	
337	*Sequoia sempervirens*	coast redwood	32+28+26+10	90	20	4-3	3	
338	*Sequoia sempervirens*	coast redwood	38	80	24	4	3	
339	*Sequoia sempervirens*	coast redwood	27	70	18	4-3	3	
340	*Umbellularia californica*	California bay	32	60	35	4-3	2	
341	*Sequoia sempervirens*	coast redwood	33+17	80	20	4-3	3	
342	*Sequoia sempervirens*	coast redwood	22+30	80	20	4-3	3	
343	*Sequoia sempervirens*	coast redwood	35.5	75	24	4-3	3	
344	*Sequoia sempervirens*	coast redwood	31+16	90	22	4-3	3	
345	*Sequoia sempervirens*	coast redwood	27.5	70	18	4-3	3	
346	*Sequoia sempervirens*	coast redwood	28+15	85	19	4-3	3	
347	*Sequoia sempervirens*	coast redwood	12	50				dead, remove
348	*Sequoia sempervirens*	coast redwood	18.5	70	12	3	3	
349	*Sequoia sempervirens*	coast redwood	25+14.5+35	80	26	4-3	3	
350	*Umbellularia californica*	California bay	18	60	34	4	3	
351	*Umbellularia californica*	California bay	17+18+17+10	60	32	4	3	
352	*Acer macrophyllum*	big leaf maple	15+12	30	28	4-3	3	
353	*Sequoia sempervirens*	coast redwood	52	70	20	4	3	
354	*Sequoia sempervirens*	coast redwood	25	65	20	3	3	
355	*Sequoia sempervirens*	coast redwood	49+9	70	24	3	3	
356	*Acer macrophyllum*	big leaf maple	8+5+8+7	35	16	4-3	4	
357	*Acer macrophyllum*	big leaf maple	7	30	18	4-3	4	
358	*Sequoia sempervirens*	coast redwood	9+30.5	70	20	4	3	
359	*Sequoia sempervirens*	coast redwood	26	70	18	4	3	
360	*Sequoia sempervirens*	coast redwood	12+11+4	20	14	4	4	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
361	*Sequoia sempervirens*	coast redwood	30	70	18	4	3	
362	*Sequoia sempervirens*	coast redwood	26	65	18	4	3	
363	*Acer macrophyllum*	big leaf maple	10+12	20	15	3	3	
364	*Sequoia sempervirens*	coast redwood	34+20	60	20	4	3	
365	*Sequoia sempervirens*	coast redwood	24	50	18	4	3	
366	*Sequoia sempervirens*	coast redwood	78	20	30	4	3	
367	*Sequoia sempervirens*	coast redwood	36+35	95	20	4	3	
368	*Sequoia sempervirens*	coast redwood	24	85	18	4	3	
369	*Sequoia sempervirens*	coast redwood	26	70	18	4-3	3	
370	*Sequoia sempervirens*	coast redwood	36	90	20	3	3	
371	*Sequoia sempervirens*	coast redwood	66	120	30	4-3	3	
372	*Sequoia sempervirens*	coast redwood	45+52	120	24	4-3	3	
373	*Sequoia sempervirens*	coast redwood	51	90	26	3	3	
374	*Acer macrophyllum*	big leaf maple	9.5+9.5+8.5+10+12	35	15	2	2	structurally unstable, remove
375	*Sequoia sempervirens*	coast redwood	21	70	20	3	3	
376	*Pseudotsuga menziesii*	Douglas fir	23	50	26	3	3	
377	*Sequoia sempervirens*	coast redwood	51	95	30	4	3	
378	*Sequoia sempervirens*	coast redwood	8	30	13	3	4	
379	*Sequoia sempervirens*	coast redwood	47+15.5	95	20	3	3	
380	*Sequoia sempervirens*	coast redwood	42	95	22	4	3	
381	*Sequoia sempervirens*	coast redwood	44+44+44	95	22	4	3	
382	*Sequoia sempervirens*	coast redwood	10+79	140	26	4	3	
383	*Sequoia sempervirens*	coast redwood	14	35	18	4	4	
384	*Sequoia sempervirens*	coast redwood	27.5	75	22	3	3	
385	*Sequoia sempervirens*	coast redwood	77	100	30	4-3	3	
386	*Sequoia sempervirens*	coast redwood	54	120	26	4	3	
387	*Sequoia sempervirens*	coast redwood	54	120	25	4	3	
388	*Sequoia sempervirens*	coast redwood	78+35+20	120	20	4	3	
389	*Sequoia sempervirens*	coast redwood	11+58.5	110	20	4	3	
390	*Sequoia sempervirens*	coast redwood	38+20+60+16+15	110	20	4	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
391	*Acer macrophyllum*	big leaf maple	10	20	20	4	3	
392	*Sequoia sempervirens*	coast redwood	40+15+38+16+17+20	90	28	4	3	
393	*Sequoia sempervirens*	coast redwood	32	80	18	4-3	3	
394	*Sequoia sempervirens*	coast redwood	34+40+38	95	30	4	3	
395	*Sequoia sempervirens*	coast redwood	35+36	95	27	4	3	
396	*Acer macrophyllum*	big leaf maple	19+19	55	32	4-3	3	
397	*Pseudotsuga menziesii*	Douglas fir	22	60	20	3	3	
398	*Sequoia sempervirens*	coast redwood	50+8+6+12	50	20	3	3	
399	*Sequoia sempervirens*	coast redwood	25	60	20	4-3	3	
400	*Sequoia sempervirens*	coast redwood	16+27+21	75	22	4-3	3	
401	*Umbellularia californica*	California bay	9+8+7	45	30	3	3	
402	*Sequoia sempervirens*	coast redwood	40	100	20	4-3	3	
403	*Sequoia sempervirens*	coast redwood	24+50	100	22	4-3	3	
404	*Sequoia sempervirens*	coast redwood	37	100	24	4-3	3	
405	*Sequoia sempervirens*	coast redwood	40	100	24	4-3	3	
406	*Sequoia sempervirens*	coast redwood	42+10	100	24	4-3	3	
407	*Sequoia sempervirens*	coast redwood	50+29+29	90	20	4-3	3	
408	*Sequoia sempervirens*	coast redwood	23	70	20	4-3	3	
409	*Sequoia sempervirens*	coast redwood	42.5+32	90	20	4-3	3	
410	*Sequoia sempervirens*	coast redwood	42+40+42	90	26	3-2	3	
411	*Sequoia sempervirens*	coast redwood	50	95	20	3-2	3	
412	*Sequoia sempervirens*	coast redwood	18	50	16	3	3	
413	*Sequoia sempervirens*	coast redwood	40+42+45+30	100	24	3	3	
414	*Sequoia sempervirens*	coast redwood	40	65	20	3	3	
415	*Sequoia sempervirens*	coast redwood	38+16+42	80	20	4-3	3	
416	*Sequoia sempervirens*	coast redwood	40	80	20	4-3	3	
417	*Umbellularia californica*	California bay	11	50	35	3	3	
418	*Umbellularia californica*	California bay	13	40	30	4-3	3	
419	*Sequoia sempervirens*	coast redwood	40	85	18	4-3	3	
420	*Sequoia sempervirens*	coast redwood	40	85	18	4-3	3	

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
421	*Sequoia sempervirens*	coast redwood	40	85	18	4-3	3	
422	*Sequoia sempervirens*	coast redwood	24	70	16	4-3	3	
423	*Sequoia sempervirens*	coast redwood	20	65	15	3	3	
424	*Sequoia sempervirens*	coast redwood	20	70	18	4-3	3	
425	*Sequoia sempervirens*	coast redwood	40	80	17	4-3	3	
426	*Sequoia sempervirens*	coast redwood	38	80	16	4-3	3	
427	*Sequoia sempervirens*	coast redwood	40	80	17	4-3	3	
428	*Sequoia sempervirens*	coast redwood	15	35	15	4	3	
429	*Sequoia sempervirens*	coast redwood	24+30+30	80	20	4-3	3	
430	*Sequoia sempervirens*	coast redwood	42	90	24	4	3	
431	*Umbellularia californica*	California bay	10	20	19	3-2	4	
432	*Pseudotsuga menziesii*	Douglas fir	15	40	35	2	3	
433	*Umbellularia californica*	California bay	20	50	28	3	3	
434	*Sequoia sempervirens*	coast redwood	45+17+45	80	20	3	3	
435	*Sequoia sempervirens*	coast redwood	16+32	80	18	3	3	
436	*Sequoia sempervirens*	coast redwood	14+30+30+30	80	18	3	3	
437	*Quercus agrifolia*	coast live oak	18	40	30	3-2	3	
438	*Sequoia sempervirens*	coast redwood	38+18	80	17	3	3	
439	*Sequoia sempervirens*	coast redwood	24	70	16	3	3	
440	*Sequoia sempervirens*	coast redwood	37.5	80	20	3	3	
441	*Sequoia sempervirens*	coast redwood	32	70	18	3	3	
442	*Sequoia sempervirens*	coast redwood	42+20	75	18	3	3	
443	*Sequoia sempervirens*	coast redwood	40	75	16	3	3	
444	*Quercus agrifolia*	coast live oak	18	20	18	3	3	
445	*Umbellularia californica*	California bay	14.5	35	24	4-3	3	
446	*Acer macrophyllum*	big leaf maple	10	20	20	2	1	structurally unstable, remove
447	*Sequoia sempervirens*	coast redwood	18	60	18	4-3	3	
448	*Alnus rhombifolia*	white alder	14	45	16	4-3	3	
449	*Pseudotsuga menziesii*	Douglas fir	24	95	24	3	3	
450	*Sequoia sempervirens*	coast redwood	17	60	16	4	3	

TREE INVENTORY

February 7, 2008

Sir Francis Drake Blvd., Marin County

(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
451	*Sequoia sempervirens*	coast redwood	12	30	13	3	3	
452	*Alnus rhombifolia*	white alder	20.5+20	38	20	3	3	
453	*Salix species*	willow	20	35	18	2	2	
454	*Salix species*	willow	14+9	20	19	3	3	
455	*Quercus agrifolia*	coast live oak	10	18	11	3-2	4	
456	*Quercus agrifolia*	coast live oak	6.5	16	12	3	4	
457	*Quercus agrifolia*	coast live oak	17	35	18	4-3	4	
458	*Quercus agrifolia*	coast live oak	7+8.5	20	16	4-3	4	
459	*Sequoiadendron giganteum*	giant sequoia	18+24	40	18	4-3	3	
460	*Pseudotsuga menziesii*	Douglas fir	9.5	18	12	4-3	4	
461	*Umbellularia californica*	California bay	14+22	45	35	3	3	
462	*Pseudotsuga menziesii*	Douglas fir	20.5	45	20	3	3	
463	*Quercus agrifolia*	coast live oak	15	30	22	3	4	
464	*Umbellularia californica*	California bay	17+13.5	45	24	3	2	
465	*Pseudotsuga menziesii*	Douglas fir	46	100	30	4-3	3	
466	*Sequoia sempervirens*	coast redwood	15+10+9+15	80	20	3	3	
467	*Sequoia sempervirens*	coast redwood	30	70	20	4-3	3	
468	*Sequoia sempervirens*	coast redwood	26	65	20	3	3	
469	*Pseudotsuga menziesii*	Douglas fir	36	100	30	4-3	3	
470	*Pseudotsuga menziesii*	Douglas fir	48	100	30	3	2	
471	*Pseudotsuga menziesii*	Douglas fir	28	70				dead, remove
472	*Pseudotsuga menziesii*	Douglas fir	28	70				dead, remove
473	*Pseudotsuga menziesii*	Douglas fir	30	55				dead, remove
474	*Pseudotsuga menziesii*	Douglas fir	34	65				dead, remove
475	*Quercus agrifolia*	coast live oak	12+9	20	20	1	1	SOD infected, remove
476	*Pseudotsuga menziesii*	Douglas fir	40	60				
477	*Arbutus menziesii*	madrone	28	35	28	1	1	structurally unstable, remove
478	*Sequoia sempervirens*	coast redwood	36	50	28	3	3	
479	*Pseudotsuga menziesii*	Douglas fir	15	30	18	3	4	
480	*Pseudotsuga menziesii*	Douglas fir	24	60	18	4-3	3	

TREE INVENTORY

Sir Francis Drake Blvd., Marin County

(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
481	*Quercus agrifolia*	coast live oak	19.5	20	18	1	1	structurally unstable, remove
482	*Aesculus californica*	California buckeye	12+11+9+10+15	30	20	3	3	
483	*Umbellularia californica*	California bay	24+24	30	18	3	2	
484	*Quercus agrifolia*	coast live oak	14+12	28	14	3	3	
485	*Quercus agrifolia*	coast live oak	13+10	18	14	4-3	3	
486	*Quercus agrifolia*	coast live oak	19+8	20	15	3	3	
487	*Fraxinus latifolia*	Oregon ash	20	30	20	3-2	3	
488	*Quercus agrifolia*	coast live oak	16	18	20	2	2	
489	*Quercus agrifolia*	coast live oak	26	35				dead, remove
490	*Umbellularia californica*	California bay	34	40	30	3	2	
491	*Umbellularia californica*	California bay	20	30	24	3	3	
492	*Umbellularia californica*	California bay	10	40	20	3	3	
493	*Umbellularia californica*	California bay	23	45	30	3	3	
494	*Sequoia sempervirens*	coast redwood	17	55	18	3	4	
495	*Umbellularia californica*	California bay	20	48	30	3	3	
496	*Umbellularia californica*	California bay	18	10	20	3	2	
497	*Umbellularia californica*	California bay	12.5+14+13+9	30	20	4-3	2	
498	*Quercus agrifolia*	coast live oak	24	30	22	3-2	2	
499	*Quercus agrifolia*	coast live oak	15	18	20	3	3	
500	*Pseudotsuga menziesii*	Douglas fir	15	40	20	3	3	
501	*Umbellularia californica*	California bay	10	38	20	4-3	4	
502	*Quercus agrifolia*	coast live oak	12.5	30	18	1	1	SOD infected, remove
503	*Umbellularia californica*	California bay	9+9	30	16	4	4	
504	*Quercus agrifolia*	coast live oak	14	30	19	1	1	structurally unstable, remove
505	*Pseudotsuga menziesii*	Douglas fir	8.5	28	12	4	3	
506	*Umbellularia californica*	California bay	6+5	18	15	3	4	
507	*Umbellularia californica*	California bay	11	28	15	3	4	
508	*Aesculus californica*	California buckeye	11	28	16	4	4	
509	*Sequoia sempervirens*	coast redwood	50+50	80	25	4	3	
510	*Sequoia sempervirens*	coast redwood	50	80	20	4-3	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
511	*Sequoia sempervirens*	coast redwood	24+18	60	14	3-2	3	
512	*Sequoia sempervirens*	coast redwood	50	80	26	3	3	
513	*Acer macrophyllum*	big leaf maple	12	30	20	4-3	3	
514	*Acer macrophyllum*	big leaf maple	11	20	14	3	3	
515	*Umbellularia californica*	California bay	30	35	20	3	1	structurally unstable, remove
516	*Umbellularia californica*	California bay	19+12+9	40	20	3	3	
517	*Umbellularia californica*	California bay	15	38	30	3	3	
518	*Aesculus californica*	California buckeye	8	16	16	3	3	
519	*Aesculus californica*	California buckeye	18+18	20	16	4	3-2	remove decayed trunk
520	*Umbellularia californica*	California bay	7	18	15	4	3	
521	*Acer macrophyllum*	big leaf maple	14	20	17	4	4	
522	*Aesculus californica*	California buckeye	11	14	12	4	4	
523	*Umbellularia californica*	California bay	13	35	16	4	2	
524	*Umbellularia californica*	California bay	15	35	18	4	3	
525	*Umbellularia californica*	California bay	24+9	35	18	3	1	SOD infected, remove
526	*Pseudotsuga menziesii*	Douglas fir	13	35	16	4	3	
527	*Quercus agrifolia*	coast live oak	7+5+5	16	15	4	4	
528	*Umbellularia californica*	California bay	16	30	18	4	2	
529	*Alnus rhombifolia*	white alder	20	45	35	4	3	
530	*Alnus rhombifolia*	white alder	20	40	16	2	3	
531	*Quercus agrifolia*	coast live oak	27	38	32	1	1	SOD infected, remove
532	*Quercus agrifolia*	coast live oak	20	20	14	1	2	structurally unstable, remove
533	*Pseudotsuga menziesii*	Douglas fir	7	20	15	4	3	
534	*Umbellularia californica*	California bay	13	20	20	4	2	
535	*Umbellularia californica*	California bay	25+25	45	32	3	2	
536	*Umbellularia californica*	California bay	26	45	25	4-3	2	
537	*Umbellularia californica*	California bay	20	20	18	4	1	
538	*Umbellularia californica*	California bay	19	35	20	4	2	
539	*Quercus agrifolia*	coast live oak	29	40	24	1	1	SOD infected, remove
540	*Pseudotsuga menziesii*	Douglas fir	14.5	35	20	4	4	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
541	*Umbellularia californica*	California bay	40	45	32	3	3	
542	*Pseudotsuga menziesii*	Douglas fir	17	40	20	4-3	3	
543	*Quercus agrifolia*	coast live oak	9	20	20	3	4	
544	*Umbellularia californica*	California bay	8+9	30	18	3	4	
545	*Pseudotsuga menziesii*	Douglas fir	11	25	16	3	4	
546	*Quercus agrifolia*	coast live oak	13	20	15	3	4	
547	*Quercus agrifolia*	coast live oak	8+4	20	14	4	4	
548	*Quercus agrifolia*	coast live oak	20	20	20	3	4	
549	*Umbellularia californica*	California bay	18	40	20	3	3	
550	*Umbellularia californica*	California bay	13	35	18	3	4	
551	*Quercus agrifolia*	coast live oak	30	40	30	2	2	SOD infected, remove
552	*Pseudotsuga menziesii*	Douglas fir	8	25	14	4	4	
553	*Pseudotsuga menziesii*	Douglas fir	28	60	24	4	3	
554	*Quercus agrifolia*	coast live oak	10+10	30	16	3	4	
555	*Quercus agrifolia*	coast live oak	12+10	30	15	1	1	SOD infected, remove
556	*Pseudotsuga menziesii*	Douglas fir	21	50	26	4-3	3	
557	*Quercus agrifolia*	coast live oak	34	40	30	3	3	
558	*Quercus agrifolia*	coast live oak	23	45	22	3	2	structurally unstable, remove
559	*Quercus agrifolia*	coast live oak	20+16	32				dead, remove
560	*Umbellularia californica*	California bay	31	45	30	3	3	
561	*Umbellularia californica*	California bay	6+4	25	14	4	4	
562	*Quercus agrifolia*	coast live oak	16+14	35	24	2	1	structurally unstable, remove
563	*Quercus agrifolia*	coast live oak	18	35				dead, remove
564	*Umbellularia californica*	California bay	24	40	30	3	3	
565	*Umbellularia californica*	California bay	54	45	26	3	3-2	
566	*Umbellularia californica*	California bay	34	45	30	4-3	3	
567	*Quercus agrifolia*	coast live oak	22	38	24	1	2	structurally unstable, remove
568	*Acer macrophyllum*	big leaf maple	17	35	26	4	4	
569	*Alnus rhombifolia*	white alder	21	40	18	3	3	
570	*Alnus rhombifolia*	white alder	17	45	20	3	3	

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
571	*Pseudotsuga menziesii*	Douglas fir	17	45	20	3	4	
572	*Alnus rhombifolia*	white alder	28	50	20	4-3	3	
573	*Alnus rhombifolia*	white alder	30	45	17	3	3	
574	*Alnus rhombifolia*	white alder	18	45	20	4	4	
575	*Quercus agrifolia*	coast live oak	11+6+8	15	12	3	4	
576	*Quercus agrifolia*	coast live oak	5+8	12	11	4-3	4	
577	*Quercus agrifolia*	coast live oak	8+9	15	12	3-2	4	
578	*Quercus agrifolia*	coast live oak	10+9	15	14	3	4	
579	*Umbellularia californica*	California bay	20+18+20+9	35	24	4	3	
580	*Quercus agrifolia*	coast live oak	24+20	35	20	2-1	2	SOD infected, remove
581	*Quercus agrifolia*	coast live oak	19	30	20	2-1	2	structurally unstable, remove
582	*Umbellularia californica*	California bay	10+9+9+8	20	18	4	4	
583	*Quercus agrifolia*	coast live oak	8	18	12	4	4	
584	*Quercus agrifolia*	coast live oak	11	18	12	4	4	
585	*Quercus agrifolia*	coast live oak	9+9+9+4+4	18	12	4	4	
586	*Quercus agrifolia*	coast live oak	9+6+4+6+6	18	13	2	3	
587	*Quercus agrifolia*	coast live oak	11+6	18	14	2	3	
588	*Quercus agrifolia*	coast live oak	18+12+16	30	15	2	3	
589	*Quercus agrifolia*	coast live oak	8+10+6+6+9	20	15	2	3	
590	*Quercus agrifolia*	coast live oak	6	18	12	3	4	
591	*Quercus agrifolia*	coast live oak	6+10	18	12	4-3	3	
592	*Quercus agrifolia*	coast live oak	19+10	35	20	2	3	
593	*Quercus agrifolia*	coast live oak	20+19	45	28	2	3	
594	*Aesculus californica*	California buckeye	6+8+3	20	15	4	4	
595	*Aesculus californica*	California buckeye	10+10+7+8	25	16	4	4	
596	*Quercus agrifolia*	coast live oak	40	45	24	2	3	
597	*Quercus agrifolia*	coast live oak	10+9	18	13	2	4	
598	*Quercus agrifolia*	coast live oak	6+9+8+6	15	14	2	4	
599	*Quercus agrifolia*	coast live oak	5+6+9	15	12	3	4	
600	*Quercus agrifolia*	coast live oak	10+9	18	12	3	4	

TREE INVENTORY

Sir Francis Drake Blvd., Marin County

(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
601	*Quercus agrifolia*	coast live oak	9+7+4	18	12	2	4	
602	*Pinus species*	pine	10	20	10	3	4	
603	*Quercus agrifolia*	coast live oak	10+8	25	15	2	4	
604	*Quercus agrifolia*	coast live oak	15+14	30	19	2	4	
605	*Quercus agrifolia*	coast live oak	26	30	20	3-2	3	
606	*Quercus agrifolia*	coast live oak	15	30	18	3-2	4	
607	*Quercus agrifolia*	coast live oak	11	30	18	3-2	4	
608	*Quercus agrifolia*	coast live oak	26	40	20	1	2	structurally unstable, remove
609	*Quercus agrifolia*	coast live oak	17	38	17	2	4	
610	*Quercus agrifolia*	coast live oak	7	18	16	2	4	
611	*Quercus agrifolia*	coast live oak	10+12	30	17	2	4	
612	*Quercus agrifolia*	coast live oak	10	30	15	3	4	
613	*Quercus agrifolia*	coast live oak	9+10+8+10+9	30	16	3-2	4	
614	*Quercus agrifolia*	coast live oak	17+10	28	16	3-2	4	
615	*Quercus agrifolia*	coast live oak	12.5	32	16	2	4	
616	*Quercus agrifolia*	coast live oak	13+13	35	18	2	4	
617	*Quercus agrifolia*	coast live oak	12	28	15	2	4	
618	*Quercus agrifolia*	coast live oak	24+19	35	19	2	4	
619	*Quercus agrifolia*	coast live oak	8	28	14	2	4	
620	*Quercus agrifolia*	coast live oak	12+27	35	20	2	3	
621	*Quercus agrifolia*	coast live oak	10+12+9	30	18	3	4	
622	*Quercus agrifolia*	coast live oak	6+8+8+5	28	14	3	4	
623	*Quercus agrifolia*	coast live oak	9	18	11	3	4	
624	*Quercus agrifolia*	coast live oak	9+10	20	15	3	4	
625	*Quercus agrifolia*	coast live oak	9+8+13	35	17	3	4	
626	*Quercus agrifolia*	coast live oak	18+13+10	30	19	3	3	
627	*Quercus agrifolia*	coast live oak	10+9+7	20	14	3	2	
628	*Quercus agrifolia*	coast live oak	10+10+11+16	18	14	3-2	4	
629	*Quercus agrifolia*	coast live oak	14	18	14	3-2	4	
630	*Quercus agrifolia*	coast live oak	14+12+12+16	18	13	2	4	

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
631	*Quercus agrifolia*	coast live oak	6+7+5+6	18	12	3-2	4	
632	*Quercus agrifolia*	coast live oak	14+8+8	20	16	3-2	4	
633	*Quercus agrifolia*	coast live oak	10+6+11	20	16	3-2	4	
634	*Quercus agrifolia*	coast live oak	7	16	11	3	3	
635	*Quercus agrifolia*	coast live oak	8+9	22	14	3	4	
636	*Quercus agrifolia*	coast live oak	13	25	14	3	4	
637	*Quercus agrifolia*	coast live oak	10+12	18	12	3	4	
638	*Quercus agrifolia*	coast live oak	15+10	20	14	3-2	4	
639	*Quercus agrifolia*	coast live oak	8	16	13	4	4	
640	*Quercus agrifolia*	coast live oak	6+9+8+9+7+10	18	12	4-3	4	
641	*Quercus agrifolia*	coast live oak	15	25	18	3-2	4	
642	*Quercus agrifolia*	coast live oak	14+13	25	19	3	4	
643	*Quercus agrifolia*	coast live oak	6+7	18	12	3	4	
644	*Quercus agrifolia*	coast live oak	11	18	12	3	4	
645	*Quercus agrifolia*	coast live oak	6+7	15	12	3-2	4	
646	*Quercus agrifolia*	coast live oak	7+7+8	15	12	3	4	
647	*Quercus agrifolia*	coast live oak	15+14	20	15	3-2	4	
648	*Quercus agrifolia*	coast live oak	14.5	25	16	4	3	
649	*Quercus agrifolia*	coast live oak	7+7+6	15	14	4	3	
650	*Quercus agrifolia*	coast live oak	4+7	15	12	4-3	4	
651	*Umbellularia californica*	California bay	8	18	12	4	4	
652	*Quercus agrifolia*	coast live oak	22	38	22	4	3-2	
653	*Aesculus californica*	California buckeye	6+9+7	18	14	4	4	
654	*Robinia pseudoacacia*	black locust	12+10+6+9	25	12	2	2	
655	*Quercus agrifolia*	coast live oak	24	45	24	4-3	3	
656	*Salix species*	willow	20	35	20	3	4	
657	*Fraxinus latifolia*	Oregon ash	24+10+15	48	32	4-3	3	
658	*Aesculus californica*	California buckeye	11+12	28	16	4	3	
659	*Umbellularia californica*	California bay	24+16+22+20+19+19+10	48	30	4	3-2	
660	*Umbellularia californica*	California bay	7	18	14	4	4	

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
661	*Alnus rhombifolia*	white alder	29	45	20	4-3	3	
662	*Aesculus californica*	California buckeye	30+6	45	20	3-2	3	
663	*Quercus agrifolia*	coast live oak	36	45	30	2	3	
664	*Salix species*	willow	7	15	12	4	4	
665	*Quercus agrifolia*	coast live oak	7.5+10	25	16	4-3	4	
666	*Quercus agrifolia*	coast live oak	9.5	25	16	4-3	4	
667	*Quercus agrifolia*	coast live oak	6.5	20	12	4-3	4	
668	*Quercus agrifolia*	coast live oak	9.5+7	25	14	4-3	4	
669	*Salix species*	willow	6+8	20	14	4	4	
670	*Salix species*	willow	6.5	20	14	4	4	
671	*Quercus agrifolia*	coast live oak	8	18	11	4-3	4	
672	*Quercus agrifolia*	coast live oak	7	20	12	4-3	4	
673	*Quercus agrifolia*	coast live oak	8	18	13	4-3	4	
674	*Quercus agrifolia*	coast live oak	13+16+24	48	35	3	3	
675	*Umbellularia californica*	California bay	14+14+11+11	38	24	3	3	
676	*Umbellularia californica*	California bay	19+22+9+10	38	22	3	3	
677	*Salix species*	willow	10	30	16	3	2	
678	*Salix species*	willow	12	25	20	4-3	3	
679	*Salix species*	willow	10+7+8	30	16	4	3	
680	*Umbellularia californica*	California bay	18	30	18	2	3	
681	*Salix species*	willow	11+10	25	17	2	3	
682	*Aesculus californica*	California buckeye	9+10+6+10	20	20	4-3	3	
683	*Umbellularia californica*	California bay	10	20	14	4	4	
684	*Umbellularia californica*	California bay	20+16+19+14	38	26	3	3	
685	*Quercus agrifolia*	coast live oak	31	38	20	1	1	structurally unstable, remove
686	*Umbellularia californica*	California bay	11+13+12	38	20	3	4	
687	*Umbellularia californica*	California bay	7.5	20	8	3-2	4	
688	*Umbellularia californica*	California bay	6+6+16+11	30	16	3-2	4	
689	*Alnus rhombifolia*	white alder	18+18+18	40	30	4-3	3-2	remove decayed trunk over road
690	*Quercus agrifolia*	coast live oak	30	40	22	2	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±'')	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
691	*Umbellularia californica*	California bay	14+10+10+6	25	20	3	3	
692	*Umbellularia californica*	California bay	6+7+7	18	18	2	3	
693	*Umbellularia californica*	California bay	20+20	40	20	3	3	
694	*Umbellularia californica*	California bay	20+17+18+17+7+15+19	45	22	3	3	
695	*Quercus agrifolia*	coast live oak	38+34	40	25	2	2	
696	*Quercus agrifolia*	coast live oak	27	40	30	3-2	3	
697	*Umbellularia californica*	California bay	16+20+14+10+16	40	26	3	3	
698	*Quercus agrifolia*	coast live oak	17	28	20	2	3	
699	*Quercus agrifolia*	coast live oak	17	28	16	2	3	
700	*Umbellularia californica*	California bay	9	20	15	4	3	
701	*Quercus agrifolia*	coast live oak	40	40	28	3-2	3	
702	*Quercus agrifolia*	coast live oak	18+16	30	18	3-2	3	
703	*Quercus agrifolia*	coast live oak	12	28	14	2	3	
704	*Quercus agrifolia*	coast live oak	18	35	19	3-2	3	
705	*Quercus agrifolia*	coast live oak	11	17	12	3-2	3	
706	*Quercus agrifolia*	coast live oak	11+11	20	14	3-2	3	
707	*Quercus agrifolia*	coast live oak	16+13+10	30	18	3	3	
708	*Quercus agrifolia*	coast live oak	17	32	17	3	3	
709	*Quercus agrifolia*	coast live oak	6.5	16	12	4-3	4	
710	*Quercus agrifolia*	coast live oak	15	30	16	3	3	
711	*Umbellularia californica*	California bay	8	22	13	4-3	4	
712	*Umbellularia californica*	California bay	19+11+12	35	19	4-3	3	
713	*Eucalyptus globulus*	blue gum	8.5+9+4+17	42	14	3	4	
714	*Eucalyptus globulus*	blue gum	10+7+9+9+10	45	18	4-3	3	
715	*Calocedrus decurrens*	incense cedar	17	40	16	4-3	3	
716	*Calocedrus decurrens*	incense cedar	17	40	16	4-3	3	
717	*Calocedrus decurrens*	incense cedar	20	40	16	4-3	3	
718	*Calocedrus decurrens*	incense cedar	17	25	15	4-3	3	
719	*Platanus acerifolia*	London plane tree	18	35	18	3	3	
720	*Platanus acerifolia*	London plane tree	18	35	18	3	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
721	*Calocedrus decurrens*	incense cedar	16	28	12	3	3	
722	*Calocedrus decurrens*	incense cedar	13	30	14	3	3	
723	*Calocedrus decurrens*	incense cedar	8	30	12	3	4	
724	*Calocedrus decurrens*	incense cedar	22	38	14	3	3	
725	*Platanus acerifolia*	London plane tree	28	38	24	3	3	
726	*Quercus agrifolia*	coast live oak	9	18	12	4	4	
727	*Pinus radiata*	Monterey pine	48	50	30	3	3	
728	*Pinus radiata*	Monterey pine	45	60	30	2	3	
729	*Cedrus atlantica*	Atlas cedar	10+10+10	28	20	3	4	
730	*Cedrus deodara*	Deodar cedar	14	28	15	3	3	
731	*Cupressus macrocarpa*	Monterey cypress	40	45	22	4-3	3	
732	*Cupressus macrocarpa*	Monterey cypress	9+20	38	20	4-3	3	
733	*Cupressus macrocarpa*	Monterey cypress	8.5	20	12	4-3	4	
734	*Cupressus macrocarpa*	Monterey cypress	6+4+3	20	12	4-3	4	
735	*Cupressus macrocarpa*	Monterey cypress	8+6	20	12	4-3	4	
736	*Cupressus macrocarpa*	Monterey cypress	7	20	12	4-3	4	
737	*Cupressus macrocarpa*	Monterey cypress	34	45	24	4-3	3	
738	*Salix species*	willow	14+9+10+7+7	15	16	2	2	
739	*Quercus agrifolia*	coast live oak	10	20	15	3	4	
740	*Quercus agrifolia*	coast live oak	11	20	16	3	4	
741	*Quercus agrifolia*	coast live oak	19	25	20	3	4	
742	*Quercus agrifolia*	coast live oak	6+3	18	13	4	4	
743	*Quercus agrifolia*	coast live oak	9+12+11+7	20	15	4-3	3	
744	*Pinus species*	pine	12+12	32	14	3	3	
745	*Quercus agrifolia*	coast live oak	11	14	14	3	3	
746	*Quercus agrifolia*	coast live oak	10+6+7+10	20	16	3	3	
747	*Quercus agrifolia*	coast live oak	14+25+22+15	30	20	3	3	
748	*Cupressus macrocarpa*	Monterey cypress	37	38	32	4	3	
749	*Quercus agrifolia*	coast live oak	10	17	12	3	3	
750	*Cupressus macrocarpa*	Monterey cypress	28	30	20	3	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
751	*Cupressus macrocarpa*	Monterey cypress	17	28	16	2	2	
752	*Cupressus macrocarpa*	Monterey cypress	9	20	8	2	2	
753	*Cupressus macrocarpa*	Monterey cypress	26	30	20	4	3	
754	*Sequoia sempervirens*	coast redwood	36	40	20	4	3	
755	*Cupressus macrocarpa*	Monterey cypress	14	20	16	3	3	
756	*Cupressus macrocarpa*	Monterey cypress	29.5	20	32	3	3	
757	*Cupressus macrocarpa*	Monterey cypress	21	30	20	4	3	
758	*Cupressus macrocarpa*	Monterey cypress	24	38	28	4	3	
759	*Cupressus macrocarpa*	Monterey cypress	18	25	20	4-3	3	
760	*Cupressus macrocarpa*	Monterey cypress	22	35	20	3	3	
761	*Cupressus macrocarpa*	Monterey cypress	24	30	20	3	3	
762	*Acer macrophyllum*	big leaf maple	20+14+16+16	20	15	3	2	
763	*Umbellularia californica*	California bay	50	60	32	4	3	
764	*Umbellularia californica*	California bay	14	33	24	4	4	
765	*Umbellularia californica*	California bay	19+8+8+10	30	15	4	2	
766	*Quercus agrifolia*	coast live oak	14	30	20	4-3	3	
767	*Umbellularia californica*	California bay	14+12+9+20	30	16	4	2	
768	*Acer macrophyllum*	big leaf maple	9+9	18	14	3	2	
769	*Salix species*	willow	6	15	13	3	3	
770	*Salix species*	willow	10	28	15	3	3	
771	*Umbellularia californica*	California bay	10+12+10	35	20	4	3	
772	*Umbellularia californica*	California bay	7	20	12	4	4	
773	*Umbellularia californica*	California bay	24+24	30	14	3	3	
774	*Umbellularia californica*	California bay	14+12+10+10	30	18	3	3	
775	*Umbellularia californica*	California bay	20+18+18	40	20	3	3	
776	*Acer macrophyllum*	big leaf maple	9+14	30	18	3	2	
777	*Salix species*	willow	9+10	18	15	3	3	
778	*Quercus agrifolia*	coast live oak	38	45	28	3	3	
779	*Acer macrophyllum*	big leaf maple	9	20	12	2	2	
780	*Umbellularia californica*	California bay	9+9	18	18	3	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
781	*Quercus agrifolia*	coast live oak	20+13	30	20	4-3	3	
782	*Umbellularia californica*	California bay	14+14	30	14	4	3	
783	*Umbellularia californica*	California bay	27+9+11	20	12	4	4	
784	*Umbellularia californica*	California bay	13	20	14	4	4	
785	*Umbellularia californica*	California bay	9	18	8	1	1	structurally unstable, remove
786	*Umbellularia californica*	California bay	16+12	20	12	4	4	
787	*Umbellularia californica*	California bay	13+15	18	14	4	4	
788	*Aesculus californica*	California buckeye	8+9	20	11	4	4	
789	*Umbellularia californica*	California bay	14+8+9+19	20	12	2	2	
790	*Umbellularia californica*	California bay	9+4+4	20	13	4-3	4	
791	*Umbellularia californica*	California bay	28+28+28+10+9	30	20	4	3-2	
792	*Umbellularia californica*	California bay	16+6	20	18	3	3	
793	*Umbellularia californica*	California bay	9	32	12	4	4	
794	*Aesculus californica*	California buckeye	12+10+8+9+12	32	18	3	3	
795	*Umbellularia californica*	California bay	14	35	20	4	3	
796	*Umbellularia californica*	California bay	28+14+20	38	20	3	3-2	
797	*Umbellularia californica*	California bay	20	20	18	3	3	
798	*Aesculus californica*	California buckeye	8+7+8+8	20	18	3	3	
799	*Aesculus californica*	California buckeye	10	15	18	3	3	
800	*Umbellularia californica*	California bay	10	30	20	3	3	
801	*Quercus agrifolia*	coast live oak	24+24+21	40	20	3-2	3	
802	*Aesculus californica*	California buckeye	8	30	19	3	2	
803	*Umbellularia californica*	California bay	6.5+6+6	30	14	4-3	4	
804	*Umbellularia californica*	California bay	8	20	8	4	4	
805	*Umbellularia californica*	California bay	13	20	12	4-3	3	
806	*Aesculus californica*	California buckeye	8.5+8	18	14	3	3	
807	*Quercus agrifolia*	coast live oak	34	40	26	2	2	
808	*Umbellularia californica*	California bay	28	30	20	3-2	3	
809	*Aesculus californica*	California buckeye	9.5	15	5	2	2	
810	*Umbellularia californica*	California bay	40	45	20	3-2	1	structurally unstable, remove

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
811	*Umbellularia californica*	California bay	11.5	30	16	4-3	4	
812	*Umbellularia californica*	California bay	10+9	28	19	4-3	3	
813	*Quercus agrifolia*	coast live oak	13	38	18	3	3	
814	*Quercus agrifolia*	coast live oak	15+13+12+11+12	35	18	4-3	3	
815	*Umbellularia californica*	California bay	11	30	16	4-3	4	
816	*Umbellularia californica*	California bay	45	50	30	4-3	3	
817	*Umbellularia californica*	California bay	14.5+15+16	35	18	4	2	
818	*Umbellularia californica*	California bay	6+11.5+7	28	22	4	2	
819	*Aesculus californica*	California buckeye	11.5+11	20	18	3	3	
820	*Salix species*	willow	20+9	20	20	3	2	
821	*Umbellularia californica*	California bay	17+20	45	24	4-3	3	
822	*Alnus rhombifolia*	white alder	27	45	30	3	3	
823	*Umbellularia californica*	California bay	16+9	24	17	4	3	
824	*Umbellularia californica*	California bay	23	38	18	4	3	
825	*Aesculus californica*	California buckeye	15+12+6+8	30	16	4-3	3	
826	*Umbellularia californica*	California bay	16+12	30	16	4-3	3	
827	*Umbellularia californica*	California bay	16	30	17	4-3	3	
828	*Quercus agrifolia*	coast live oak	16+9+9	30	18	3-2	3	
829	*Umbellularia californica*	California bay	9.5	28	14	4-3	3	
830	*Umbellularia californica*	California bay	17+12	35	18	3	3	
831	*Quercus agrifolia*	coast live oak	18	32	15	2	3	
832	*Quercus agrifolia*	coast live oak	20	28	16	1	1	structurally unstable, remove
833	*Umbellularia californica*	California bay	10.5+6	20	12	4-3	4	
834	*Umbellularia californica*	California bay	8+3	20	12	4-3	4	
835	*Umbellularia californica*	California bay	11+10+9	25	14	4-3	3	
836	*Umbellularia californica*	California bay	17	32	16	3	3	
837	*Umbellularia californica*	California bay	15+15	35	19	3-2	3	
838	*Umbellularia californica*	California bay	7	30	12	4-3	4	
839	*Umbellularia californica*	California bay	10	20	13	4-3	4	
840	*Umbellularia californica*	California bay	13	28	15	4-3	3	

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
841	*Umbellularia californica*	California bay	10+6	28	14	4-3	4	
842	*Aesculus californica*	California buckeye	6+6+8+4	20	14	4-3	3	
843	*Umbellularia californica*	California bay	9+4+6+5	20	14	4	4	
844	*Umbellularia californica*	California bay	7+7+5+5	20	13	4-3	4	
845	*Umbellularia californica*	California bay	12+9+4	20	13	3	4	
846	*Umbellularia californica*	California bay	9+4	18	12	3	4	
847	*Pseudotsuga menziesii*	Douglas fir	43	80	30	3-2	3	
848	*Prunus species*	plum	14+10	25	16	4-3	3	
849	*Prunus species*	plum	8+9+4	20	14	4-3	3	
850	*Umbellularia californica*	California bay	12	20	13	3	4	
851	*Prunus species*	plum	8+6	20	13	4	3	
852	*Prunus species*	plum	6+7+3+8	20	13	4-3	3	
853	*Aesculus californica*	California buckeye	10.5	20	14	4	4	
854	*Salix species*	willow	8+4	15	14	3-2	2	
855	*Aesculus californica*	California buckeye	11+6+8+5	20	16	4-3	3	
856	*Umbellularia californica*	California bay	9+10+16+15+16+8+11+9	30	20	3	3	
857	*Aesculus californica*	California buckeye	10	20	20	3	3	
858	*Aesculus californica*	California buckeye	6+7+8+6+9+6	18	20	4-3	3	
859	*Aesculus californica*	California buckeye	9+6+6+6+8+5+6	20	16	4-3	3	
860	*Alnus rhombifolia*	white alder	10	30	30	3	3	
861	*Aesculus californica*	California buckeye	8+6+9	18	16	3	3	
862	*Quercus agrifolia*	coast live oak	11	20	16	2	3	
863	*Quercus agrifolia*	coast live oak	6.5	18	12	2	4	
864	*Quercus agrifolia*	coast live oak	16	28	16	2	4	
865	*Quercus agrifolia*	coast live oak	10+10+9.5	30	16	2	3	
866	*Quercus agrifolia*	coast live oak	9+8+9	20	14	2	3	
867	*Quercus agrifolia*	coast live oak	8.5	20	14	2	3	
868	*Quercus agrifolia*	coast live oak	11.5+11	25	16	2	3	
869	*Umbellularia californica*	California bay	7	30	13	4-3	4	
870	*Umbellularia californica*	California bay	9+8	30	14	4	4	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
871	*Umbellularia californica*	California bay	10+8	30	14	4	4	
872	*Umbellularia californica*	California bay	13+10+9+8+7	35	20	4-3	3-2	
873	*Umbellularia californica*	California bay	16+14+10	35	20	4-3	3	
874	*Acer macrophyllum*	big leaf maple	9+8	30	14	3	4	
875	*Quercus agrifolia*	coast live oak	17+10	40	18	3-2	3	
876	*Acer macrophyllum*	big leaf maple	10+5.5	30	16	4	2	
877	*Pseudotsuga menziesii*	Douglas fir	45	70	35	4	2	
878	*Umbellularia californica*	California bay	16	40	20	4	3	
879	*Umbellularia californica*	California bay	45	50	40	3	2	
880	*Acer macrophyllum*	big leaf maple	26	45	35	4-3	3	
881	*Acer macrophyllum*	big leaf maple	13	30	14	3	2	
882	*Acer macrophyllum*	big leaf maple	13.5+14	35	17	3-2	2	
883	*Acer macrophyllum*	big leaf maple	17	35	20	3-2	2	
884	*Pseudotsuga menziesii*	Douglas fir	37	50				dead, remove
885	*Acer macrophyllum*	big leaf maple	13	35	19	3-2	3	
886	*Acer macrophyllum*	big leaf maple	16+15	45	20	3	3	
887	*Umbellularia californica*	California bay	40	45	24	4	3	
888	*Umbellularia californica*	California bay	10+11	35	20	4-3	3	
889	*Acer macrophyllum*	big leaf maple	10+11+11+9+10+7	35	18	3	3	
890	*Sequoia sempervirens*	coast redwood	32+32	80	20	4	3	
891	*Sequoia sempervirens*	coast redwood	26	65	18	4	3	
892	*Umbellularia californica*	California bay	16+12+8	35	20	4-3	4	
893	*Sequoia sempervirens*	coast redwood	27	70	18	4	3	
894	*Sequoia sempervirens*	coast redwood	26	70	18	4	3	
895	*Umbellularia californica*	California bay	18+14	45	20	4	3	
896	*Umbellularia californica*	California bay	18+26	45	32	4	3	
897	*Sequoia sempervirens*	coast redwood	60	65	25	3-2	2	
898	*Umbellularia californica*	California bay	12+7.5	20	14	4-3	3	
899	*Acer macrophyllum*	big leaf maple	12.5	30	18	3	3	
900	*Umbellularia californica*	California bay	13+6	30	18	4	3	

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
901	*Arbutus menziesii*	madrone	12	25	14	4	4	
902	*Umbellularia californica*	California bay	14+10+13+8	35	18	4-3	3	
903	*Acer macrophyllum*	big leaf maple	10+7.5	25	14	4-3	4	
904	*Acer macrophyllum*	big leaf maple	10.5	28	14	4-3	4	
905	*Acer macrophyllum*	big leaf maple	9.5	20	12	4-3	4	
906	*Acer macrophyllum*	big leaf maple	8+7	25	12	3	3	
907	*Acer macrophyllum*	big leaf maple	11.5	25	14	4-3	3	
908	*Acer macrophyllum*	big leaf maple	11	30	14	3	3	
909	*Acer macrophyllum*	big leaf maple	8+8+7+4+6	30	12	2	3	
910	*Umbellularia californica*	California bay	11+15	35	16	4-3	3-2	
911	*Acer macrophyllum*	big leaf maple	11	30	14	3-2	4	
912	*Umbellularia californica*	California bay	34	35	14	3	2	
913	*Acer macrophyllum*	big leaf maple	10.5+9	20	14	2-1	2	
914	*Sequoia sempervirens*	coast redwood	10.5+32.5+32	70	19	4-3	3	
915	*Umbellularia californica*	California bay	11+9.5+9	40	18	4	3	
916	*Umbellularia californica*	California bay	9	35	16	4-3	4	
917	*Umbellularia californica*	California bay	14.5	28	14	2	2	
918	*Sequoia sempervirens*	coast redwood	21+6	40	14	4-3	4	
919	*Umbellularia californica*	California bay	8	20	12	2	4	
920	*Sequoia sempervirens*	coast redwood	14	30	14	3	3	
921	*Sequoia sempervirens*	coast redwood	38.5+14+9	65	20	4	3	
922	*Umbellularia californica*	California bay	10+9	20	14	3	3	
923	*Acer macrophyllum*	big leaf maple	13.5+11	35	22	4	3	
924	*Acer macrophyllum*	big leaf maple	13+19	30	20	4-3	3	
925	*Umbellularia californica*	California bay	10+10.5+16+8.5+6	35	20	3	3	
926	*Umbellularia californica*	California bay	10.5+14+9	30	19	4	3	
927	*Umbellularia californica*	California bay	5+14+17.5+19	35	20	4	3	
928	*Umbellularia californica*	California bay	15+15	38	35	4	3	
929	*Acer macrophyllum*	big leaf maple	16	40	18	4-3	3	
930	*Umbellularia californica*	California bay	10	28	18	3	2	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
931	*Umbellularia californica*	California bay	12+10.5	30	17	4-3	3	
932	*Acer macrophyllum*	big leaf maple	18.5	40	20	4	4	
933	*Acer macrophyllum*	big leaf maple	7.5	28	13	1	2	structurally unstable, remove
934	*Umbellularia californica*	California bay	16.5+14+12	40	20	4	3	
935	*Acer macrophyllum*	big leaf maple	9.5	30	16	1	2	structurally unstable, remove
936	*Umbellularia californica*	California bay	35+15+26.5	45	26	4	3	
937	*Acer macrophyllum*	big leaf maple	8.5+16.5	30	14	1	1	structurally unstable, remove
938	*Acer macrophyllum*	big leaf maple	13	30	14	3	3	
939	*Umbellularia californica*	California bay	7.5+15	20	16	4	3	
940	*Umbellularia californica*	California bay	10+14.5	35	18	4	3	
941	*Umbellularia californica*	California bay	8.5+14+12.5+12.5	35	18	4	3	
942	*Umbellularia californica*	California bay	15	30	20	3	3	
943	*Acer macrophyllum*	big leaf maple	10	12	8	1	1	structurally unstable, remove
944	*Umbellularia californica*	California bay	25.5	45	30	4	3	
945	*Acer macrophyllum*	big leaf maple	9+9.5+9+10.5	15	14	2	2	
946	*Umbellularia californica*	California bay	14.5	30	20	4-3	3	
947	*Umbellularia californica*	California bay	11+5	30	14	3-2	2	
948	*Umbellularia californica*	California bay	11.5+14.5+20	35	18	4-3	3	
949	*Aesculus californica*	California buckeye	11.5+12	30	16	3	3	
950	*Aesculus californica*	California buckeye	14	28	18	3	3	
951	*Umbellularia californica*	California bay	37.5	45	30	3	3-2	
952	*Umbellularia californica*	California bay	11.5+31+15.5	45	30	3	3-2	
953	*Aesculus californica*	California buckeye	10+10+9+8+9	30	20	3-2	3-2	
954	*Umbellularia californica*	California bay	15+22	35	30	4-3	3	
955	*Pseudotsuga menziesii*	Douglas fir	8	20	14	3	4	
956	*Pseudotsuga menziesii*	Douglas fir	16+12	35	14	3	3	
957	*Umbellularia californica*	California bay	11	30	18	3	3	
958	*Acer macrophyllum*	big leaf maple	8.5+13+13	30	19	3	3	
959	*Umbellularia californica*	California bay	8.5	25	15	3	4	
960	*Umbellularia californica*	California bay	16.5+14	35	28	4	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
961	*Alnus rhombifolia*	white alder	10+6+3+4	20	14	3-2	2	
962	*Alnus rhombifolia*	white alder	17.5	30	20	4-3	3	
963	*Umbellularia californica*	California bay	12+11.5+11.5	30	18	4	3	
964	*Acer macrophyllum*	big leaf maple	14+12.5+13.5	32	20	4	3	
965	*Acer macrophyllum*	big leaf maple	9+11	30	17	3	3	
966	*Acer macrophyllum*	big leaf maple	9	28	15	4-3	4	
967	*Acer macrophyllum*	big leaf maple	10.5+13	30	17	3	3	
968	*Aesculus californica*	California buckeye	11+8	20	14	3	3	
969	*Umbellularia californica*	California bay	25.5	30	20	3	3	
970	*Umbellularia californica*	California bay	33.5	38	26	3	2	
971	*Aesculus californica*	California buckeye	10	20	15	3	4	
972	*Aesculus californica*	California buckeye	13	20	14	3	3	
973	*Aesculus californica*	California buckeye	12	18	12	3	4	
974	*Aesculus californica*	California buckeye	10.5	18	13	3	4	
975	*Umbellularia californica*	California bay	24+16	40	26	4-3	3	
976	*Aesculus californica*	California buckeye	9	20	14	4	3	
977	*Quercus agrifolia*	coast live oak	25+22	45	28	3-2	3	
978	*Umbellularia californica*	California bay	17+19+18.5	45	28	4-3	3	
979	*Umbellularia californica*	California bay	11	30	18	4	3	
980	*Acer macrophyllum*	big leaf maple	19.5+24	45	32	3-2	3	
981	*Quercus agrifolia*	coast live oak	18.5+24.5	40	26	3-2	3	
982	*Pseudotsuga menziesii*	Douglas fir	46	75	30	3	3	
983	*Umbellularia californica*	California bay	19+28+12.5	45	30	4	3	
984	*Pseudotsuga menziesii*	Douglas fir	9.5	30	16	3	3	
985	*Umbellularia californica*	California bay	24.5	45	20	3	2	
986	*Umbellularia californica*	California bay	17	30	18	3	4	
987	*Aesculus californica*	California buckeye	7.5	20	14	3	4	
988	*Aesculus californica*	California buckeye	7.5+7	25	16	3	4	
989	*Quercus agrifolia*	coast live oak	14	30	24	1	2	structurally unstable, remove
990	*Aesculus californica*	California buckeye	7+10	20	15	3	3	

TREE INVENTORY

Sir Francis Drake Blvd., Marin County

(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
991	*Aesculus californica*	California buckeye	14+11	25	24	3	3	
992	*Aesculus californica*	California buckeye	10.5	18	24	3	3	
993	*Umbellularia californica*	California bay	59	45	30	3	3	
994	*Umbellularia californica*	California bay	33+15	40	30	4-3	3	
995	*Umbellularia californica*	California bay	54.5+7	45	28	3	2	
996	*Pseudotsuga menziesii*	Douglas fir	9	30	15	3	4	
997	*Umbellularia californica*	California bay	25	45	20	3	3	
998	*Umbellularia californica*	California bay	13.5+32.5	45	28	4-3	3	
999	*Pseudotsuga menziesii*	Douglas fir	15.5	45	16	3	3	
1000	*Umbellularia californica*	California bay	25	40	20	3	3	
1001	*Umbellularia californica*	California bay	25+8+8+6	40	24	3	3	
1002	*Umbellularia californica*	California bay	26+9+14.5	40	20	3-2	2	
1003	*Umbellularia californica*	California bay	10+10	40	16	3	3	
1004	*Umbellularia californica*	California bay	8.5	30	20	4-3	3	
1005	*Umbellularia californica*	California bay	13.5+10	30	18	3	3	
1006	*Umbellularia californica*	California bay	19	30	18	4-3	3	
1007	*Umbellularia californica*	California bay	34+10+16	45	24	4-3	2	
1008	*Quercus agrifolia*	coast live oak	32	40	26	3	3	
1009	*Umbellularia californica*	California bay	12	30	16	3	4	
1010	*Alnus rhombifolia*	white alder	34	35	17	2	2	
1011	*Aesculus californica*	California buckeye	12	25	16	3	3	
1012	*Aesculus californica*	California buckeye	15	25	15	3	3	
1013	*Sequoia sempervirens*	coast redwood	79	80	26	4	3	
1014	*Fraxinus latifolia*	Oregon ash	8	20	18	3-2	3	
1015	*Aesculus californica*	California buckeye	7	18	13	4-3	3	
1016	*Aesculus californica*	California buckeye	8+7	18	14	4-3	3	
1017	*Umbellularia californica*	California bay	44+6	50	22	2	1	structurally unstable, remove
1018	*Umbellularia californica*	California bay	15	20	18	3	3	
1019	*Aesculus californica*	California buckeye	9.5+9+8+6+4	25	19	4	3	
1020	*Alnus rhombifolia*	white alder	13+19	40	20	3	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
1021	*Aesculus californica*	California buckeye	9	20	12	3	3	
1022	*Aesculus californica*	California buckeye	6+5.5	15	11	2	3	
1023	*Aesculus californica*	California buckeye	10+7.5+11	20	14	3	3	
1024	*Salix species*	willow	8.5	20	18	4-3	3	
1025	*Umbellularia californica*	California bay	31+27.5	45	26	3-2	1	structurally unstable, remove
1026	*Aesculus californica*	California buckeye	8.5+8.5	20	15	2	2	
1027	*Quercus agrifolia*	coast live oak	7	14	12	2	3	
1028	*Aesculus californica*	California buckeye	13+5+9+6	20	15	3	3	
1029	*Umbellularia californica*	California bay	21.5	40	20	4	3	
1030	*Aesculus californica*	California buckeye	9+8+8	30	18	3	3	
1031	*Aesculus californica*	California buckeye	10	20	12	3	3	
1032	*Aesculus californica*	California buckeye	6+14+15	30	22	3	3	
1033	*Umbellularia californica*	California bay	18+15	40	22	3	3	
1034	*Aesculus californica*	California buckeye	9	20	15	3	3	
1035	*Acer macrophyllum*	big leaf maple	10+11+10	35	16	2	2	
1036	*Alnus rhombifolia*	white alder	14	35	18	4-3	3	
1037	*Acer macrophyllum*	big leaf maple	9+7	25	15	4-3	3	
1038	*Fraxinus latifolia*	Oregon ash	27	38	20	3	2	
1039	*Fraxinus latifolia*	Oregon ash	7	20	13	3	3	
1040	*Umbellularia californica*	California bay	6	15	12	4	4	
1041	*Quercus agrifolia*	coast live oak	6.5	12	11	4-3	3	
1042	*Acer macrophyllum*	big leaf maple	6.5	20	14	4-3	4	
1043	*Aesculus californica*	California buckeye	9+6.5	25	17	3	4	
1044	*Umbellularia californica*	California bay	40+28	48	26	4-3	2	
1045	*Umbellularia californica*	California bay	21	38	34	4-3	3-2	
1046	*Umbellularia californica*	California bay	20+20	40	26	4-3	3	
1047	*Aesculus californica*	California buckeye	8.5+7+10.5+7+10	30	17	3	3	
1048	*Quercus agrifolia*	coast live oak	12+15.5+9	25	20	3	3	
1049	*Aesculus californica*	California buckeye	6.5+5+7	20	12	4-3	3	
1050	*Umbellularia californica*	California bay	5+7.5	15	13	4	3	SOD infected, remove

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	**Species**	**Common Name**	**Trunk (diameter ±")**	**Height (±')**	**Dripline (radius ±')**	**Health 1 - 5**	**Structure 1 - 4**	**Recommendations**
1051	*Aesculus californica*	California buckeye	8+6+6+5+4+6	20	18	4	4	SOD infected, remove
1052	*Quercus agrifolia*	coast live oak	11.5+9.5	18	14	4-3	3	
1053	*Aesculus californica*	California buckeye	9.5+8+4+4	12	12	4	3	
1054	*Quercus agrifolia*	coast live oak	13	17	12	3	3	
1055	*Aesculus californica*	California buckeye	7	14	11	3	3	
1056	*Aesculus californica*	California buckeye	11	15	12	4-3	3	
1057	*Quercus agrifolia*	coast live oak	20	28	16	4-3	3	
1058	*Quercus agrifolia*	coast live oak	8+6+6	15	10	1	2	structurally unstable, remove
1059	*Umbellularia californica*	California bay	7.5+8	20	12	4-3	4	
1060	*Umbellularia californica*	California bay	6.5+4	15	10	4-3	4	
1061	*Quercus agrifolia*	coast live oak	11.5	18	12	4	4	
1062	*Quercus agrifolia*	coast live oak	6.5+5.5+4	14	10	4	4	
1063	*Umbellularia californica*	California bay	7	15	11	4-3	4	
1064	*Prunus species*	plum	5+9.5+12	18	16	4	3	
1065	*Quercus agrifolia*	coast live oak	6.5	15	10	3	3	
1066	*Quercus agrifolia*	coast live oak	13.5+6.5	20	15	1	2	structurally unstable, remove
1067	*Quercus agrifolia*	coast live oak	27	40	31	2	3	
1068	*Quercus agrifolia*	coast live oak	28.5+12.5	38	26	3-2	3	
1069	*Umbellularia californica*	California bay	8	22	12	4	4	
1070	*Umbellularia californica*	California bay	7+7.5+3+3	25	15	4	3	
1071	*Umbellularia californica*	California bay	14.5	30	16	4-3	3	
1072	*Salix species*	willow	6+6	15	12	4	3	
1073	*Umbellularia californica*	California bay	39	48	28	3-2	3	
1074	*Umbellularia californica*	California bay	19	35	19	3-2	3	
1075	*Umbellularia californica*	California bay	42	48	26	3-2	3	
1076	*Quercus agrifolia*	coast live oak	5.5+7.5	15	14	3-2	3	
1077	*Umbellularia californica*	California bay	29	48	20	3-2	3	
1078	*Umbellularia californica*	California bay	34	48	30	3-2	3	
1079	*Umbellularia californica*	California bay	42	48	30	3-2	3	
1080	*Umbellularia californica*	California bay	7.5+8.5	28	18	3	4	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
1081	*Umbellularia californica*	California bay	22	45	32	3-2	3	
1082	*Fraxinus latifolia*	Oregon ash	15+9	35	19	3	3	
1083	*Umbellularia californica*	California bay	21	45	18	3-2	3	
1084	*Quercus agrifolia*	coast live oak	27	40	20	3	3	
1085	*Umbellularia californica*	California bay	15.5+15+8.5	35	20	3	3	
1086	*Quercus agrifolia*	coast live oak	18.5	30	20	3-2	3	
1087	*Quercus agrifolia*	coast live oak	24.5	40	20	3-2	3	
1088	*Fraxinus latifolia*	Oregon ash	16+16+14	40	20	3	3	
1089	*Quercus agrifolia*	coast live oak	10	15	10	3	3	
1090	*Quercus agrifolia*	coast live oak	10.5	15	10	4-3	4	
1091	*Aesculus californica*	California buckeye	7+6	18	12	3	3	
1092	*Aesculus californica*	California buckeye	17	20	15	3	3	
1093	*Acer macrophyllum*	big leaf maple	7.5	17	11	4-3	4	
1094	*Umbellularia californica*	California bay	24+6+20+10+16	38	26	3	3	
1095	*Umbellularia californica*	California bay	8	20	12	3	4	
1096	*Umbellularia californica*	California bay	7.5+7+6+8	18	12	1	1	structurally unstable, remove
1097	*Umbellularia californica*	California bay	13+11.5	25	20	3	3	
1098	*Umbellularia californica*	California bay	24+6	35	35	3	2	
1099	*Sequoia sempervirens*	coast redwood	77	80	24	4	3	
1100	*Sequoia sempervirens*	coast redwood	24	60	20	4-3	3	
1101	*Sequoia sempervirens*	coast redwood	60+19+60	80	20	4	3	
1102	*Sequoia sempervirens*	coast redwood	60+60	80	24	4	3	
1103	*Sequoia sempervirens*	coast redwood	10+15+18+14+30+30+35+20+32+35+35	80	28	4	3	
1104	*Sequoia sempervirens*	coast redwood	44	70	18	4-3	3	
1105	*Sequoia sempervirens*	coast redwood	49	70	18	4	3	
1106	*Umbellularia californica*	California bay	17+17	45	35	4-3	3	
1107	*Umbellularia californica*	California bay	21.5	60	18	3	3	
1108	*Umbellularia californica*	California bay	21.5+9.5	50	30	3	3	
1109	*Sequoia sempervirens*	coast redwood	60+16	80	22	4	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
1110	*Sequoia sempervirens*	coast redwood	28+8	40	20	4-3	3	
1111	*Sequoia sempervirens*	coast redwood	50	90	20	4	3	
1112	*Sequoia sempervirens*	coast redwood	50	90	26	4-3	3	
1113	*Sequoia sempervirens*	coast redwood	14	25	12	4	4	
1114	*Acer macrophyllum*	big leaf maple	10	25	16	4-3	3	
1115	*Umbellularia californica*	California bay	8	20	17	4	2	
1116	*Umbellularia californica*	California bay	13.5	35	30	4	3	
1117	*Umbellularia californica*	California bay	9+9.5	20	15	3	4	
1118	*Umbellularia californica*	California bay	14.5	30	16	4-3	3	
1119	*Sequoia sempervirens*	coast redwood	6	15	9	4	4	
1120	*Sequoia sempervirens*	coast redwood	12	25	14	4	4	
1121	*Sequoia sempervirens*	coast redwood	40+9+8+14+19+40+45	75	30	4	3	
1122	*Umbellularia californica*	California bay	7	20	12	3	4	
1123	*Aesculus californica*	California buckeye	8.5+5	20	15	4	3	
1124	*Umbellularia californica*	California bay	12+12+13+7	30	18	4-3	3	
1125	*Umbellularia californica*	California bay	12.5	30	15	3	4	
1126	*Umbellularia californica*	California bay	11+15+12+8	30	18	3	2	
1127	*Umbellularia californica*	California bay	7.5+10	28	16	4	3	
1128	*Quercus agrifolia*	coast live oak	20	35	20	3	3	
1129	*Aesculus californica*	California buckeye	9+7+7	25	18	4	3	
1130	*Umbellularia californica*	California bay	12	35	16	4-3	3	
1131	*Quercus agrifolia*	coast live oak	9	15	14	3	3	
1132	*Quercus agrifolia*	coast live oak	10	25	17	3	3	
1133	*Aesculus californica*	California buckeye	6+10	20	16	4	3	
1134	*Aesculus californica*	California buckeye	12+6.5	20	18	4	3	
1135	*Quercus agrifolia*	coast live oak	15	30	18	3	3	
1136	*Quercus agrifolia*	coast live oak	12+15.5	30	20	2	2	
1137	*Aesculus californica*	California buckeye	6+6	18	16	4-3	3	
1138	*Quercus agrifolia*	coast live oak	9+6	15	12	3	3	
1139	*Umbellularia californica*	California bay	10.5+5	30	14	4-3	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
1140	*Umbellularia californica*	California bay	9	30	16	4-3	3	
1141	*Lithocarpus densiflorus*	tanbark oak	10+6	15	11	2-1	2	
1142	*Umbellularia californica*	California bay	6	20	14	3	3	
1143	*Pseudotsuga menziesii*	Douglas fir	48	80	20	3	2	
1144	*Quercus agrifolia*	coast live oak	9.5+5	20	16	3	3	
1145	*Quercus agrifolia*	coast live oak	10.5	20	16	3	3	
1146	*Quercus agrifolia*	coast live oak	14.5	35	20	2	3	
1147	*Umbellularia californica*	California bay	14	40	18	4-3	3	
1148	*Lithocarpus densiflorus*	tanbark oak	10+7+12+6	25	17	4	3	
1149	*Aesculus californica*	California buckeye	11	15	11	3	3	
1150	*Lithocarpus densiflorus*	tanbark oak	9	25	15	1	1	SOD infected, remove
1151	*Aesculus californica*	California buckeye	6	18	16	3	3	
1152	*Lithocarpus densiflorus*	tanbark oak	23+12.5	45	24	4-3	1	structurally unstable, remove
1153	*Lithocarpus densiflorus*	tanbark oak	7	25	14	1	1	SOD infected, remove
1154	*Umbellularia californica*	California bay	26+31	50	30	3	3	
1155	*Umbellularia californica*	California bay	10	38	20	3	4	
1156	*Umbellularia californica*	California bay	14	40	20	3	3	
1157	*Umbellularia californica*	California bay	13+21.5	60	20	3	3	
1158	*Lithocarpus densiflorus*	tanbark oak	7	20	14	3	4	
1159	*Pseudotsuga menziesii*	Douglas fir	33	80	22	3	3	
1160	*Lithocarpus densiflorus*	tanbark oak	10	30	16	3	2	
1161	*Umbellularia californica*	California bay	15	45	20	3	3	
1162	*Pseudotsuga menziesii*	Douglas fir	8	30	14	2	3	
1163	*Umbellularia californica*	California bay	17+16	45	24	3	3	
1164	*Umbellularia californica*	California bay	21.5+26	45	28	3	3	
1165	*Pseudotsuga menziesii*	Douglas fir	41	80	26	4-3	3	
1166	*Umbellularia californica*	California bay	16.5+14	45	30	3	3	
1167	*Umbellularia californica*	California bay	12+13+12+11	40	24	3	3	
1168	*Sequoia sempervirens*	coast redwood	36.5	55	20	4	3	
1169	*Sequoia sempervirens*	coast redwood	40	90	24	4	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
1170	*Sequoia sempervirens*	coast redwood	22	65	20	4	3	
1171	*Sequoia sempervirens*	coast redwood	27.5	70	20	4	3	
1172	*Sequoia sempervirens*	coast redwood	21	60	20	4	3	
1173	*Sequoia sempervirens*	coast redwood	43	90	20	4	3	
1174	*Lithocarpus densiflorus*	tanbark oak	11	30	15	4	3	
1175	*Pseudotsuga menziesii*	Douglas fir	45+46	90	24	3-2	3	
1176	*Umbellularia californica*	California bay	8.5	25	14	3	4	
1177	*Lithocarpus densiflorus*	tanbark oak	11	30	14	3	2	
1178	*Lithocarpus densiflorus*	tanbark oak	7.5	20	12	1	2	structurally unstable, remove
1179	*Lithocarpus densiflorus*	tanbark oak	23	35	20	4-3	2-1	structurally unstable, remove
1180	*Quercus agrifolia*	coast live oak	21	30	20	2	2	
1181	*Sequoia sempervirens*	coast redwood	51.5	70	24	4-3	3	
1182	*Pseudotsuga menziesii*	Douglas fir	10	30	15	3-2	3	
1183	*Torreya californica*	California nutmeg	14.5	30	15	3	3	
1184	*Umbellularia californica*	California bay	13+13	40	20	3	2-1	
1185	*Sequoia sempervirens*	coast redwood	13.5	30	15	4	4	
1186	*Pseudotsuga menziesii*	Douglas fir	8	28	14	3	4	
1187	*Sequoia sempervirens*	coast redwood	40+40+40	75	22	4	3	
1188	*Sequoia sempervirens*	coast redwood	34	70	20	4	3	
1189	*Acer macrophyllum*	big leaf maple	6+8+6+6	20	15	3	3-2	
1190	*Sequoia sempervirens*	coast redwood	19+24+16+55+40	85	30	3	3	
1191	*Sequoia sempervirens*	coast redwood	70+40	85	30	3	3	
1192	*Sequoia sempervirens*	coast redwood	36+57	85	20	3	3	
1193	*Acer macrophyllum*	big leaf maple	6.5+6	20	14	2	3-2	
1194	*Sequoia sempervirens*	coast redwood	40+60	90	26	3	3	
1195	*Sequoia sempervirens*	coast redwood	15+15+28+15	70	20	4-3	3	
1196	*Sequoia sempervirens*	coast redwood	50	90	20	4	3	
1197	*Sequoia sempervirens*	coast redwood	7+15+30	70	18	4	3	
1198	*Acer macrophyllum*	big leaf maple	6	20	12	3	4	
1199	*Acer macrophyllum*	big leaf maple	7+8	22	16	2	3	

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
1200	*Acer macrophyllum*	big leaf maple	10+6.5	30	9	2	3-2	
1201	*Umbellularia californica*	California bay	9.5+9+9.5	35	20	4	3	
1202	*Acer macrophyllum*	big leaf maple	10	45	20	3	3	
1203	*Umbellularia californica*	California bay	7	20	16	4	4	
1204	*Umbellularia californica*	California bay	16.5+25	45	30	4	3	
1205	*Sequoia sempervirens*	coast redwood	55+18	95	26	4	3	
1206	*Sequoia sempervirens*	coast redwood	45	90	26	4-3	3	
1207	*Acer macrophyllum*	big leaf maple	18.5	38	18	3	3	
1208	*Umbellularia californica*	California bay	18+17+26+14	45	30	4-3	3	
1209	*Acer macrophyllum*	big leaf maple	9+8.5	20	14	3-2	3	
1210	*Umbellularia californica*	California bay	32+24	45	30	4-3	3	
1211	*Umbellularia californica*	California bay	17+10+15	48	20	4-3	3	
1212	*Acer macrophyllum*	big leaf maple	9.5	20	12	3	4	
1213	*Umbellularia californica*	California bay	27.5	45	18	4-3	3	
1214	*Umbellularia californica*	California bay	7	15	11	4	4	
1215	*Umbellularia californica*	California bay	8+32	50	18	3	3	
1216	*Umbellularia californica*	California bay	7.5	18	13	4	4	
1217	*Umbellularia californica*	California bay	7	18	13	4	4	
1218	*Pseudotsuga menziesii*	Douglas fir	59	90	30	4-3	3	
1219	*Prunus species*	plum	10+6+7.5	18	15	4-3	3	
1220	*Quercus agrifolia*	coast live oak	17.5	20	16	3	3	
1221	*Aesculus californica*	California buckeye	7+4+5	15	12	4	4	
1222	*Quercus agrifolia*	coast live oak	18+20+19	35	20	3-2	3	
1223	*Quercus agrifolia*	coast live oak	6+13.5+10	30	16	2	3	
1224	*Umbellularia californica*	California bay	7	20	15	4	4	
1225	*Alnus rhombifolia*	white alder	18+18	40	20	4	3	
1226	*Quercus agrifolia*	coast live oak	16	35	20	3	3	
1227	*Quercus agrifolia*	coast live oak	16	40	20	3	3	
1228	*Sequoia sempervirens*	coast redwood	55	90	30	3-2	3	
1229	*Sequoia sempervirens*	coast redwood	31	90	30	4	3	

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
1230	*Sequoia sempervirens*	coast redwood	29	90	20	4	3	
1231	*Sequoia sempervirens*	coast redwood	60+60	90	30	4-3	3	
1232	*Sequoia sempervirens*	coast redwood	30+20	75	20	4-3	3	
1233	*Sequoia sempervirens*	coast redwood	26	70	20	4	3	
1234	*Sequoia sempervirens*	coast redwood	22	60	16	4	3	
1235	*Sequoia sempervirens*	coast redwood	55	90	28	4	3	
1236	*Sequoia sempervirens*	coast redwood	24+55+30	90	24	4	3	
1237	*Umbellularia californica*	California bay	18+24	40	26	4	4	
1238	*Acer macrophyllum*	big leaf maple	8+9+9+5	30	16	3	3	
1239	*Acer macrophyllum*	big leaf maple	14	30	15	2	2	
1240	*Sequoia sempervirens*	coast redwood	65+50+26	90	26	4	3	
1241	*Sequoia sempervirens*	coast redwood	27	65	20	4	4	
1242	*Umbellularia californica*	California bay	28+22+15+14	45	26	3	3	
1243	*Umbellularia californica*	California bay	11.5	30	15	4-3	4	
1244	*Sequoia sempervirens*	coast redwood	19	30	14	4	4	
1245	*Sequoia sempervirens*	coast redwood	45	90	26	4	3	
1246	*Sequoia sempervirens*	coast redwood	34+34	70	18	4-3	3	
1247	*Sequoia sempervirens*	coast redwood	36+38+28	75	20	4-3	3	
1248	*Sequoia sempervirens*	coast redwood	19+32	75	20	4-3	3	
1249	*Lithocarpus densiflorus*	tanbark oak	18	30	14	1	1	SOD infected, remove
1250	*Sequoia sempervirens*	coast redwood	16+29	70	20	3	3	
1251	*Sequoia sempervirens*	coast redwood	17	50	20	4-3	3	
1252	*Sequoia sempervirens*	coast redwood	14.5	28	12	3	4	
1253	*Sequoia sempervirens*	coast redwood	40+30	70	20	4-3	3	
1254	*Sequoia sempervirens*	coast redwood	26	70	20	4	3	
1255	*Sequoia sempervirens*	coast redwood	7	20	12	4	4	
1256	*Sequoia sempervirens*	coast redwood	24+40	80	30	4	3	
1257	*Sequoia sempervirens*	coast redwood	40	90	30	4-3	3	
1258	*Sequoia sempervirens*	coast redwood	16	40	16	4	4	
1259	*Sequoia sempervirens*	coast redwood	26+45+45	90	30	4-3	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
1260	*Umbellularia californica*	California bay	25+6	45	18	2	3	
1261	*Sequoia sempervirens*	coast redwood	32+32+11+36	90	26	3	3	
1262	*Sequoia sempervirens*	coast redwood	34+34+6	80	20	3	3	
1263	*Sequoia sempervirens*	coast redwood	17.5	50	16	3	3	
1264	*Sequoia sempervirens*	coast redwood	40	80	24	4-3	3	
1265	*Lithocarpus densiflorus*	tanbark oak	26.5	45	26	4-3	3	
1266	*Acer macrophyllum*	big leaf maple	7.5	20	12	3	3	
1267	*Umbellularia californica*	California bay	20+7	60	30	4-3	4	
1268	*Sequoia sempervirens*	coast redwood	37.5	75	24	4	3	
1269	*Sequoia sempervirens*	coast redwood	49	90	30	4	3	
1270	*Sequoia sempervirens*	coast redwood	45	90	30	4	3	
1271	*Sequoia sempervirens*	coast redwood	8	20	10	3	4	
1272	*Sequoia sempervirens*	coast redwood	50+50	90	30	4	3	
1273	*Sequoia sempervirens*	coast redwood	50	90	30	4	3	
1274	*Sequoia sempervirens*	coast redwood	19.5	60	20	4	4	
1275	*Sequoia sempervirens*	coast redwood	40	80	20	4-3	3	
1276	*Sequoia sempervirens*	coast redwood	11.5	40	16	4-3	4	
1277	*Sequoia sempervirens*	coast redwood	45+10	75	20	4	3	
1278	*Umbellularia californica*	California bay	17+18+14+12+17	48	30	4-3	3	
1279	*Sequoia sempervirens*	coast redwood	38	75	24	4	3	
1280	*Sequoia sempervirens*	coast redwood	40+40+4	80	28	4	3	
1281	*Sequoia sempervirens*	coast redwood	38+38	80	24	4	3	
1282	*Sequoia sempervirens*	coast redwood	38	80	20	4	3	
1283	*Sequoia sempervirens*	coast redwood	50	80	24	4	3	
1284	*Umbellularia californica*	California bay	15.5	40	20	4	4	
1285	*Umbellularia californica*	California bay	15+10+10+9	45	26	4	3	
1286	*Umbellularia californica*	California bay	11	30	15	3	3	
1287	*Umbellularia californica*	California bay	12	35	15	3	3	
1288	*Sequoia sempervirens*	coast redwood	28	70	20	4	3	
1289	*Sequoia sempervirens*	coast redwood	12+40	80	20	4	3	

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
1290	*Sequoia sempervirens*	coast redwood	11.5	25	14	4	4	
1291	*Sequoia sempervirens*	coast redwood	32	75	20	4	3	
1292	*Sequoia sempervirens*	coast redwood	20	48	18	4	3	
1293	*Sequoia sempervirens*	coast redwood	21	65	18	4	4	
1294	*Sequoia sempervirens*	coast redwood	8.5	20	14	4	4	
1295	*Sequoia sempervirens*	coast redwood	21	65	15	4	4	
1296	*Sequoia sempervirens*	coast redwood	24	65	16	4	4	
1297	*Sequoia sempervirens*	coast redwood	15+40+10+26	80	20	4	3	
1298	*Umbellularia californica*	California bay	9	25	14	4	4	
1299	*Umbellularia californica*	California bay	6	20	14	4	4	
1300	*Sequoia sempervirens*	coast redwood	50+45+24	80	28	4	3	
1301	*Sequoia sempervirens*	coast redwood	50	80	28	4	3	
1302	*Sequoia sempervirens*	coast redwood	40	70	24	4	3	
1303	*Sequoia sempervirens*	coast redwood	40	75	20	4	3	
1304	*Sequoia sempervirens*	coast redwood	45+16	80	20	4	4	
1305	*Sequoia sempervirens*	coast redwood	17	70	16	3	4	
1306	*Sequoia sempervirens*	coast redwood	34	75	20	4	4	
1307	*Sequoia sempervirens*	coast redwood	17	60	16	4-3	4	
1308	*Umbellularia californica*	California bay	16+20	45	30	3	1	structurally unstable, remove
1309	*Umbellularia californica*	California bay	12	45	20	4-3	4	
1310	*Sequoia sempervirens*	coast redwood	38+60+28	80	30	4	3	
1311	*Sequoia sempervirens*	coast redwood	24	70	22	4	3	
1312	*Sequoia sempervirens*	coast redwood	45	80	30	4	3	
1313	*Sequoia sempervirens*	coast redwood	55	85	30	4	3	
1314	*Sequoia sempervirens*	coast redwood	30	70	20	4	3	
1315	*Sequoia sempervirens*	coast redwood	50	80	20	4	3	
1316	*Acer macrophyllum*	big leaf maple	8	20	14	2	3	
1317	*Acer macrophyllum*	big leaf maple	9	30	16	4	4	
1318	*Acer macrophyllum*	big leaf maple	10	20	13	3	3	
1319	*Acer macrophyllum*	big leaf maple	20	40	30	2	2	

TREE INVENTORY

Sir Francis Drake Blvd., Marin County

(Between Shafter Bridge and Platform Bridge Road)

February 7, 2008

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
1320	*Umbellularia californica*	California bay	10+8+8	35	20	4-3	3	
1321	*Umbellularia californica*	California bay	8.5	35	16	4-3	4	
1322	*Umbellularia californica*	California bay	12+14+17+22	45	30	3	2	
1323	*Sequoia sempervirens*	coast redwood	16	40	18	4	4	
1324	*Sequoia sempervirens*	coast redwood	38	70	20	4-3	3	
1325	*Sequoia sempervirens*	coast redwood	7.5	25	12	3	4	
1326	*Sequoia sempervirens*	coast redwood	33.5	80	20	4-3	3	
1327	*Sequoia sempervirens*	coast redwood	35+20+30	80	28	4-3	3	
1328	*Sequoia sempervirens*	coast redwood	8+50+26+45	80	30	4-3	3	
1329	*Umbellularia californica*	California bay	10+5	45	24	4-3	3	
1330	*Sequoia sempervirens*	coast redwood	40+45	80	28	4-3	3	
1331	*Sequoia sempervirens*	coast redwood	8	20	10	3	4	
1332	*Sequoia sempervirens*	coast redwood	39	80	20	4-3	3	
1333	*Sequoia sempervirens*	coast redwood	38	80	20	4-3	3	
1334	*Sequoia sempervirens*	coast redwood	50+40+12+50+55	80	30	4-3	3	
1335	*Umbellularia californica*	California bay	10	30	18	3	4	
1336	*Umbellularia californica*	California bay	8	30	18	4-3	4	
1337	*Umbellularia californica*	California bay	11	30	20	4	3	
1338	*Acer macrophyllum*	big leaf maple	15	20	20	2	3	
1339	*Acer macrophyllum*	big leaf maple	6.5+7+7+6	30	20	3	3	
1340	*Acer macrophyllum*	big leaf maple	12	40	28	3	3	
1341	*Sequoia sempervirens*	coast redwood	40+40+40	85	30	4-3	3	
1342	*Sequoia sempervirens*	coast redwood	43	85	20	3	3	
1343	*Sequoia sempervirens*	coast redwood	29	80	20	3	3	
1344	*Sequoia sempervirens*	coast redwood	38	80	20	3	3	
1345	*Sequoia sempervirens*	coast redwood	40	60	20	3	3	
1346	*Sequoia sempervirens*	coast redwood	60+26	90	30	4-3	3	
1347	*Quercus agrifolia*	coast live oak	10.5	20	15	3	4	
1348	*Quercus agrifolia*	coast live oak	6	20	12	4	4	
1349	*Acer macrophyllum*	big leaf maple	8	12	8	3	4	

February 7, 2008

TREE INVENTORY
Sir Francis Drake Blvd., Marin County
(Between Shafter Bridge and Platform Bridge Road)

Tree #	Species	Common Name	Trunk (diameter ±")	Height (±')	Dripline (radius ±')	Health 1 - 5	Structure 1 - 4	Recommendations
1350	*Acer macrophyllum*	big leaf maple	9	20	20	4-3	4	
1351	*Sequoia sempervirens*	coast redwood	60	90	30	4	4	
1352	*Sequoia sempervirens*	coast redwood	60	90	30	4	3	
1353	*Sequoia sempervirens*	coast redwood	50	80	30	4	3	
1354	*Acer macrophyllum*	big leaf maple	10+8	35	28	4-3	4	
1355	*Lithocarpus densiflorus*	tanbark oak	9	20	14	1	2	SOD infected, remove
1356	*Sequoia sempervirens*	coast redwood	7.5	15	12	4	4	
1357	*Sequoia sempervirens*	coast redwood	30	65	20	4-3	3	
1358	*Sequoia sempervirens*	coast redwood	34	65	20	4-3	3	
1359	*Sequoia sempervirens*	coast redwood	36+40	65	20	4-3	3	
1360	*Sequoia sempervirens*	coast redwood	12+34	65	20	4-3	4	
1361	*Sequoia sempervirens*	coast redwood	11+12	30	14	4-3	4	
1362	*Pseudotsuga menziesii*	Douglas fir	12	35	30	4-3	3	
1363	*Umbellularia californica*	California bay	15.5+16	50	30	3	1	structurally unstable, remove
1364	*Pseudotsuga menziesii*	Douglas fir	51	80	30	3	3	
1365	*Lithocarpus densiflorus*	tanbark oak	12	20	4	1	1	structurally unstable, remove
1366	*Acer macrophyllum*	big leaf maple	17	45	30	3	3	
1367	*Sequoia sempervirens*	coast redwood	40	80	30	4	3	
1368	*Acer macrophyllum*	big leaf maple	11	35	30	4-3	4	

KEY TO RATINGS

HEALTH

(5) Excellent - health and vigor are exceptional, no pest, disease, or distress symptoms.

(4) Good - health and vigor are average, no significant or specific distress symptoms, no significant pest or disease.

(3) Fair - health and vigor are somewhat compromised, distress is visible, pest or disease may be present and affecting health, problems are generally correctable.

(2) Marginal - health and vigor are significantly compromised, distress is highly visible and present to the degree that survivability is in question.

(1) Poor - decline has progressed beyond the point of being able to return to a healthy condition again. Long-term survival is not expected. This designation includes dead trees.

STRUCTURE

(4) Good structure - some minor structural problems may be present which do not require corrective action.

(3) Moderate structure - normal, typical, structural issues present which can be corrected with pruning.

(2) Marginal structure - serious structural problems are present which may or may not be correctable with pruning, cabling, bracing, etc.

(1) Poor structure - hazardous structural condition which cannot be effectively corrected with pruning or other measures, may require removal depending on location and the presence of targets.

APPENDIX G

AIR QUALITY MODELING

This page intentionally left blank.

Road Construction Emissions Model, Version 6.3.2

Emission Estimates for -> Sir Francis Drake Blvd.

Project Phases (English Units)	**ROG (lbs/day)**	**CO (lbs/day)**	**NOx (lbs/day)**	**Total PM10 (lbs/day)**	**Exhaust PM10 (lbs/day)**	**Fugitive Dust PM10 (lbs/day)**	**Total PM2.5 (lbs/day)**	**Exhaust PM2.5 (lbs/day)**	**Fugitive Dust PM2.5 (lbs/day)**	**CO2 (lbs/day)**
Grubbing/Land Clearing	9.3	35.3	47.1	12.7	2.7	10.0	4.6	2.5	2.1	4,919.7
Grading/Excavation	10.0	38.7	50.9	13.2	3.2	10.0	5.0	2.9	2.1	5,480.4
Drainage/Utilities/Sub-Grade	9.3	33.8	44.2	12.9	2.9	10.0	4.7	2.7	2.1	4,690.5
Paving	7.9	26.1	26.7	2.5	2.5	-	2.3	2.3	-	2,911.7
Maximum (pounds/day)	10.0	38.7	50.9	13.2	3.2	10.0	5.0	2.9	2.1	5,480.4
Total (tons/construction project)	0.9	3.5	4.5	1.1	0.3	0.8	0.4	0.3	0.2	481.1

Notes: Project Start Year -> 2010
Project Length (months) -> 9
Total Project Area (acres) -> 19
Maximum Area Disturbed/Day (acres) -> 1
Total Soil Imported/Exported (yd^3/day)-> 20

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for -> Sir Francis Drake Blvd.

Project Phases (Metric Units)	**ROG (kgs/day)**	**CO (kgs/day)**	**NOx (kgs/day)**	**Total PM10 (kgs/day)**	**Exhaust PM10 (kgs/day)**	**Fugitive Dust PM10 (kgs/day)**	**Total PM2.5 (kgs/day)**	**Exhaust PM2.5 (kgs/day)**	**Fugitive Dust PM2.5 (kgs/day)**	**CO2 (kgs/day)**
Grubbing/Land Clearing	4.2	16.1	21.4	5.8	1.2	4.5	2.1	1.1	0.9	2,236.2
Grading/Excavation	4.6	17.6	23.1	6.0	1.4	4.5	2.3	1.3	0.9	2,491.1
Drainage/Utilities/Sub-Grade	4.2	15.4	20.1	5.9	1.3	4.5	2.2	1.2	0.9	2,132.0
Paving	3.6	11.8	12.1	1.1	1.1	-	1.0	1.0	-	1,323.5
Maximum (kilograms/day)	4.6	17.6	23.1	6.0	1.4	4.5	2.3	1.3	0.9	2,491.1
Total (megagrams/construction project)	0.8	3.2	4.1	1.0	0.3	0.8	0.4	0.2	0.2	436.3

Notes: Project Start Year -> 2010
Project Length (months) -> 9
Total Project Area (hectares) -> 8
Maximum Area Disturbed/Day (hectares) -> 0
Total Soil Imported/Exported ($meters^3$/day)-> 15

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

This page intentionally left blank.

APPENDIX H

GEOTECHNICAL REPORT

This page intentionally left blank.

KLEINFELDER
Bright People. Right Solutions.

GEOTECHNICAL INVESTIGATION
SIR FRANCIS DRAKE BOULEVARD
PAVEMENT REHABILITATION
MARIN COUNTY, CALIFORNIA

Kleinfelder Job No: 82400

A Report Prepared for:

BKF Engineers
255 Shoreline Drive, Ste. 200
Redwood City, CA 94065

Attention: Robert Stevens

GEOTECHNICAL INVESTIGATION
SIR FRANCIS DRAKE BOULEVARD
PAVEMENT REHABILITATION
MARIN COUNTY, CALIFORNIA

Kleinfelder Job No: 82400

By:

Mark H. Stanley, GE 2397
Principal Geotechnical Engineer

Reviewed by:

William V. McCormick, CEG 1673
Geotechnical Group Manager

REGISTERED PROFESSIONAL ENGINEER
MARK H. STANLEY
No. C049746
Exp. 9/30/08
CIVIL
STATE OF CALIFORNIA

KLEINFELDER
2240 Northpoint Parkway
Santa Rosa, CA 95407
(707) 571-1883

August 21, 2008

UNAUTHORIZED USE OR COPYING OF THIS DOCUMENT IS STRICTLY PROHIBITED BY ANYONE OTHER THAN THE CLIENT FOR THE SPECIFIC PROJECT.

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make *contractors* liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

8811 Colesville Road/Suite G106 Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

TABLE OF CONTENTS

PLATES

Plate 1	Site Location Map
Plate 2	Boring Location Plan
Plate 3	Site Geology
Plate 4	Liquefaction Potential
Plate 5	Concrete and Asphalt Concrete Sections
Plate 6	Shattered PCC Slab Conditions

APPENDICES

APPENDIX A

Plate A-1	Boring Log Legend
Plate A-2	Rock Description Criteria
Plates A-3 through A-13	Log of Exploration Borings K-1 through K-11

APPENDIX B

Laboratory Test Results

APPENDIX C

Visual Pavement Condition Survey

GEOTECHNICAL INVESTIGATION
SIR FRANCIS DRAKE BOULEVARD
PAVEMENT REHABILITATION
MARIN COUNTY, CALIFORNIA

1.0 INTRODUCTION

This report presents the results of Kleinfelder's geotechnical investigation for the proposed rehabilitation of a 5.5 mile segment of Sir Francis Drake Boulevard extending from Shafter Bridge to Platform Bridge Road in Marin County, California. The location of the project is shown on the Site Location Map, Plate 1. The objective of this report is to provide the Client (BKF Engineers) and the County of Marin with findings, conclusions and recommendations regarding the geotechnical aspects of the proposed pavement rehabilitation project. Our investigation has been coordinated through Mr. Robert Stevens of BKF Engineers.

1.1 PROJECT AND SITE DESCRIPTION

Sir Francis Drake Boulevard (SFDB) extends in a north-northwest direction across the center of Marin County connecting the City of San Rafael on the east to State Highway 1 at Olema on the west. SFDB is located along the former Olema-San Rafael stagecoach road that was paved with Portland cement concrete (PCC) in 1929[1].

---

[1] Dodd and Berensmeier, San Geronimo Valley Community Center.

Currently, the two lane roadway consists of a central PCC section that in places has been subsequently overlain and patched with asphalt concrete. Asphalt concrete has also been placed along either side of the roadway to provide its current two lane configuration. Within the project reach (see Boring Location Map, Plate 2), the roadway follows Lagunitas Creek through Samuel P. Taylor State Park and a portion of the Golden Gate National Recreation Area (Plate 2). The roadway is threaded between trees and crosses Lagunitas Creek with two bridges. Near-vertical rock cuts are present at some locations along the upslope edge of the roadway; steep slopes are located between the roadway and the creek. As currently proposed, the SFDB rehabilitation project will include:

- Initial planning level studies and CEQA assessment for the project.
- Design of the final selected project pavement/alignment modification alternatives that will include straightening and minor grading for traffic safety.
- Rehabilitating the pavement by replacing the pavements where required and overlaying pavements where feasible.

1.2 PURPOSE AND SCOPE OF SERVICES

The purpose of our geotechnical investigation is to explore and evaluate the geologic and geotechnical (soil) conditions at the site in order to assess the existing geologic and geotechnical character of the underlying soils and existing road sections, and to provide geotechnical conclusions and recommendations for design of pavement rehabilitation. Our first phase scope of services, as outlined in our subconsultant agreement dated March 29, 2007, consisted of field exploration, laboratory testing, engineering analyses, and preparation of this report. This investigation did not include a geotechnical assessment of existing structures (bridges) or an assessment of creek bank stability.

1.3 AUTHORIZATION

This investigation was authorized by BKF Engineers Subconsultant Agreement dated March 30, 2007, signed by BKF Engineers and Mr. Michael Burns of Kleinfelder.

2.0 GEOLOGIC SETTING

2.1 REGIONAL GEOLOGY

The site is located within the Coast Ranges Geomorphic Province of Northern California. The Coast Ranges Province is a geologically complex and seismically active region characterized by sub-parallel northwest-trending faults, mountain ranges, and valleys that are a reflection of the dominant northwest structural trend of the bedrock in this region. The oldest mapped bedrock unit within the Coast Ranges Province is the Franciscan Complex, a diverse group of igneous, sedimentary, and metamorphic rocks of Upper Jurassic to Cretaceous age (140 to 65 million years old). Since deposition, the bedrock materials have been subjected to faulting and folding. These rocks are part of a northwest-trending belt of material that lies along the east side of the San Andreas fault system. Locally, these older bedrock deposits are overlain by younger, Quaternary age (less than 2 million years old) marsh, alluvial, and colluvial deposits.

2.2 LOCAL GEOLOGY

The site and vicinity have been mapped by Blake et al. (2000, United States Geologic Survey, Miscellaneous Field Studies MF-2337, Version 1, Geologic Map and Map Databases of parts of Marin, San Francisco, Alameda, Contra Costa, and Sonoma Counties, California) as shown on the Site Geology, Plate 3. The site and vicinity have also been mapped by Wentworth and Frizzell (1975, United States Geologic Survey, Open File Map 75-281 Sheet 7, Reconnaissance Landslide Map of Parts of Marin and Sonoma Counties, California). The geologic map prepared by Blake et al. indicates that the site is underlain by the Franciscan Complex including greenstone, sandstone and shale, mélange, and chert. The northern portion of the project alignment (borings K-10 and K-11) have been mapped as being underlain by sandstone and shale; the northern half of the alignment (K-5 to K-9) has been mapped as being underlain by mélange; and the southern portion of the alignment (K-1 to K-4) has been mapped as being underlain by greenstone. Wentworth and Frizzell have mapped colluvium, landslides, and severe creep along several sections of the roadway alignment. Landslides and overall roadway stability are beyond the scope of this investigation.

The site has also been mapped by Knudsen et al. (Unites States Geological Survey Open File Report 444) as having a high potential liquefaction hazard, as shown on the Liquefaction Potential map, Plate 4.

2.3 FAULTING AND SEISMICITY

The site, as well as the entire Northern California Coastal Region, is located within a seismically active portion of the state, dominated by the presence of the San Andreas fault system, which forms the boundary between two tectonic plates of the earth's crust. At this boundary, the Pacific Plate (west of the fault) is moving north relative to the North American Plate (east of the fault). In the Northern San Francisco Bay Area, this movement is distributed across a complex system of strike-slip, right-lateral, parallel, and sub-parallel faults which include the San Andreas, Healdsburg/Rodgers Creek, and Maacama among others.

The site is not located within an Earthquake Fault Zone as defined by the California Division of Mines and Geology (CDMG) in accordance with the Alquist–Priolo Earthquake Fault Zone Act of 1972. The nearest known active fault is the San Andreas (Northern) fault, located approximately 1.5 miles west of the site, which is capable of producing a maximum earthquake magnitude event of 8.25. Moderate to major earthquakes generated on the San Andreas fault can be expected to cause strong ground shaking at the site. In addition, strong ground shaking can be expected from moderate to major earthquakes generated on other faults in the region including but not limited to the Hayward/Rodgers Creek fault, (located approximately 18 miles southeast of the site), and the Maacama fault (located approximately 36 miles north of the site). A number of large earthquakes have occurred within this region in the historic past. Some of the significant nearby events include two 1969 Santa Rosa earthquakes (M5.6, 5.7), and the 1906 San Francisco earthquake (M8+). Future seismic events in this region can be expected to produce strong seismic ground shaking at this site.

3.0 FIELD EXPLORATION

3.1 FIELD EXPLORATION

Our field exploration was conducted on July 9 and 10, 2007, and consisted of drilling eleven (11) soil borings (labeled K-1 through K-11) at the approximate locations shown on the Boring Location Map, Plate 2, and summarized in the table below. Five of the borings, K-1, K-2, K-3, K-9, and K-11, were drilled in the northbound lane. The remaining six borings, K-4 through K-8 and K-10 were drilled in the southbound lane. The locations of the soil borings were estimated by our Staff Engineer based on taping and or pacing from existing landmarks. As such, the location of the borings should be considered accurate to the degree implied by the method used.

Table 1 – Summary of Geotechnical Explorations

Section	Boring	Traffic Lane Location	Comments
1	K-1	Northbound	In asphalt concrete next to edge of concrete Mile Post (MP) 15.38
	K-2	Northbound	Approximately MP 15.9
	K-3	Northbound	East side of lane; next to concrete; approximately MP 16.4
	K-4	Southbound	Center of lane; MP 16.80
	K-5	Southbound	On edge of concrete; approximately MP 17.3
	K-6	Southbound	Center of lane at edge of concrete; MP 17.93
	K-7	Southbound	MP 18.72
2	K-8	Southbound	Center of lane; MP 19.21
	K-9	Northbound	Center of lane; approximately MP 19.7
3	K-10	Southbound	Edge of Road; approximately MP 20.1
	K-11	Northbound	Southeast corner of Sir Francis Drake Blvd. & Platform Bridge Rd. northbound shoulder; approximately MP 20.4

The borings were drilled using a truck-mounted Mobile B-53 drill rig equipped with 6- and 8-inch-diameter, solid-flight and hollow-stem augers to depths of up to 11.5 feet below existing grade. Due to the local presence of concrete and variable thickness asphalt concrete, the upper portions of some borings were cored with a portable concrete coring machine. Materials encountered in each test boring were visually classified in the field and logs were recorded by our Staff Engineer. Visual classifications were made in accordance with the Unified Soil Classification System and are presented in Appendix A on the Boring Log Explanation, Plate A-1; Bedrock encountered in borings K-1 through K-4 was described in general accordance with the rock classification system presented in Appendix A, Rock Description Criteria, Plate A-2. The Logs of Exploration Borings K-1 through K-11, showing pavement sections, soil classifications and sample depths, are presented in Appendix A on Plates A-3 through A-13.

Relatively undisturbed samples were obtained from the major soil types encountered in each boring by driving a 2.5-inch (inside diameter) California sampler containing thin brass liners or a Standard Penetration Test (SPT) sampler in advance of the augers, as each boring was drilled. The sampler was advanced by dropping a 140-pound hammer 30 inches per blow. The number of blows required to drive the last 12 inches of an 18-inch-drive were recorded as raw blow counts, in blows per foot, on the boring logs. When the sampler was withdrawn from each boring, the brass liners containing the samples were removed, examined for logging, labeled, and sealed to preserve their natural moisture content for possible laboratory testing. Upon completion of our drilling and sampling program, the borings were backfilled with bentonite chips and capped with fast-setting concrete.

3.2 LABORATORY TESTING

Selected soil samples were tested in our laboratory to evaluate pertinent engineering and physical properties. The laboratory-testing program evaluated the Resistance (R)-value of the soils encountered in six of the soil test borings drilled through the pavement. R-values of the subgrade soils are relatively consistent throughout the project area; the R-values ranged from <5 to 8. Laboratory testing of the soils encountered in the test borings also consisted of moisture-density determination, particle size analysis, corrosivity analysis, Atterberg Limits, expansion index, and unconfined compressive strength. The results of the laboratory testing program are summarized in Appendix B.

3.3 VISUAL PAVEMENT CONDITION MAPPING

A visual pavement condition survey was conducted along the subject segment of SFDB on June 27 and June 28, 2007, for both traffic lanes in northbound and southbound directions. The survey was conducted in a manner similar to the pavement condition index procedure as developed by the Bay Area Metropolitan Transportation Commission (MTC). The focus of the survey was to identify pavement distress that will need to be mitigated as part of the rehabilitation recommendations, including distress possibly caused by pavement structural problems. The types of pavement distresses observed during the pavement condition survey are presented in Section 4.0 of this report. Note that the stationing of the survey (Station 0+00) started at Shafter Bridge approximately at mile post (MP) 15.32 (nearest mile post marker). The survey continued in a northwesterly direction for approximately five miles to the intersection of Platform Bridge Road and SFDB, MP 20.39 (Station 273+00 feet). The visual pavement condition survey was conducted by dividing the roadway into 100-foot-sections along both travel lanes (e.g. evaluation based on visual pavement condition between Stations 0+00 and 1+00), and the results are summarized in the attached Appendix C. Detailed crack mapping was not conducted as part of this study.

Based upon the observed pavement distress, the 5.5 mile reach of SFDB can be divided into the following three distinct pavement sections or reaches:

Pavement Section 1 – MP 15.32 to approximately MP 18.76 (Station 0+00 to 181+63)
Pavement Section 2 – MP 18.76 to approximately MP 19.94 (Station 181+63 to 243+93)
Pavement Section 3 – MP 19.94 to approximately MP 20.39 (Station 243+93 to 273+00)

4.0 PAVEMENT AND SUBSURFACE CONDITIONS

4.1 PAVEMENT STRUCTURAL SECTIONS

The eleven borings drilled encountered variable thicknesses of concrete, asphalt concrete, and aggregate base rock. Pavement thicknesses varied from 6 to 9 inches of concrete, and 1.5 to 9 inches of asphalt concrete with underlying aggregate base rock layer thicknesses ranging from 0 to over 24 inches, locally. As mentioned before, the concrete roadway was widened using asphalt concrete. In some locations, a portion of the roadway is concrete and the remainder of the road is asphalt concrete. Asphalt concrete overlays have been placed over portions of the concrete and asphalt concrete sections as well. Aggregate base was only encountered in three borings; in the remaining eight borings the pavement was placed directly on fill/colluvial subgrade soils. Detailed information regarding the pavement structural section at each boring location is presented in Appendix A on the Logs of Exploration Borings K-1 through K-11, Plates A-3 through A-13, and is summarized as follows in the Tables 2a through 2c; subsurface conditions are summarized in Tables 3a through 3c.

4.2 PAVEMENT THICKNESS

For the purposes of this report, we have divided the project into three separate sections/reaches. The pavement thicknesses observed and subsurface conditions in each section are summarized below. The location of asphalt concrete and PCC pavements are shown on the Concrete and Asphalt Concrete Section, Plate 5. The condition of the PCC pavement along the length of the alignment is shown on The Shattered PCC Slab Conditions, Plate 6. A summary of the results obtained from our pavement condition survey for the subject street segments is presented in Appendix C. Throughout the survey it was noted that significant pavement distress was observed at the location of culverts, areas near steep embankments and areas near water which are most likely rated to subgrade conditions.

Pavement Section 1 – MP 15.32 to approximately MP 18.76 (Station 0+00 to 181+63)

The first 200 feet of Section 1 is a hot-mix asphalt (HMA) pavement, approximately 5-inches-thick underlain with either PCC or built directly on a silty sandy gravel subgrade. The rest of the pavement section is a PCC pavement 6- to 9-inches-thick built directly on a clayey sandy gravel and/or greenstone subgrade. Throughout the pavement section, there are areas where the PCC pavement has been patched with HMA material, in some cases up to 1.5 inches thick. In addition, there are HMA shoulders along the section, varying from 3 to 8 feet in width, depending on location of obstacles (structures, trees, etc.) and the available road width. Based on our observations, some areas of Section 1 showed low to medium severity longitudinal and transverse cracking, particularly near MP 15.4 and 16.1. Some medium severity shattered PCC slabs were observed near MP 15.4, MP 16.1, and MP 17.4. In addition, low to medium severity reflective cracking was observed in the HMA shoulders throughout the pavement section, indicating a possible presence of PCC pavement underneath the HMA surface. Medium severity fatigue cracking was observed near MP 18.4.

Table 2a- Summary of Pavement Structural Section – SFDB Section 1

Boring	Mile Post	Concrete Thickness (Inches)	HMA Thickness (Inches)	Aggregate Base Thickness (Feet)
K-1	15.38	8 (adjacent to hole)	5	0
K-2	~15.9	6	0	0
K-3	~16.4	8 (adjacent to hole)	6	0.5
K-4	16.80	6	0	0
K-5	~17.3	9	0	0
K-6	17.93	6	1.5	0
K-7	18.72	0 (concrete in northbound lane and half of southbound lane)	7	0

Table 3a – Summary of Subsurface Conditions - SFDB Section 1

Boring	Description
K-1	Encountered approximately 8 feet of fill and/or debris material including wood below the asphalt concrete section in boring K-1. Near boring K-1, rip-rap was noted on the creek side of the road, indicating there may have been a stability issue in the past. The fill/debris was underlain by greenstone. Caving also occurred in boring K-1 at a depth of 6 feet where it then caved to a depth of 3 feet.
K-2	The subgrade generally consisted of dense to very dense clayey gravel with sand colluvium, derived from or composed of highly weathered greenstone bedrock underlain by highly weathered greenstone.

Boring	Description
K-3	The subgrade generally consisted of highly to moderately weathered greenstone bedrock. For engineering purposes, the highly weathered bedrock and/or residual soil deposits (subgrade soils) encountered in the borings may be generally characterized as dense to very dense soils.
K-4	The subgrade generally consisted of highly to moderately weathered greenstone bedrock. For engineering purposes, the highly weathered bedrock and/or residual soil deposits (subgrade soils) encountered in the borings may be generally characterized as dense to very dense soils.
K-5	The subgrade generally consisted of dense to very dense clayey gravel with sand colluvium, derived from or composed of highly weathered greenstone bedrock underlain by highly weathered greenstone.
K-6	The subgrade consists of 4.5 feet of dense clayey gravel with sand underlain by 2.5 feet of medium dense sandy silty gravel. Moderate to high plasticity colluvial soils were encountered at a depth of 7 feet. Bedrock was not encountered.
K-7	The subgrade consists of coarse grained colluvium (sandy gravel with silt) overlying granular residual soil classified as a gravelly sand with silt. Bedrock was not encountered.

Pavement Section 2 – MP 18.76 to approximately MP 19.94 (Station 181+63 to 243+93)

The second pavement section is primarily a 7- to 9-inches-thick PCC pavement with a thick HMA overlay (approximately 6- to 8-inches-thick). The PCC was built on a subgrade, most predominantly a sandy clay material. Based on our observations, low to medium severity longitudinal/transverse cracking of the HMA surface was present throughout the pavement section. The remains of a weathered seal coat (slurry seal or chip seal) were observed in intermittent locations on the pavement surface.

Table 2b- Summary of Pavement Structural Section – SFDB Section 2

Boring	Mile Post	Concrete Thickness (Inches)	HMA Thickness (Inches)	Aggregate Base Thickness (Feet)
K-8	19.21	9	8	0
K-9	~19.7	7	6	0

Table 3b – Summary of Subsurface Conditions - SFDB Section 2

Boring ID	Description
K-8	Subgrade consists of alternating layers of very stiff/medium dense sandy clay, clayey gravel with sand, sandy silt to a depth of 8 feet. A moderate to high plasticity clay was then encountered that extends to 10 feet. The boring was terminated in colluvium consisting of sandy clay with sandstone fragments. Bedrock was not encountered.
K-9	The subgrade consists of stiff low to moderate plasticity clay to a depth of 4 feet which is underlain by a moderate to high plasticity sandy clay with variable gravel content to a depth of 9.5 feet.

Pavement Section 3 – MP 19.94 to approximately MP 20.39 (Station 247+93 to 273+00)

Based on limited subsurface exploration, pavement section 3 is primarily a HMA pavement, 6- to 9-inches-thick built on a subgrade consisting of primarily a clayey sand material. Based on our visual survey, the primary distress observed was low severity longitudinal/transverse cracking. In general, this pavement section appears to be in relatively good condition.

Table 2c- Summary of Pavement Structural Section –SFDB Section 3

Boring	Mile Post	Concrete Thickness (Inches)	HMA Thickness (Inches)	Aggregate Base Thickness (Feet)
K-10	~20.1	0	9	1.2
K-11	~20.4	0	6	2

Table 3b – Summary of Subsurface Conditions - SFDB Section 3

Boring ID	Description
K-10	Subgrade consists of granular very stiff/medium dense colluvial soils. The upper 3.5 feet consist of sandy silt and clayey sand overlying dense clayey gravel/clayey sand.
K-11	The subgrade consists 2.5 feet of fill overlying moderate clayey sand colluvium that extends to a depth of 11.5 feet, the total depth explored.

4.3 GROUNDWATER

Groundwater was not encountered in the soil test borings except for boring K-1 where it was encountered at a depth of 2 feet. However, the proximity to the creek, the steep side slopes, and the presence of colluvium in the subgrade indicate groundwater may be an issue. Our experience in the project vicinity indicates that "perched" groundwater levels can rise to within 5 feet of the surface, depending on factors such as seasonal rainfall, temperature, groundwater withdrawal, and construction activities on this or adjacent properties. In general, winter to early summer construction can experience extra earthwork costs related to the presence of groundwater or seepage, depending on the magnitude of prior seasonal rainfall.

5.0 CONCLUSIONS

5.1 GENERAL

The following conclusions are based on the properties of the materials encountered in the borings, the results of the laboratory-testing program, and our engineering analyses performed. We judge the primary geotechnical issues affecting the pavement rehabilitation project are the presence of variable subgrade conditions, the potential for slope instability/erosion intruding into the alignment because of the proximity of the creek and creek bank; and the potential for liquefaction and related ground deformation if liquefiable soils are present at depth.

5.2 GEOLOGIC HAZARDS

5.2.1 Liquefaction

The term liquefaction describes a phenomenon in which saturated, cohesionless soils temporarily lose shear strength (liquefy) due to increased pore water pressures induced by strong, cyclic ground motions. Such motions can be induced by construction activities such as blasting or pile installation; however, the majority of observed liquefaction events have resulted from earthquakes with magnitudes greater than 5.5 to 6. Structures founded on or above potentially liquefiable soils may experience bearing capacity failures due to the temporary loss of foundation support, vertical settlements (both total and differential), and may undergo lateral spreading. River banks comprised of loose sand can be highly susceptible to lateral spreading. The factors known to influence liquefaction potential include soil type, relative density, grain size, confining pressure, depth to groundwater, age of soil deposit, and the intensity and duration of the seismic ground shaking. Soils most susceptible to liquefaction are Holocene age, loose, fine-grained, poorly graded sands, and low plasticity silts below the groundwater table. Knudsen, Sowers, Witter, Wentworth and Helley (2000, United States Geological Survey Open File Report 00-444) indicate the alluvial deposits on-site have a high susceptibility to liquefaction. Kleinfelder concurs with USGS that liquefaction is a potential seismic hazard to the project.

Although not encountered in our shallow explorations, the Lagunitas Creek Channel is mapped as having a high liquefaction potential. We judge that the locations that pose the highest risk for liquefaction induces settlements or slope deformations are near the creek crossings and in areas where the roadway is located immediately adjacent to the creek.

5.2.2 Settlement and Slope Stability

The explorations conducted for this project indicate that a significant portion of the roadway is underlain by colluvial and residual soils. These soils are subject to heave and settlement due to seasonal moisture variation and can experience a reduction in strength upon saturation that may result in shallow instability within either slopes above or below the roadway. Also, steep cutslopes are also present above the roadway that will continue to weather and be subject to spalls and rock falls. High flows within Lagunitas Creek could also erode and undermine the creek banks that could result in slope failure below the roadway that, if large enough, could extend upward and impact the roadway. We judge that the pavement rehabilitation project will not increase the risk of site settlement or the occurrence of slope instability, provided drainage features are designed to collect and discharge surface water appropriately. The site has an inherent risk for settlement and slope instability and maintenance of the roadway will be required.

During our pavement condition survey it was noted that pavement distress was commonly seen in the area of culvert crossings, near the top of steep embankments and adjacent to the creek. Subsurface exploration of each of these occurrences was beyond the scope of this investigation. We anticipate that full depth replacement will be required in most of these areas. Subexcavation of the subgrade and replacement with select import materials (such as Class 2 aggregate base) will be required for soft subgrade conditions. Recommendations regarding methods to improve subgrade conditions are provided in Section 6 of this report.

5.2.3 Seismic Considerations

As previously discussed, the site is located 1.5 miles east of the San Andreas Fault. Therefore, the site will most likely be subjected to strong ground shaking. Structures or other appurtenant structures should be designed to withstand these forces. Regulatory seismic design requirements generally vary by type of structure. Kleinfelder should be consulted to provide the appropriate geotechnical input for design of these structures once they are identified.

5.2.4 Flooding

Review of Federal Emergency Management Agency (FEMA) Flood Insurance Rate Index Map (FIRM) 0601731250A dated March 1, 1982, indicates that a portion of SFDB is mapped as falling within Zone A, defined as an area subject to 100-year flooding but flood levels have not been determined. Roadway pavements and drainage systems should be designed to allow rapid drainage of flood water as they recede.

5.3 PAVEMENT REHABILITATION

Significant portions of the existing pavement sections date back to 1929 and have failed. Therefore, in its present condition, the pavements have exceeded the original design life and should be replaced or rehabilitated.

Based on the pavement visual condition survey and the limited subsurface exploration, different rehabilitation alternatives may be considered for improving the performance and structural capacity of each pavement section. A first alternative might be removal of the entire pavement and the placement of a new pavement section. As this first alternative might be considered too costly, several other alternatives for each pavement section are provided in Table 4 below. These rehabilitation alternatives assume that a structural overlay of the existing pavement structure, with full-depth repair of localized failures as appropriate, will suitably extend the pavement design life. Detailed descriptions of these alternatives are discussed in the following table.

Table 4. Pavement Rehabilitation Alternatives

Pavement Section	Rehabilitation 1 Mill Surface, Crack and Seat, HMA Overlay	Rehabilitation 2 Crack Filling, Double Rubber Chip Seal	Rehabilitation 3 Mill Surface and HMA Overlay – ≥2" thick Localized Repair	Rehabilitation 4 Mill Surface and RAC* Overlay – ≥2" thick Localized Repair
Section 1	X		X	X
Section 2		X	X	X
Section 3		X	X	X

* RAC = Rubberized Asphalt Concrete, Gap-Graded

5.3.1 Rehabilitation 1: Mill Surface, Crack and Seat, HMA Overlay

The crack and seat process is an effective way to re-use an existing PCC pavement and reduce the reflective cracking potential in a HMA overlay. Prior to the crack and seat process, the existing PCC pavement should be milled to remove any HMA material on the pavement surface. The crack and seat equipment will apply loads on the existing PCC pavement at 1 to 3 foot intervals along the pavement length to break up the PCC pavement into smaller pieces (1 to 3 foot panels). After the cracking is complete, rollers are run along the pavement surface to "seat" the panels and create interlock of the panels. After appropriate preparation of the newly seated PCC surface, a new HMA surface can be placed. The thickness of the overlay will be dependent on the desired design life of the pavement.

5.3 2 Rehabilitation 2: Crack Filling, Double Rubber Chip Seal

In the areas where the existing HMA surface is in good condition with minimal fatigue cracking present, a surface treatment may be the most economical option for rehabilitation. We recommend that all existing cracks greater than ¼" wide be filled prior to the placement of a surface seal. We recommend a double rubber chip seal, which is a seal that uses an asphalt emulsifier with crumb rubber. The benefit of this material is that it tends to retard the development of underlying cracks and thus minimize the potential for surface water infiltration into the pavement subgrade. Typically, two seals would be placed as part of this process. This may not be the best rehabilitation option if the existing pavement requires structural improvement to meet the required design life.

5.3.3 Rehabilitation 3: Mill Surface, and HMA Overlay ≥2" Thick, Localized Repair

For this alternative, we recommend that the pavement surface be milled to remove any existing surface seal and, in the case of PCC surfaces, remove any HMA skin patches from the pavement surface. In the case of the PCC pavement surface (Section 1), it may be necessary to diamond grind the PCC surface in order to remove any areas of faulting or vertical displacements. Where a thick HMA overlay is present (Sections 2, 3), it is important to leave a thickness of at least 2 inches of existing HMA remaining. A minimum new HMA overlay thickness of at least 2 inches is recommended for serviceability purposes and for retarding reflective cracking of underlying cracks. However, the HMA pavement thickness should be designed to meet the requirements of the desired pavement design life, which may require an overlay greater than 2 inches.

Prior to the placement of the overlay, we recommend that full-depth pavement repairs be conducted in areas where fatigue cracking or other asphalt concrete load-related distress is visible on the pavement surface. Also, a pavement reinforcement fabric may be desirable to retard reflective cracking in areas not proposed for full-depth pavement repairs.

5.3.4 Rehabilitation 4 Mill Surface and RAC Overlay ≥2" Thick Localized Repair

For this alternative, we recommend that the pavement surface be milled to remove any existing surface seal and, in the case of PCC surfaces, remove any HMA skin patches from the pavement surface. In the case of the PCC pavement surface (Section 1), it may be necessary to diamond grind the PCC surface in order to remove any areas of faulting or vertical displacements. Where a thick HMA overlay is present (Sections 2, 3), it is important to leave a thickness of at least 2 inches of existing HMA remaining. A minimum new RAC overlay thickness of at least 1.5 inches is recommended for serviceability purposes and for retarding reflective cracking of underlying cracks. However, the RAC pavement thickness should be designed to meet the requirements of the desired pavement design life, which may require an overlay greater than 2 inches.

A rubberized asphalt concrete material (RAC) might be considered for use in the pavement overlay as an alternative to conventional HMA. Although often more expensive than HMA material, RAC has been observed to perform effectively in retarding reflective cracking. If during the design of the pavement section, a thick HMA surface is required, the final design may be a conventional HMA layer, overlayed with a RAC layer.

Prior to the placement of the overlay, we recommend that full-depth pavement repairs be conducted in areas where fatigue cracking or other asphalt concrete load-related distress is visible on the pavement surface. Also, a pavement reinforcement fabric may be desirable to retard reflective cracking for areas not proposed for full-depth pavement repairs.

5.4 PAVEMENT EVALUATION

The R-values of the subgrade soils throughout the project site are relatively consistent, ranging from <5 to 8. We currently recommend that any future roadway improvements utilize an R-value of 5 for new pavement design. Existing pavement sections are highly variable along Sections 2 and 3. Borings K-8 and K-9 (Section 2) encountered structural sections consisting of 7 to 8 inches of HMA overlying PCC pavement placed directly on the clay subgrade, respectively. We judge that this section is behaving as a full depth pavement section. Borings K-10 and K-11 (Section 3) encountered structural sections consisting of 6 to 9 inches of HMA overlying 15 to 18 inches of granular base. The HMA pavement at boring K-10 consists of an initial 5 inch layer with a 4 inch overlay. This pavement section follows more conventional pavement design.

In Table 5 we have calculated the required pavement section as a function of the Traffic Index (TI) for the range of HMA pavement thickness and HMA/PCC pavement thickness observed in our borings. This table is provided as a guide to evaluate the adequacy of an existing pavement section. Rehabilitation of pavements is typically based upon measurement of pavement deflection and comparing these deflections against pre-determined “tolerable deflections.” Caltrans defines tolerable defections as the level of deflection that repeated deflections of that magnitude would produce fatigue cracking in the surface prior to the planned design period of the pavement. Measurement of pavement deflection is beyond the scope of our studies. Recommendations for design of new pavements are provided in Section 6.0 of this report.

TABLE 5: CALCULATED PAVEMENT SECTIONS

R-Value = 5

Asphalt Concrete Thickness (inches)	Assumed Traffic Index (inches)	Required Aggregate Base (inches) R-value = 78	Required Aggregate Subbase (inches) R-value = 50	Total Pavement Section (inches)
5.5	7.5	15	--	20.5
		5	11	21.5
	9	20.5	--	26
		8	13.5	27
	11	28	--	33.5
		12.5	17	35
9	7.5	8.5	--	17
		0	9.5	18
	9	14.5	--	23.5
		2	13.5	24.5
	11	22.5	--	31.5
		7	17	33
12	7.5	3	--	15
		--	3	15
	9	9	--	21
		--	10	22
	11	18	--	30
		2.5	17	31.5

5.5 SITE DRAINAGE

Design of storm water collection and discharge facilities will be important to the overall performance of this project. Care should be taken to control storm water that will run onto the site from the adjacent steep hillsides and ravines. Collected storm water will most likely be discharged onto the colluvial and residual soil slopes located between the roadway and creek. We recommend that, at a minimum, the culverts discharge onto a properly sized dissipation pad consisting of adequately sized rip-rap in accordance with Caltrans Standard Specifications. Level spreaders may be required to mimic natural sheet flow discharges. Culverts should not be designed to allow concentrated flow to discharge onto natural slope that could result in significant erosion and formation of erosion gullies and potentially induce deep seated slope failures.

6.0 RECOMMENDATIONS

6.1 SITE PREPARATION AND GRADING

We anticipate that required grading will consist mainly of minor cuts and fills of approximately 1 to 2 feet in maximum vertical height along the edges of the roadway to allow realignment and to provide positive surface drainage in areas adjacent to the street. General recommendations regarding site preparation and grading are provided herein. More detailed recommendations may be required once the project design is completed and Kleinfelder should be provided the opportunity to review project plans to determine if additional recommendations are warranted.

Finished construction areas should generally be sloped, and drainage gradients maintained, to carry surface water to storm drain systems. Ponding of water or concentrated seepage should not be allowed under structures, or adjacent to the roadway. Grading should be sloped and directed to suitable collection facilities so that the proposed improvements do not impact the drainage of the adjacent properties.

The areas to receive fill should be stripped of vegetation and organic or construction debris before grading commences. We anticipate that the stripping operation will require the removal of 2 to 3 inches of topsoil in most areas. Deeper stripping or grubbing will be required where concentrations or pockets of organic-laden soil, or old fill, and soft subgrade are encountered. Cleared construction and vegetative debris should be removed from the site and properly disposed. The stripped, organic-rich material may be stockpiled and used for future landscaping purposes; however, this material should not be used as engineered fill. Low plasticity alluvial soils free of organics or other deleterious substances could possibly be segregated and stockpiled for potential re-use as select fill, subject to observation by Kleinfelder. Asphalt grindings or other suitably pulverized pavements generated from this project may also be suitable for re-use as fill. Additional laboratory testing should be conducted by Kleinfelder to confirm the material is suitable for use as select fill.

Excavations for the removal of culverts should be cleaned of loose materials and widened as necessary to permit compaction equipment access. The excavations should be subsequently backfilled with properly compacted soil as specified in the following sections of this report.

On-site soils that are free of organic matter and do not contain rocks over 4 inches in diameter will generally be satisfactory for re-use as general fill. However, on-site expansive soils (typically boring log classification symbols CH and CL with plasticity indices greater than 15 percent) should not be used as select fill.

Imported select fill should be of low expansion potential and free of organic matter, and should conform, in general, to the following requirements:

Plasticity Index	less than 15%
Liquid Limit	less than 40%
Percent Soil Passing #200 Sieve	between 15% and 60%
Maximum Aggregate Size	4 inches

Fill should be spread in thin lifts; moisture conditioned to near optimum moisture content and compacted to the relative compaction specifications presented below. Fill (or cut) subgrade soils should be finished to present smooth, unyielding surfaces. Subgrade soils should be maintained at their moist or above optimum moisture contents and be free of shrinkage cracks, until covered by permanent construction. A summary of our compaction requirements is presented in the following Table 6.

TABLE 6: SUMMARY OF COMPACTION REQUIREMENTS

Area	Compaction Requirements
General and Select Engineered Fill	In lifts, a maximum of 8 inches loose thickness, compact to a minimum of 90 percent relative compaction at or within 2 percent of the optimum moisture content for select (non-expansive) fill. On-site expansive soil, if used outside of or below select fill zones, should be moisture conditioned to, and maintained at, 4 percent or more above optimum moisture content and compacted to between 88 and 92 percent relative compaction.
Trenches	In lifts, a maximum of 8 inches loose thickness, compact to at least 90 percent relative compaction at or within 2 percent of the optimum moisture content for select, non-expansive fill. On-site expansive soil, if used below select fill zones, should be moisture conditioned to, and maintained at, 4 percent or more above optimum moisture content and compacted to between 88 and 92 percent relative compaction.

Finished cut or fill slopes (if any) should be trimmed to expose a firm surface free of loose material, and should be no steeper than 3H:1V (horizontal to vertical) where native materials are used or exposed, or 2H:1V if select material is used in fill slope construction. Upon completion of grading, all denuded slopes should be planted with fast-growing, deep-rooted groundcover to reduce the risk of erosion.

Grading operations during or shortly following the wet season, or in areas where the soils are saturated, will likely require provisions for drying of the soil prior to achieving suitable compaction. If the project necessitates fill placement and compaction in wet conditions, we can provide alternatives to conventional drying of the soils. Conversely, additional moisture will likely be required during the dry months. Water trucks should be available in sufficient number to provide water to achieve the specified moisture conditioning during compaction.

In general, site preparation and grading operations should be observed by a representative of Kleinfelder. This will allow us to check whether unforeseen or detrimental materials are exposed by the construction equipment and to modify our recommendations, if necessary.

6.2 EXPANSIVE SOIL CONSIDERATIONS

Although not encountered in the widely space borings drilled for this project, colluvial and residual soils that have a moderate to high expansion potential may be encountered along the length of the project. Pavements placed directly on, or sufficiently close to, the expansive on-site soils in their present condition will undergo detrimental and erratic movement. Our experience indicates that, where the surface or near-surface soils are expansive, pavements will experience unacceptable distress (heave and cracking) as the expansive materials shrink and swell with changes in moisture content. Therefore, we judge that the expansive soils are not suitable for support of new shoulder pavements unless mitigating measures to reduce shrink and/or swell movement are considered in project design and construction. Kleinfelder should observe the subgrade of new or reconstructed pavements to check for the presence of expansive soils and provide supplemental recommendations for subgrade preparation, as required. General recommendations regarding treatment of expansive soil subgrades are provided below.

In asphalt-paved areas, the most practical method of lessening the detrimental effects of expansive soils is to thoroughly moisture condition them to close all shrinkage cracks for their full depth and to maintain them at a high moisture content until covered with the planned pavement section. Seasonal moisture changes at unprotected pavement edges can most effectively be controlled by installing a continuous perimeter moisture cutoff barrier. Streets that are bordered by planter areas or native ground areas may also need a moisture cutoff barrier, unless some risk of edge cracking in the asphalt concrete surfacing is acceptable. If cracking is not acceptable, the moisture barrier should consist of a 4-inch-wide trench extending a minimum of 42 inches below finished grade or 6 inches below the street subgrade, whichever is deeper. The trench should be filled with lean concrete consisting of ½-inch maximum aggregate, 2-sack slurry mix with a 6- to 8-inch slump. Asphalt pavement section recommendations are presented in Section 6.5 of this report.

During the dry season, shrinkage cracks in highly-expansive soils may be as deep as four to five feet below existing grades. Therefore, prolonged watering and flooding, and the possible use of wetting agents, may be necessary to close shrinkage cracks for their full depth. Alternatively, the grading contractor may elect to over-excavate the dry, expansive soils to facilitate moisture conditioning them. Since the exact depth of required moisture conditioning will not be known prior to site grading, we suggest that the contract documents contain provisions for either alternative at the contractor's option.

6.3 TEMPORARY EXCAVATION AND BACKFILL

Shallow excavations for culverts and utility trenches can readily be made with either a backhoe or trencher. We expect the walls of trenches less than 5 feet deep founded in cohesive soils to remain in a near-vertical configuration during utility construction, provided equipment or excavated spoil surcharges are not located near the top of the excavation. Where trenches extend deeper than 5 feet, the excavation can become unstable. However, granular soils underlie the roadway and wall of trenches are not expected to stand and will need to be sloped or shored.

Groundwater may be encountered in shallow excavations for utilities depending on the time of year construction commences. Groundwater levels are anticipated to fluctuate with the level of water in the drainages and creeks near the roadway. As such, the contractor should be prepared to dewater the utility excavations by pumping from temporary closely spaced sumps or by other similar methods, at the contractor's option. All trenches, regardless of depth, should be evaluated for stability prior to personnel entering them. Shoring or sloping of the deeper trench walls will be necessary to protect personnel and to provide stability. At a minimum, all trenches should conform to the current CAL-OSHA requirements for worker safety.

Trench backfill should be compacted in accordance with the recommendations as previously presented in Section 6.1, Table 6, or in accordance with the County of Marin requirements, whichever is more stringent. Care should be taken to adequately compact utility trench backfill in all structure areas including pavements. Poor compaction will likely cause subsequent settlement of the trench, resulting in possible distress cracking to the overlying structure or pavement.

6.4 NEW ASPHALT PAVEMENT SECTIONS

Pavement design sections presented in Table 7 below were calculated using the State of California Department of Transportation (Caltrans) flexible pavement design method and an assumed design R-value of 5, representative of the clayey soils that may be found at the site. Traffic Indices of 7.5, 8.5 and 11 were assumed for design of the roadway area. These choices for Traffic Indices should be reviewed by the project civil engineer to evaluate their suitability for the proposed development; changes in Traffic Indices will require modification of the pavement sections recommended below.

Roadway shoulders adjacent to Lagunitas Creek banks appear to have settled/softened resulting in pavement distress. These shoulders should be reconstructed by removing the soils and replacing with material meeting the requirements for imported select fill. Once the new roadway alignment is determined, Kleinfelder should be retained to conduct a geologic assessment of shoulder conditions and to develop remedial alternatives for each distressed area.

TABLE 7: RECOMMENDED PAVEMENT SECTIONS
R-Value = 5

Assumed Traffic Index	Asphalt Concrete (inches)	Aggregate Base (inches) R-value = 78	Aggregate Subbase (inches) R-value = 50
7.5	4	17.5	--
	4	7.5	11.0
	9.5	--	--
8.5	5	19.5	
	5	8.0	13.0
	13.5	--	--
11	6.5	26.5	--
	6.5	11.0	17.0
	>12"		

These recommended pavement sections assume the following conditions:

1. Expansive soil subgrades are compacted to between 90 and 92 percent relative compaction at a moisture content of at least 4 percent above optimum for the top 6 inches. Subgrade soils should have shrinkage cracks closed for their full depth, and be maintained at their above optimum moisture content, until covered by permanent construction and protected by perimeter moisture barriers.
2. Aggregate base meets with Caltrans Standard Specifications requirements for Class 2 materials.
3. All imported select fill subgrade (if any) and aggregate base materials are compacted to at least 95 percent relative compaction at near optimum moisture contents.
4. Pavement areas are sloped to drain so that the risk of subgrade soil saturation, and corresponding strength loss, is reduced.
5. Subgrade soils are firm and unyielding before aggregate base materials are placed.

6. Asphalt concrete surfacing meets with Caltrans Standard Specifications requirements, and is placed and compacted on firm and <u>unyielding</u> aggregate base materials.

If the on-site expansive soils are lime-treated, the pavement section aggregate base thickness can be reduced. Actual pavement design for lime-treated subgrade soils can be calculated after completion of additional lime-soil laboratory testing including possible R-value tests.

ADDITIONAL SERVICES

7.1 SUPPLEMENTAL CONSULTATION

We should be retained to review preliminary roadway improvement drawings and to conduct reconnaissance geologic mapping to identify areas where roadway shoulder reconstruction along the top of Lagunitas Creek banks may show existing or potential distress due to slope instability. Kleinfelder can then provide supplemental geotechnical recommendations for reconstruction of the roadway edges, as appropriate.

7.2 PLANS AND SPECIFICATIONS REVIEW

We recommend Kleinfelder conduct a general review of preliminary plans and specifications to evaluate that our earthwork and foundation recommendations have been properly interpreted and implemented during design. In the event Kleinfelder is not retained to perform this recommended review, we will assume no responsibility for misinterpretation of our recommendations.

7.3 CONSTRUCTION OBSERVATION AND TESTING

We recommend that all earthwork during construction be monitored by a representative from Kleinfelder, including site preparation, placement of all engineered fill and trench backfill, construction of roadway subgrades, and all foundation excavations. The purpose of these services would be to provide Kleinfelder the opportunity to observe the soil conditions encountered during construction, evaluate the applicability of the recommendations presented in this report to the soil conditions encountered, and recommend appropriate changes in design or construction procedures if conditions differ from those described herein.

8.0 LIMITATIONS

Recommendations contained in this report are based on our field observations and subsurface explorations, limited laboratory tests, subsurface explorations and laboratory testing performed by others, and our present knowledge of the proposed construction. A detail topographic survey was not available to Kleinfelder at the time of our visual assessment of pavement conditions. Detailed mapping of distressed roadway sections, slope or creek banks could not be conducted nor was part of our scope of work. It is possible that soil conditions could vary between or beyond the points explored. If soil conditions are encountered during construction that differ from those described herein, we should be notified immediately in order that a review may be made and any supplemental recommendations provided. If the scope of the proposed construction, including the proposed loads or structural locations, changes from that described in this report, our recommendations should also be reviewed.

We have prepared this report in substantial accordance with the generally accepted geotechnical engineering practice as it exists in the site area at the time of our study. No warranty is expressed or implied. The recommendations provided in this report are based on the assumption that an adequate program of tests and observations will be conducted by Kleinfelder during the construction phase in order to evaluate compliance with our recommendations. Other standards or documents referenced in any given standard cited in this report, or otherwise relied upon by the author of this report, are only mentioned in the given standard; they are not incorporated into it or "included by reference," as that latter term is used relative to contracts or other matters of law.

This report may be used only by the client and only for the purposes stated, within a reasonable time from its issuance (2 years). Land use, site conditions (both on site and off site) or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client who wishes to use this report shall notify Kleinfelder of such intended use. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

Plates

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO. 82400
DRAWN: 8/13/08
DRAWN BY: I.McGovern
CHECKED BY: M.Stanley
FILE NAME: SITELOC.MXD

SITE LOCATION MAP

Sir Francis Drake Blvd.
Pavement Rehabilitation Project
Marin County, California

PLATE
1

2,000 1,000 0 2,000 Feet

1:24,000

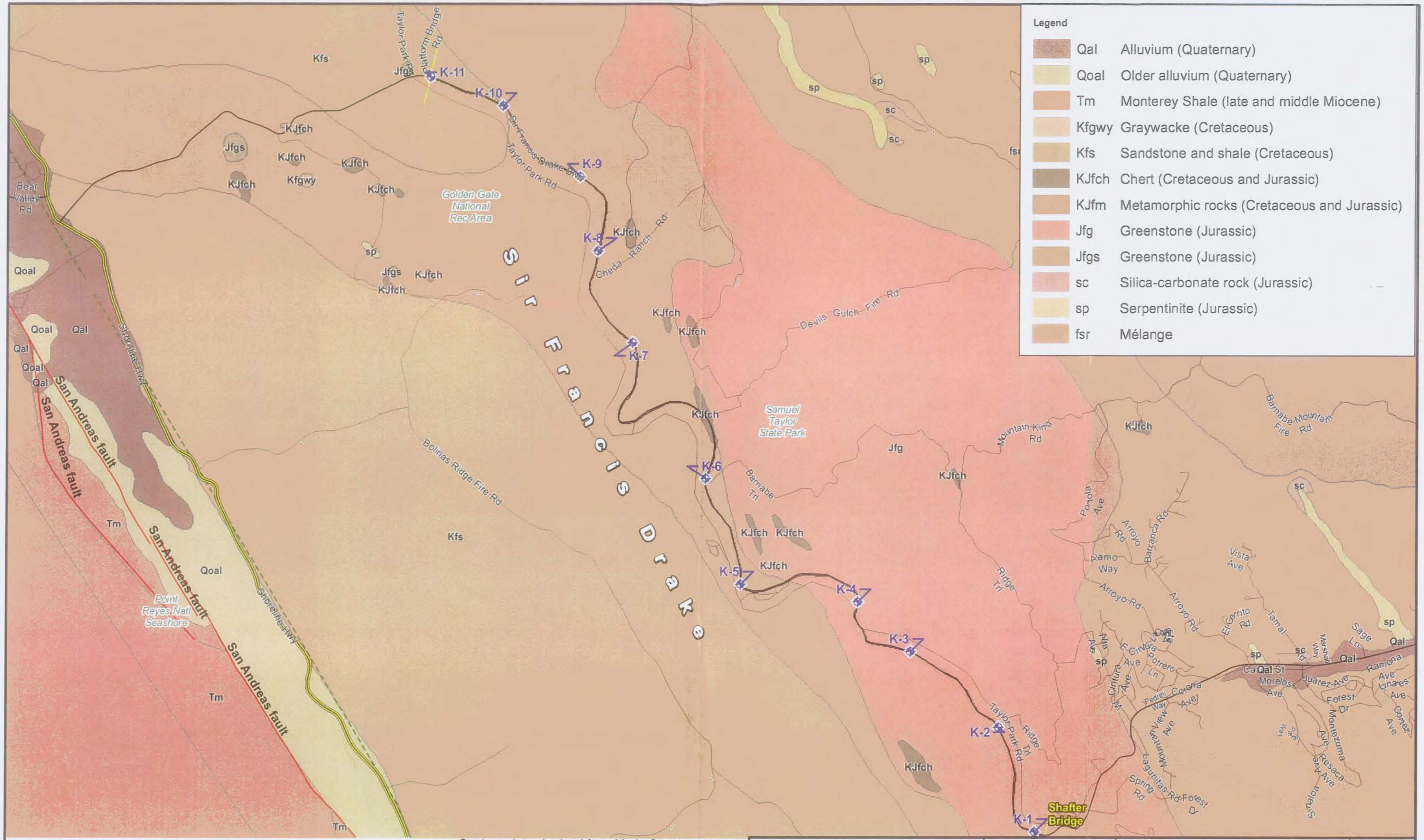
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO. 82400
DRAWN: 8/13/08
DRAWN BY: I.McGovern
CHECKED BY: M.Stanley
FILE NAME: BORINGS.MXD

BORING LOCATION MAP

Sir Francis Drake Blvd.
Pavement Rehabilitation Project
Marin County, California

PLATE
2



Geology data obtained from Marin County.
Originally from USGS
Geologic Map and Map Database of Parts of Marin, San Francisco, Alameda, Contra Costa, and Sonoma Counties, California
M. C. Blake Jr., R.W. Graymer, and D.L. Jones
http://geopubs.wr.usgs.gov/map-mf/mf2337/

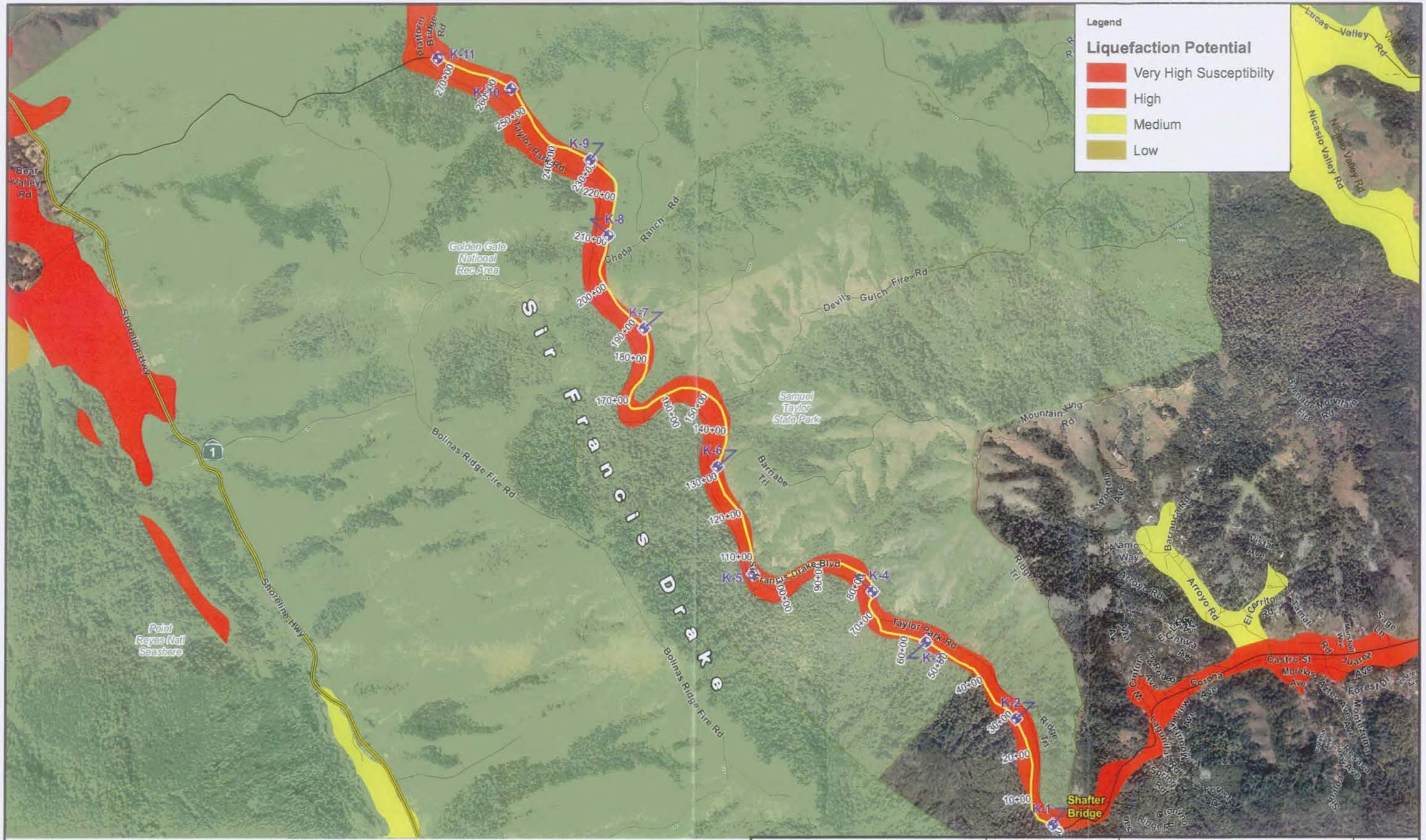
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	82400
DRAWN:	8/13/08
DRAWN BY:	I.McGovern
CHECKED BY:	M.Stanley
FILE NAME:	GEO.MXD

SITE GEOLOGY

Sir Francis Drake Blvd.
Pavement Rehabilitation Project
Marin County, California

PLATE
3



2,000 1,000 0 2,000 Feet

1:24,000

Liquefaction data obtained from Marin County.
Originally from USGS Open File Report 00-444

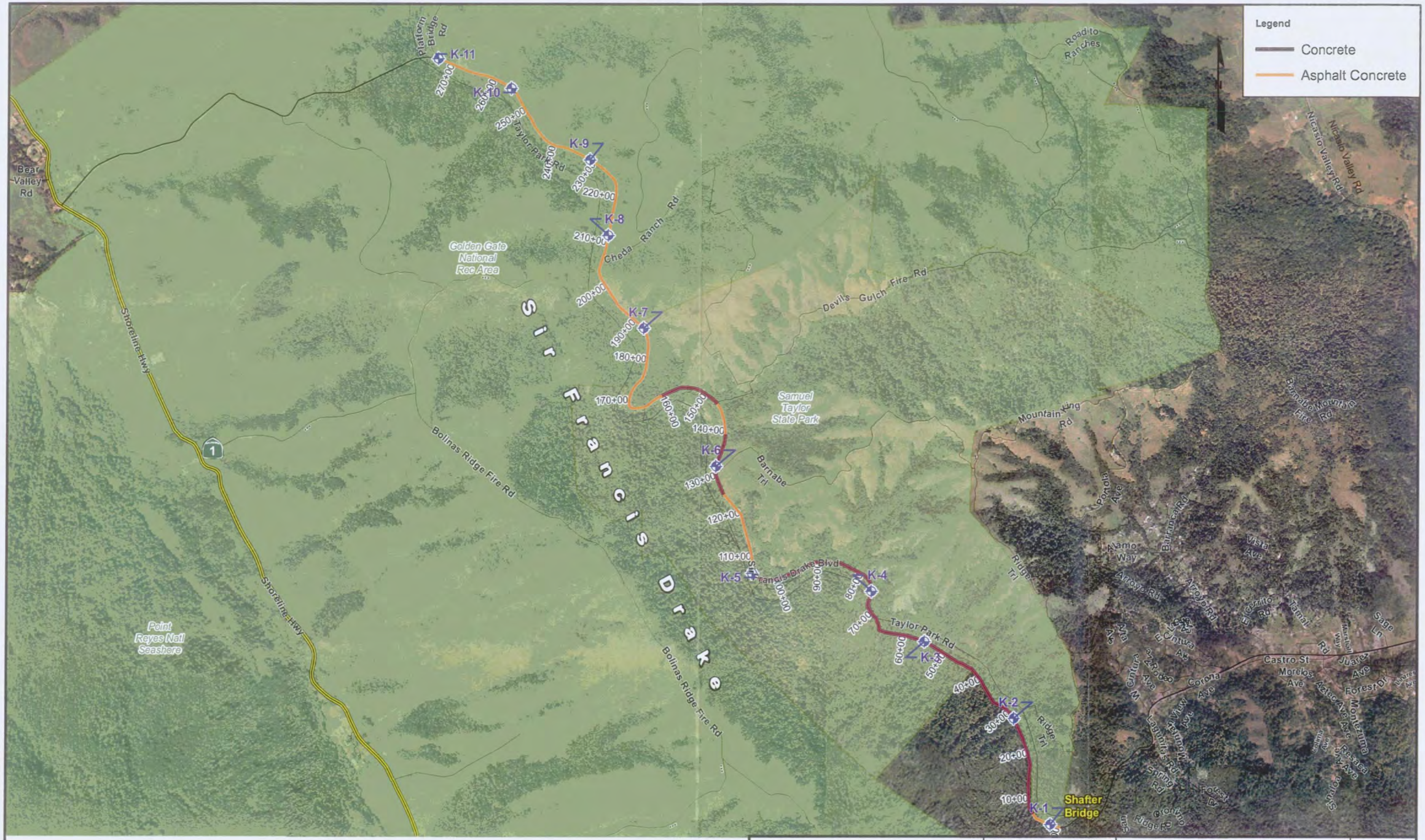
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	82400
DRAWN:	8/13/08
DRAWN BY:	I.McGovern
CHECKED BY:	M.Stanley
FILE NAME:	LIQU.MXD

LIQUEFACTION POTENTIAL

Sir Francis Drake Blvd.
Pavement Rehabilitation Project
Marin County, California

PLATE
4



Liquefaction data obtained from Marin County.
Originally from USGS Open File Report 00-444

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	82400
DRAWN:	8/13/08
DRAWN BY:	I.McGovern
CHECKED BY:	M.Stanley
FILE NAME:	PMS.MXD

CONCRETE AND ASPHALT CONCRETE SECTIONS

Sir Francis Drake Blvd.
Pavement Rehabilitation Project
Marin County, California

PLATE
5

2,000 1,000 0 2,000
Feet
1:24,000

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO.	82400
DRAWN:	8/13/08
DRAWN BY:	I.McGovern
CHECKED BY:	M.Stanley
FILE NAME: SHATSLAB.MXD	

SHATTERED PCC SLAB CONDITIONS

Sir Francis Drake Blvd.
Pavement Rehabilitation Project
Marin County, California

PLATE
6

Appendix A

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS					DESCRIPTIVE NAMES
COARSE GRAINED SOILS 50% is greater than #200 sieve	**GRAVEL** % GRAVEL > % SAND	CLEAN GRAVEL WITH LITTLE OR NO FINES (<=5%)	**GW**	○	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES
			GP	○	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURES
		GRAVEL WITH > 12% FINES	**GM**	▥	SILTY GRAVEL, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	▨	CLAYEY GRAVEL, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SAND % SAND > % GRAVEL	CLEAN SAND WITH LITTLE OR NO FINES (<=5%)	**SW**	▓	WELL GRADED SAND, GRAVELLY SAND
			SP	░	POORLY GRADED SAND, GRAVELLY SAND
		SAND WITH > 12% FINES	**SM**	▥	SILTY SAND, POORLY GRADED SAND-SILT MIXTURES
			SC	▨	CLAYEY SAND, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS 50% passes #200 sieve	**SILT AND CLAY** LIQUID LIMIT LESS THAN 50		**ML**	▥	INORGANIC SILT AND VERY FINE SAND, ROCK FLOUR, SILTY OR CLAYEY FINE SAND, OR CLAYEY SILT WITH SLIGHT PLASTICITY
			CL	▨	INORGANIC CLAY OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAY, SANDY CLAY, SILTY CLAY, LEAN CLAY
			OL	▥	ORGANIC CLAY AND ORGANIC SILTY CLAY OF LOW PLASTICITY
	SILT AND CLAY LIQUID LIMIT GREATER THAN 50		**MH**	▥	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILT
			CH	▨	INORGANIC CLAY OF HIGH PLASTICITY, FAT CLAY
			OH	▨	ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILT
HIGHLY ORGANIC SOILS			**Pt**		PEAT AND OTHER HIGHLY ORGANIC SOILS

FIELD SAMPLING

◧	CALIFORNIA SAMPLE 2.5" I.D.
■	MODIFIED CALIFORNIA SAMPLE 2" I.D.
☒	DISTURBED, BAG OR BULK SAMPLE
◪	STANDARD PENETRATION TEST
◿	SHELBY TUBE SAMPLE
◫	3.5" I.D. CONTINUOUS CORE SAMPLE
▯	UNRETAINED PORTION OF SAMPLE
⊟	HAND SAMPLER
▼	WATER LEVEL OBSERVED IN BORING (at given post-drilling time)
▽	WATER LEVEL OBSERVED IN BORING (at time of drilling)

LABORATORY TESTS

LL	LIQUID LIMIT
PI	PLASTICITY INDEX
SA	SIEVE ANALYSIS
#200	PERCENT PASSING #200 SIEVE
RV	RESISTANCE VALUE
EI	EXPANSION INDEX
DS	DIRECT SHEAR
Tx/UU	TRIAXIAL SHEAR-UNCONSOLIDATED UNDRAINED
UC	UNCONFINED COMPRESSION
SG	SPECIFIC GRAVITY
PP	POCKET PENETROMETER SHEAR STRENGTH (tsf)

NOTES: Blow counts represent the number of blows of a 140-pound hammer falling 30-inches required to drive a sampler the last 12-inches of an 18-inch penetration. Field blow counts (not-converted).

The lines separating strata on the logs represent approximate boundaries only. The actual transition may be gradual. No warranty is provided as to the continuity of soil strata between borings. Logs represent the soil strata and groundwater observed at the boring location on the date of drilling only.

KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER **82400** DATE **8/14/2008**

BORING LOG EXPLANATION

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE
A-1

WEATHERING

Fresh - No visible sign of rock material weathering; perhaps slight discoloration on major discontinuity surfaces. **Weathering Grade I.**

Slightly Weathered - Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering and may be somewhat weaker externally than in its fresh condition. **Weathering Grade II.**

Moderately Weathered - Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a continuous framework or corestones. **Weathering Grade III.**

Highly Weathered - More than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones. **Weathering Grade IV.**

Completely Weathered - All rock material is decomposed and/or disintegrated to a soil. The original mass structure is still largely intact. **Weathering Grade V.**

Residual Soil - All rock material is converted to a soil. The mass structure and material fabric are destroyed. There is a large change in volume, but the soil has not been significantly transported. **Weathering Grade VI.**

STRENGTH (OF INTACT ROCK PIECES

Grade	Description	Field Identification	Approx. UCS (Mpa)	Approx. UCS (psi)
R0	Extremely Weak Rock	Identified by thumbnail	0.25 - 1.0	50 - 150
R1	Very Weak Rock	Crumbles under firm blows with point of geological hammer	1.0 - 5.0	150 - 750
R2	Weak Rock	Can be peeled by a pocket knife, specimen can be fractured with single *firm* blow of geological hammer	5.0 - 25	750 - 3,500
R3	Moderately Strong Rock	Cannot be scraped or peeled with pocket knife, specimen can be fractured with single firm blow of geological hammer	25 - 50	3,500 - 7,500
R4	Strong Rock	Specimen requires more than one blow of geological hammer to fracture it	50 - 100	7,500 - 15,000
R5	Very Strong Rock	Specimen requires many blows of geological hammer to fracture it	100 - 250	15,000 - 35,000
R6	Extremely Strong Rock	Specimen can only be chipped with geological hammer	>250	>35,000

DISCONTINUITY SPACING

	English	Metric
1. Extremely close	<1.0 in.	(<20 mm)
2. Very close	1.0 - 2.5 in.	(20 - 60 mm)
3. Close	2.5 - 8.0 in.	(60 - 200 mm)
4. Moderately	8.0 in - 2.0 ft.	(200 - 600 mm)
5. Wide	2.0 - 6.5 ft.	(600 - 2,000 mm)
6. Very wide	6.5 - 20.0 ft.	(2 - 6 m)
7. Ext. wide	>20.0 ft.	(>6 m)

APERTURE WIDTH

Very tight	<1.0 mm
Tight	0.1 - 0.25 mm
Partly open	0.25 - 0.5 mm
Open	0.5 - 2.5 mm
Moderately wide	2.5 - 10 mm
Wide	10 mm - 1 cm
Very wide	1 - 10 cm
Extremely wide	10 - 100 cm
Cavernous	>1 m

ROCK QUALITY DESIGNATION

RQD%	Rock Quality
90 - 100	Excellent
75 - 90	Good
50 - 75	Fair
25 - 50	Poor
0 - 25	Very Poor

$$RQD = \frac{\text{Sum of Intact Pieces} >4 \text{ inches (100 mm)}}{\text{Total Core Run Length}}$$

■	Hand-Driven Tube Sample
P.P. +4.5	Pocket Penetrometer (tons per square foot, tsf)

KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER **82400** DATE **8/14/2008**

ROCK DESCRIPTION CRITERIA

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE

A-2

LABORATORY				FIELD					
Dry Density (pcf)	Moisture Content (%)	Shear Strength (ksf)	Other Tests	Blows/foot *	Sample	Depth (feet)	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION
								AC	**ASPHALT CONCRETE** is 5 inches thick. Adjacent to boring is 8 inches of concrete.
			BULK K-1			1			**SILTY SANDY GRAVEL -** brown, dry, medium dense, angular gravel from 1 - 3", ▼fine to coarse grained sand (FILL)
						2			∇
				28					
						3			
						4		GP/GM	
				6					1" of tree membrane
						5			hole caved to 3', switched to 8" hollow stem auger
						6			
						7			
				25					
						8			**GREENSTONE -** very dark gray, slightly weathered, weak to moderately strong (R2-R3), highly fractured, sandy silt infill, [FRANCISCAN BEDROCK] becomes moist
						9			
				46					
						10			
						11			
				31					
						12			BOTTOM OF BORING K-1 @ 11.5 FEET No Free Water Encountered
						13			
						14			
						15			

* Field blow counts (not-converted).

**

SURFACE ELEVATION: **170.0 ****

TOTAL DEPTH: **11.5 feet**

GROUND WATER DEPTH: ∇ **2.0 feet at time of drilling**

▼ **1.5 feet**

LOGGED BY: **C. Goitein**

DIAMETER of BORING: **8" Hollow Stem Auger**

DATE DRILLED: **7-10-07**

EQUIPMENT: **Mobile B-53 Truck mounted**

HAMMER TYPE: **140lbs.**

KLEINFELDER
Bright People. Right Solutions.

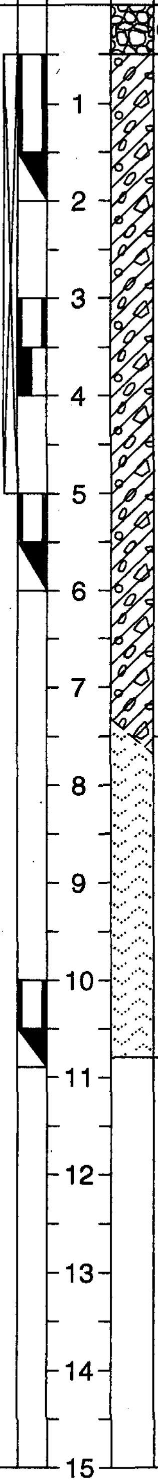
PROJECT NUMBER **82400** DATE **8/22/2008**

LOG OF EXPLORATION BORING K- 1

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE
A-3
1 of 1

Data Template: SANTA ROSA - KLEINFELDER SANTA ROSA 5-8-08 .GDT - 8/22/08 11:06 - U:\NEW GINT PROJECTS\82400 SIR FRANCIS DRAKE RD REHAB\LOGS_7-11-07.GPJ



LABORATORY				FIELD					
Dry Density (pcf)	Moisture Content (%)	Shear Strength (ksf)	Other Tests	Blows/foot *	Sample	Depth (feet)	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION
						0		CONC	**CONCRETE** is 6 inches thick.
			BULK K-2 R-Value < 5			1			**CLAYEY GRAVEL WITH SAND -** brown, dry to moist, dense to very dense, angular gravel up to 1", fine to coarse grained sand
				50		2			
						3			becomes reddish brown
				50/5		4		GC	
						5			
				50/5		6			
						7			**GREENSTONE -** mottled yellow brown, highly weathered, extremely weak (R0), highly sheared, [FRANCISCAN BEDROCK]
						8			
						9			
				50/4		10			
						11			BOTTOM OF BORING K-2 @ 10.8 FEET No Free Water Encountered
						12			
						13			
						14			
						15			

* Field blow counts (not-converted).
**

SURFACE ELEVATION: **190.0 ****
TOTAL DEPTH: **10.8 feet**
GROUND WATER DEPTH: ⊻ **feet at time of drilling**
⊻ **feet**

LOGGED BY: **C. Goitein**
DIAMETER of BORING: **6" Solid Flight Auger**
DATE DRILLED: **7-10-07**
EQUIPMENT: **Mobile B-53 Truck mounted**
HAMMER TYPE: **140lbs.**

KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER **82400** DATE **8/22/2008**

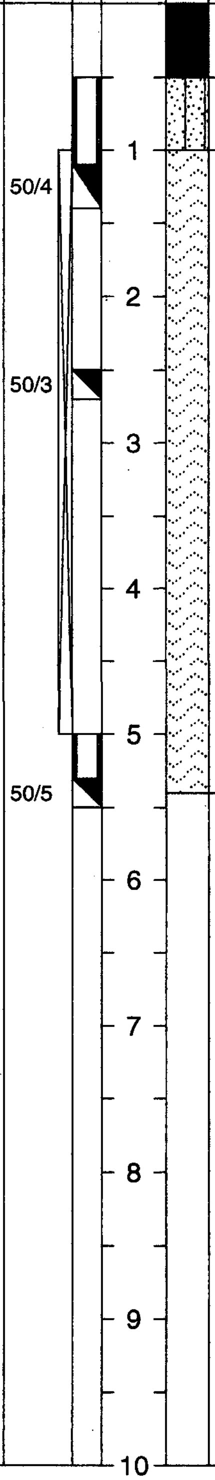
LOG OF EXPLORATION BORING K- 2

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE
A-4
1 of 1

Data Template: SANTA ROSA - KLEINFELDER SANTA ROSA 5-8-08 .GDT - 8/22/08 11:06 - U:\NEW GINT PROJECTS\82400 SIR FRANCIS DRAKE RD REHAB\LOGS_7-11-07.GPJ

LABORATORY				FIELD					
Dry Density (pcf)	Moisture Content (%)	Shear Strength (ksf)	Other Tests	Blows/foot *	Sample	Depth (feet)	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION
								AC	**ASPHALT CONCRETE** is 6 inches thick. Adjacent to boring is 8 inches of concrete.
			BULK K-3					SM	**SILTY SAND -** reddish brown, dry, dense, fine to coarse grained sand, [AGGREGATE BASE]
				50/4		1			**GREENSTONE -** light gray, fresh to slightly weathered, moderately strong to strong (R3-R4), highly fractured, [FRANCISCAN BEDROCK]
				50/3		2			
						5			becomes slightly weathered
				50/5					
						6			BOTTOM OF BORING K-3 @ 5.4 FEET No Free Water Encountered



* Field blow counts (not-converted).
**

SURFACE ELEVATION: **180.0 ****
TOTAL DEPTH: **5.4 feet**
GROUND WATER DEPTH: ▽ **feet at time of drilling**
▼ **feet**

LOGGED BY: **C. Goitein**
DIAMETER of BORING: **6" Solid Flight Auger**
DATE DRILLED: **7-10-07**
EQUIPMENT: **Mobile B-53 Truck mounted**
HAMMER TYPE: **140lbs.**

KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER **82400** DATE **8/22/2008**

LOG OF EXPLORATION BORING K- 3

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE
A-5
1 of 1

Data Template: SANTA ROSA - KLEINFELDER SANTA ROSA 5-8-08 .GDT - 8/22/08 11:06 - U:\NEW GINT PROJECTS\82400 SIR FRANCIS DRAKE RD REHAB\LOGS_7-11-07.GPJ

LABORATORY				FIELD					
Dry Density (pcf)	Moisture Content (%)	Shear Strength (ksf)	Other Tests	Blows/foot *	Sample	Depth (feet)	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION
								CONC	**CONCRETE** is 6 inches thick.
			BULK K-4 -200 = 21 % Sieve Analysis See Plate B-2			1			**GREENSTONE -** mottled reddish brown, highly weathered, extremely to very weak (R0- R1), silty clay infill, , [FRANCISCAN BEDROCK]
				75		2			
						3			
				50/4		4			
117	8.3					5			
				30/2		6			
						7			**GREENSTONE -** mottled olive and reddish brown, moderately to highly weathered, very weak (R1), highly sheared, [FRANCISCAN BEDROCK]
				25/2		8			
						9			
						10			
				53/6					
						11			BOTTOM OF BORING K-4 @ 10.5 FEET No Free Water Encountered
						12			
						13			
						14			
						15			

* Field blow counts (not-converted).
**

SURFACE ELEVATION: **140.0 ****
TOTAL DEPTH: **10.5 feet**
GROUND WATER DEPTH: ⊻ **feet at time of drilling**
⊻ **feet**

LOGGED BY: **C. Goitein**
DIAMETER of BORING: **6" Solid Flight Auger**
DATE DRILLED: **7-10-07**
EQUIPMENT: **Mobile B-53 Truck mounted**
HAMMER TYPE: **140lbs.**

KLEINFELDER

PROJECT NUMBER **82400** DATE **8/22/2008**

LOG OF EXPLORATION BORING K- 4

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE
A-6
1 of 1

LABORATORY				FIELD					
Dry Density (pcf)	Moisture Content (%)	Shear Strength (ksf)	Other Tests	Blows/foot *	Sample	Depth (feet)	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION
								CONC	**CONCRETE** is 9 inches thick.
			BULK K-5 R-Value combined with K-6, K-7 = 8			1			**SILTY SANDY GRAVEL -** olive brown, dry, very dense, angular sandstone fragments up to 0.5"
				75/9		2			
	7.6			50/4		3			
						4		GP/GM	
				85/9		5			
						6			
						7			**SILTY GRAVELLY SAND -** olive brown, dry, very dense, angular sandstone fragments up to 0.5"
				59		8		GM/SM	
						9			BOTTOM OF BORING K-5 @ 8.5 FEET No Free Water Encountered
						10			
						11			
						12			

* Field blow counts (not-converted).
**

SURFACE ELEVATION: **122.0 ****
TOTAL DEPTH: **8.5 feet**
GROUND WATER DEPTH: ▽ **feet at time of drilling**
▼ **feet**

LOGGED BY: **C. Goitein**
DIAMETER of BORING: **6" Solid Flight Auger**
DATE DRILLED: **7-9-07**
EQUIPMENT: **Mobile B-53 Truck mounted**
HAMMER TYPE: **140lbs.**

KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER **82400** DATE **8/22/2008**

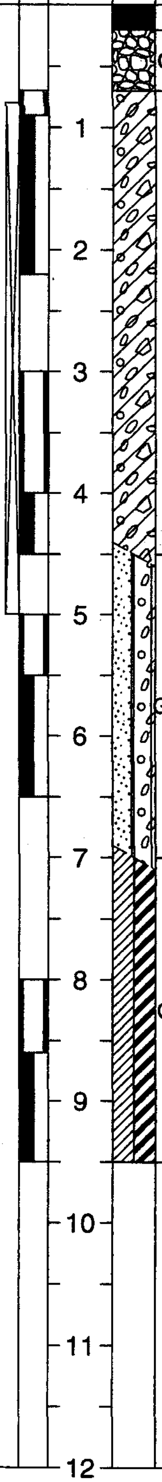
LOG OF EXPLORATION BORING K- 5

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE
A-7
1 of 1

Data Template:
SANTA ROSA - KLEINFELDER SANTA ROSA 5-8-08 .GDT - 8/22/08 11:06 - U:\NEW GINT PROJECTS\82400 SIR FRANCIS DRAKE RD REHABLOGS_7-11-07.GPJ

LABORATORY				FIELD			
Dry Density (pcf)	Moisture Content (%)	Shear Strength (ksf)	Other Tests	Blows/foot *	U.S.C.S. Designation	Depth (feet)	SOIL DESCRIPTION
					AC		**ASPHALT CONCRETE** is 1.5 inches thick.
					CONC		**CONCRETE** is 6 inches thick.
104	9.6		BULK K-6 R-Value combined with K-5, K-7 = 8	55 34	GC		**CLAYEY GRAVEL WITH SAND -** brown, moist, dense, subangular to subrounded gravel from 1 - 2", fine to medium grained sand, rootlets
				15	GM/SM		**SANDY SILTY GRAVEL/ SILTY GRAVELLY SAND -** dark brown, moist, medium dense, angular gravel up to 0.75", fine to coarse grained sand
				60	CL/CH		**GRAVELLY CLAY WITH SAND -** dark brown, moist, very stiff, fine to coarse grained sand
							BOTTOM OF BORING K-6 @ 9.5 FEET No Free Water Encountered



* Field blow counts (not-converted).
**

SURFACE ELEVATION: **120.0 ****
TOTAL DEPTH: **9.5 feet**
GROUND WATER DEPTH: ⊻ **feet at time of drilling**
⊻ **feet**

LOGGED BY: **C. Goitein**
DIAMETER of BORING: **6" Solid Flight Auger**
DATE DRILLED: **7-9-07**
EQUIPMENT: **Mobile B-53 Truck mounted**
HAMMER TYPE: **140lbs.**

KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER **82400** DATE **8/22/2008**

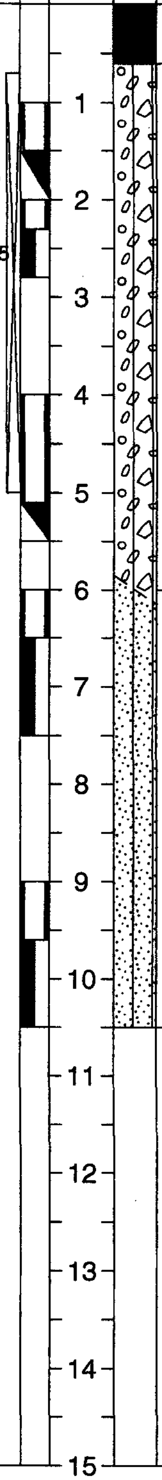
LOG OF EXPLORATION BORING K- 6

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE
A-8
1 of 1

Data Template:
SANTA ROSA - KLEINFELDER SANTA ROSA 5-8-08 .GDT - 8/22/08 11:06 - U:\NEW GINT PROJECTS\82400 SIR FRANCIS DRAKE RD REHABLOGS_7-11-07.GPJ

LABORATORY				FIELD					
Dry Density (pcf)	Moisture Content (%)	Shear Strength (ksf)	Other Tests	Blows/foot *	Sample	Depth (feet)	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION
								AC	**ASPHALT CONCRETE** is 7 inches thick.
			BULK K-7 R-Value combined with K-5, K-6 = 8	50/6 50/3.5 29		1 2 3 4 5		GM	**SANDY GRAVEL WITH SILT -** mottled reddish brown, dry to moist, very dense, angular sandstone fragments up to 1", fine to medium grained sand
	7.7			62 66		6 7 8 9 10		SM	**GRAVELLY SAND WITH SILT -** mottled reddish brown, dry to moist, very dense, angular sandstone fragments up to 1", fine to medium grained sand, rootlets
						11 12 13 14 15			BOTTOM OF BORING K-7 @ 10.5 FEET No Free Water Encountered



* Field blow counts (not-converted).
**

SURFACE ELEVATION: **88.0 ****
TOTAL DEPTH: **10.5 feet**
GROUND WATER DEPTH: ⊻ **feet at time of drilling**
⊻ **feet**

LOGGED BY: **C. Goitein**
DIAMETER of BORING: **6" Solid Flight Auger**
DATE DRILLED: **7-9-07**
EQUIPMENT: **Mobile B-53 Truck mounted**
HAMMER TYPE: **140lbs.**

KLEINFELDER
Bright People. Right Solutions.

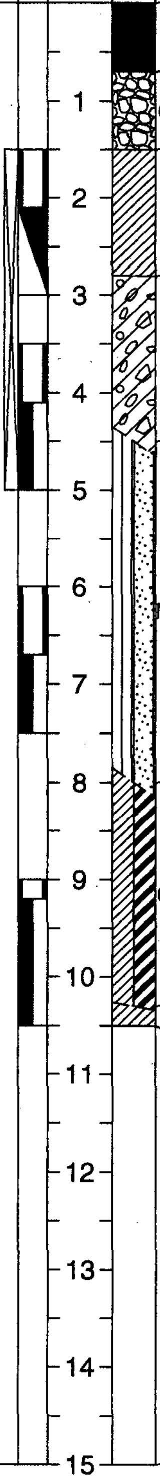
PROJECT NUMBER **82400** DATE **8/22/2008**

LOG OF EXPLORATION BORING K- 7

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE
A-9
1 of 1

Data Template:
SANTA ROSA - KLEINFELDER SANTA ROSA 5-8-08 .GDT - 8/22/08 11:06 - U:\NEW GINT PROJECTS\82400 SIR FRANCIS DRAKE RD REHABLOGS_7-11-07.GPJ



LABORATORY				FIELD					
Dry Density (pcf)	Moisture Content (%)	Shear Strength (ksf)	Other Tests	Blows/foot *	Sample	Depth (feet)	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION
								AC	**ASPHALT CONCRETE** is 8 inches thick.
						1		CONC	**CONCRETE** is 9 inches thick.
			BULK K-8			2		CL	**SANDY CLAY -** olive brown, moist, very stiff
				32					
						3		GC	**CLAYEY GRAVEL WITH SAND -** olive brown, dry to moist, medium dense
						4			
				21				ML/SM	**SANDY SILT/SILTY SAND -** brown, moist, hard/medium dense
						5			
						6			
				19		7			
						8		CL/CH	**CLAY WITH SAND -** mottled yellow brown and gray, moist, very stiff, fine grained sand
						9			
				42		10			
								CL	**SANDY CLAY WITH SANDSTONE FRAGMENTS -** mottled brown and gray, moist, very stiff, fragments up to 0.8"
						11			BOTTOM OF BORING K-8 @ 8.5 FEET No Free Water Encountered
						12			
						13			
						14			
						15			

* Field blow counts (not-converted).
**

SURFACE ELEVATION: **80.0** **
TOTAL DEPTH: **10.5 feet**
GROUND WATER DEPTH: ▽ **feet at time of drilling**
▼ **feet**

LOGGED BY: **C. Goitein**
DIAMETER of BORING: **6" Solid Flight Auger**
DATE DRILLED: **7-9-07**
EQUIPMENT: **Mobile B-53 Truck mounted**
HAMMER TYPE: **140lbs.**

KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER **82400** DATE **8/22/2008**

LOG OF EXPLORATION BORING K- 8

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE
A-10
1 of 1

Data Template: SANTA ROSA - KLEINFELDER SANTA ROSA 5-8-08 .GDT - 8/22/08 11:06 - U:\NEW GINT PROJECTS\82400 SIR FRANCIS DRAKE RD REHAB\LOGS_7-11-07.GPJ

LABORATORY				FIELD					
Dry Density (pcf)	Moisture Content (%)	Shear Strength (ksf)	Other Tests	Blows/foot *	Sample	Depth (feet)	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION
								AC	**ASPHALT CONCRETE** is 6 inches thick.
								CONC	**CONCRETE** is 7 inches thick.
						1			
	18.6		BULK K-9 R-Value combined with K-10 = 8 PI = 11 LL = 27					CL	**SANDY CLAY -** very dark brown to black, moist, stiff, fine grained sand
				12		2			
						3			
112	17.7	.55	UC See Plate B-3	8					
						4		CL/CH	**SANDY CLAY -** very dark brown, moist to wet, soft, fine to coarse grained sand, some sandstone fragments
						5			
			EI = 25 See Plate B-4	11		6			
						7			
								CL/CH	**SANDY CLAY WITH SOME GRAVEL -** reddish brown, moist to wet, soft, fine grained sand, angular gravel up to 0.5"
						8			
				13		9			
						10			BOTTOM OF BORING K-9 @ 9.5 FEET No Free Water Encountered
						11			
						12			

* Field blow counts (not-converted).

**

SURFACE ELEVATION: **90.0 ****

TOTAL DEPTH: **9.5 feet**

GROUND WATER DEPTH: ∇ **feet at time of drilling**

▼ **feet**

LOGGED BY: **C. Goitein**

DIAMETER of BORING: **6" Solid Flight Auger**

DATE DRILLED: **7-9-07**

EQUIPMENT: **Mobile B-53 Truck mounted**

HAMMER TYPE: **140lbs.**

KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER **82400** DATE **8/22/2008**

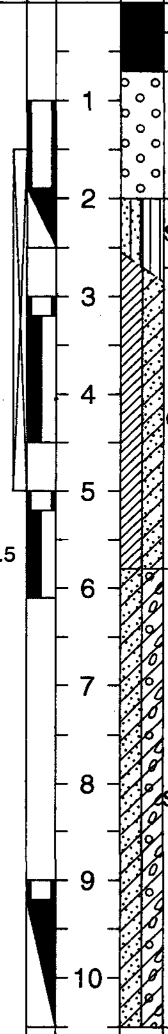
LOG OF EXPLORATION BORING K- 9

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE
A-11
1 of 1

Data Template:
SANTA ROSA - KLEINFELDER SANTA ROSA 5-8-08 .GDT - 8/22/08 11:06 - U:\NEW GINT PROJECTS\82400 SIR FRANCIS DRAKE RD REHAB\LOGS_7-11-07.GPJ

LABORATORY				FIELD					
Dry Density (pcf)	Moisture Content (%)	Shear Strength (ksf)	Other Tests	Blows/foot *	Sample	Depth (feet)	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION
								AC	**ASPHALT CONCRETE** is 4 inches thick.
								AC	**ASPHALT CONCRETE** is 5 inches thick.
			BULK K-10			1		GP	**SANDY GRAVEL -** light gray, dry to moist, medium dense, fine to medium grained sand, angular gravel up to 1" [AGGREGATE BASE]
				8		2		SM/ML	**SILTY SAND/SANDY SILT -** brown, moist, loose, fine grained sand
						3		CL/SC	**SANDY CLAY/CLAYEY SAND WITH GRAVEL -** yellow brown, moist, very stiff/medium dense, fine to medium grained sand, subrounded gravel up to 0.5"
113	16.3	2.16	UC See Plate B-3	25					
107	20.4	2.66	UC See Plate B-3			4			
						5			
				66/8.5					
						6		SC/GC	**CLAYEY GRAVEL WITH SAND/ CLAYEY SAND WITH GRAVEL -** mottled orangish brown, moist, dense, fine to medium grained sand, subangular to subrounded gravel up to 0.5"
						7			
						8			
						9			
				77		10			
						11			BOTTOM OF BORING K-10 @ 10.5 FEET No Free Water Encountered
						12			
						13			
						14			
						15			



* Field blow counts (not-converted).
**

SURFACE ELEVATION: **90.0 ****
TOTAL DEPTH: **10.5 feet**
GROUND WATER DEPTH: ☿ **feet at time of drilling**
☿ **feet**

LOGGED BY: **C. Goitein**
DIAMETER of BORING: **6" Solid Flight Auger**
DATE DRILLED: **7-9-07**
EQUIPMENT: **Mobile B-53 Truck mounted**
HAMMER TYPE: **140lbs.**

KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER **82400** DATE **8/22/2008**

LOG OF EXPLORATION BORING K-10

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE
A-12
1 of 1

LABORATORY				FIELD					
Dry Density (pcf)	Moisture Content (%)	Shear Strength (ksf)	Other Tests	Blows/foot *	Sample	Depth (feet)	Lithology Symbol	U.S.C.S. Designation	SOIL DESCRIPTION
								AC	**ASPHALT CONCRETE** is 6 inches thick.
			BULK K-11 -200 = 16 % Sieve Analysis See Plate B-2	19		1		SC	**CLAYEY SAND WITH GRAVEL -** brown, moist, medium dense, fine to coarse grained sand, angular gravel up to 1", [AGGREGATE BASE]
						2			
						3		SC	**CLAYEY SAND WITH FRAGMENTS -** brown, moist, medium dense, fine to coarse grained sand, angular sandstone fragments up to 1" (COLLUVIUM)
				19		4			
				50/6		5			
						6			
						7			
						8			
				18		9			
						10			fragment size increased up to 2"
				30		11			
						12			BOTTOM OF BORING K-11 @ 11.5 FEET No Free Water Encountered
						13			
						14			
						15			

* Field blow counts (not-converted).
**

SURFACE ELEVATION: **76.0 ****
TOTAL DEPTH: **11.5 feet**
GROUND WATER DEPTH: ▽ **feet at time of drilling**
▼ **feet**

LOGGED BY: **C. Goitein**
DIAMETER of BORING: **6" Solid Flight Auger**
DATE DRILLED: **7-10-07**
EQUIPMENT: **Mobile B-53 Truck mounted**
HAMMER TYPE: **140lbs.**

KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER **82400** DATE **8/22/2008**

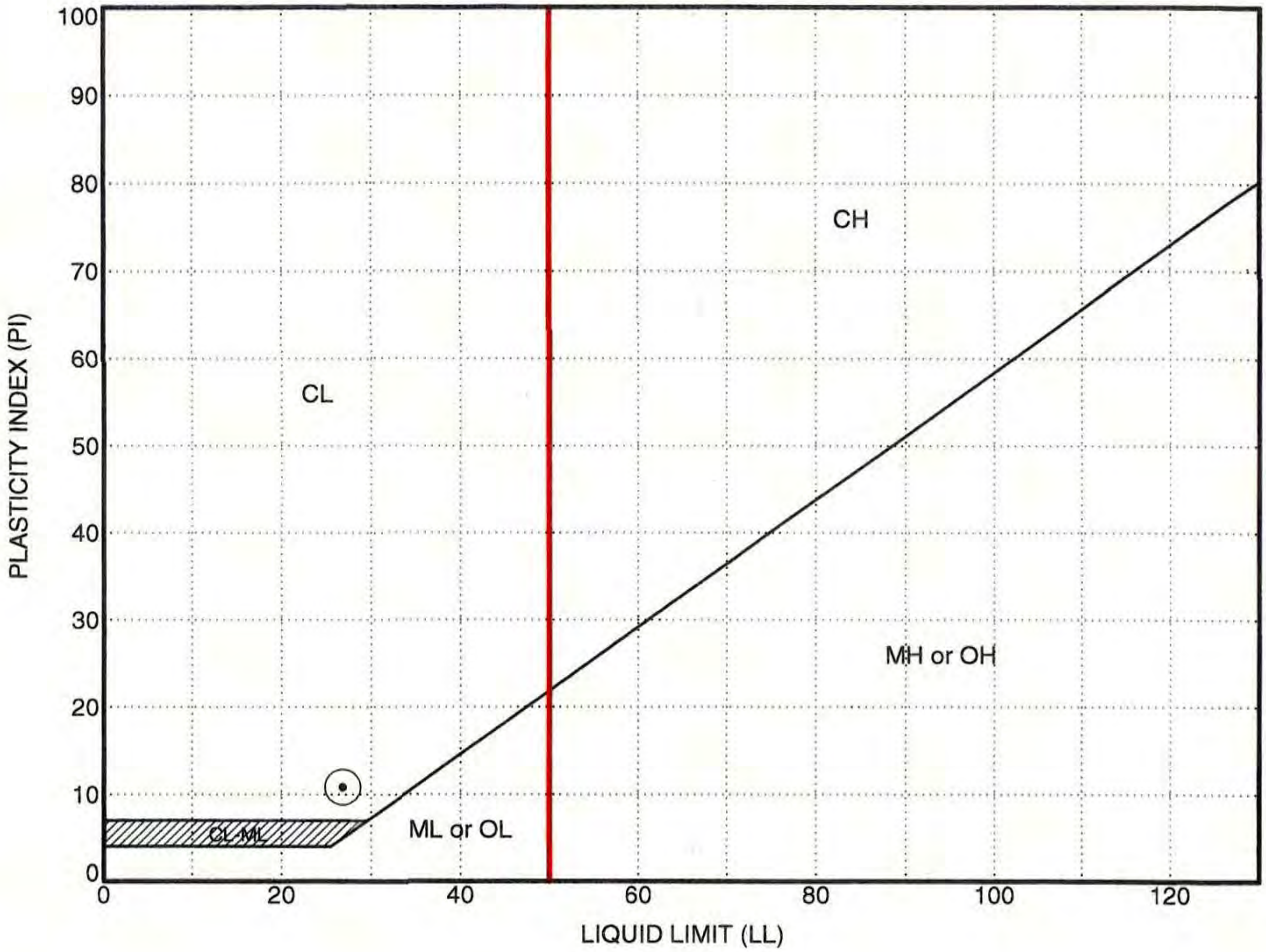
LOG OF EXPLORATION BORING K-11

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE
A-13
1 of 1

Data Template:
SANTA ROSA - KLEINFELDER SANTA ROSA 5-8-08 .GDT - 8/22/08 11:06 - U:\NEW GINT PROJECTS\82400 SIR FRANCIS DRAKE RD REHAB\LOGS_7-11-07.GPJ

Appendix B



SAMPLE SOURCE	CLASSIFICATION	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	% PASSING #200 SIEVE
⊙ K- 9 @ 1.5'	Sandy Clay (CL)	27	16	11	

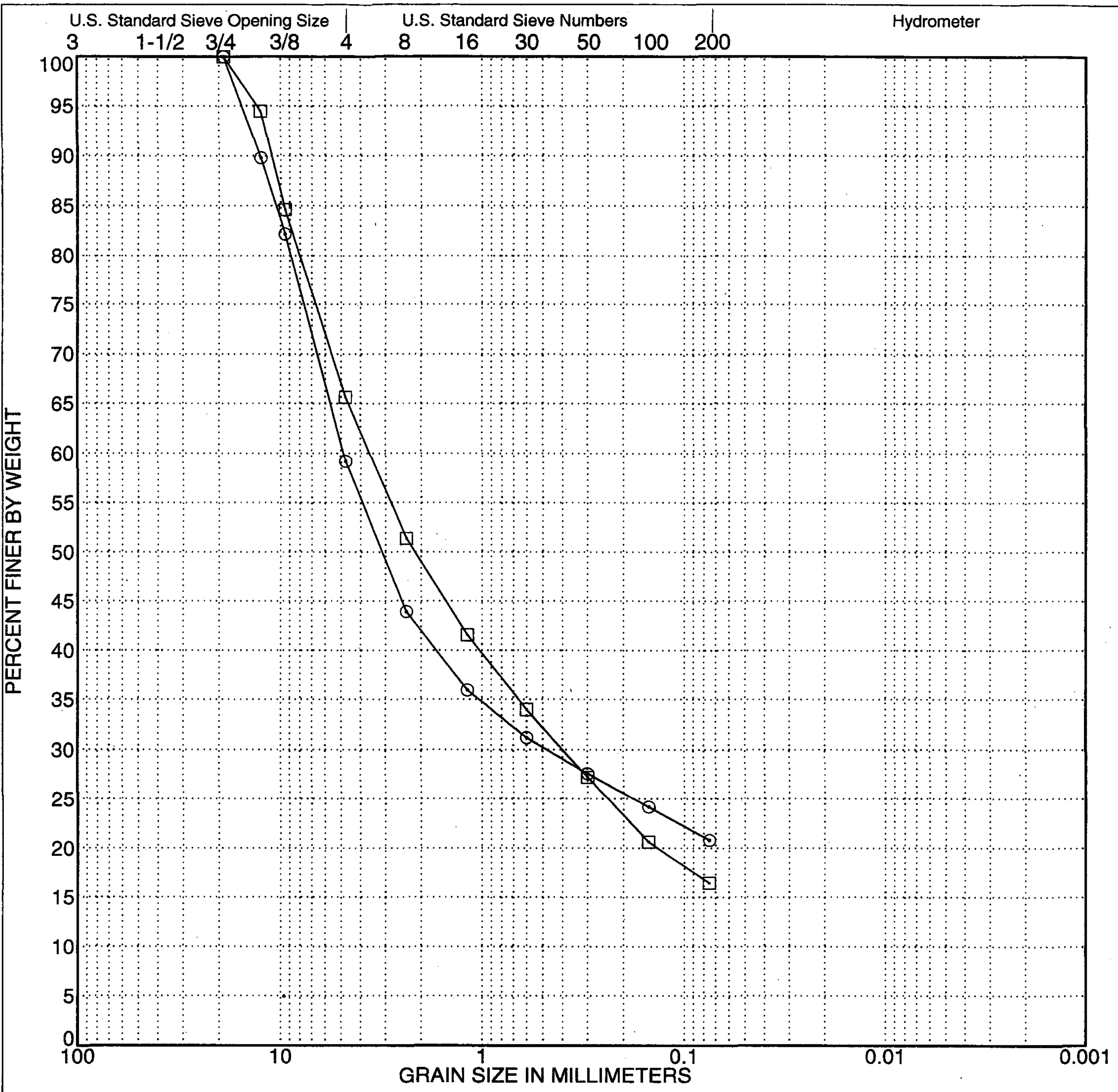
KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER **82400** DATE **8/14/2008**

PLASTICITY CHART

Sir Francis Drake Blvd. Pavement Rehabilitation Project
Marin County, California

PLATE
B-1



Cobbles	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

SYMBOL	SAMPLE SOURCE	CLASSIFICATION
⊙	K- 4 @ 0.5'	Sandstone and Shale
⊡	K-11 @ 0.5'	Silty Sand with Gravel (SM)

KLEINFELDER
Bright People. Right Solutions.

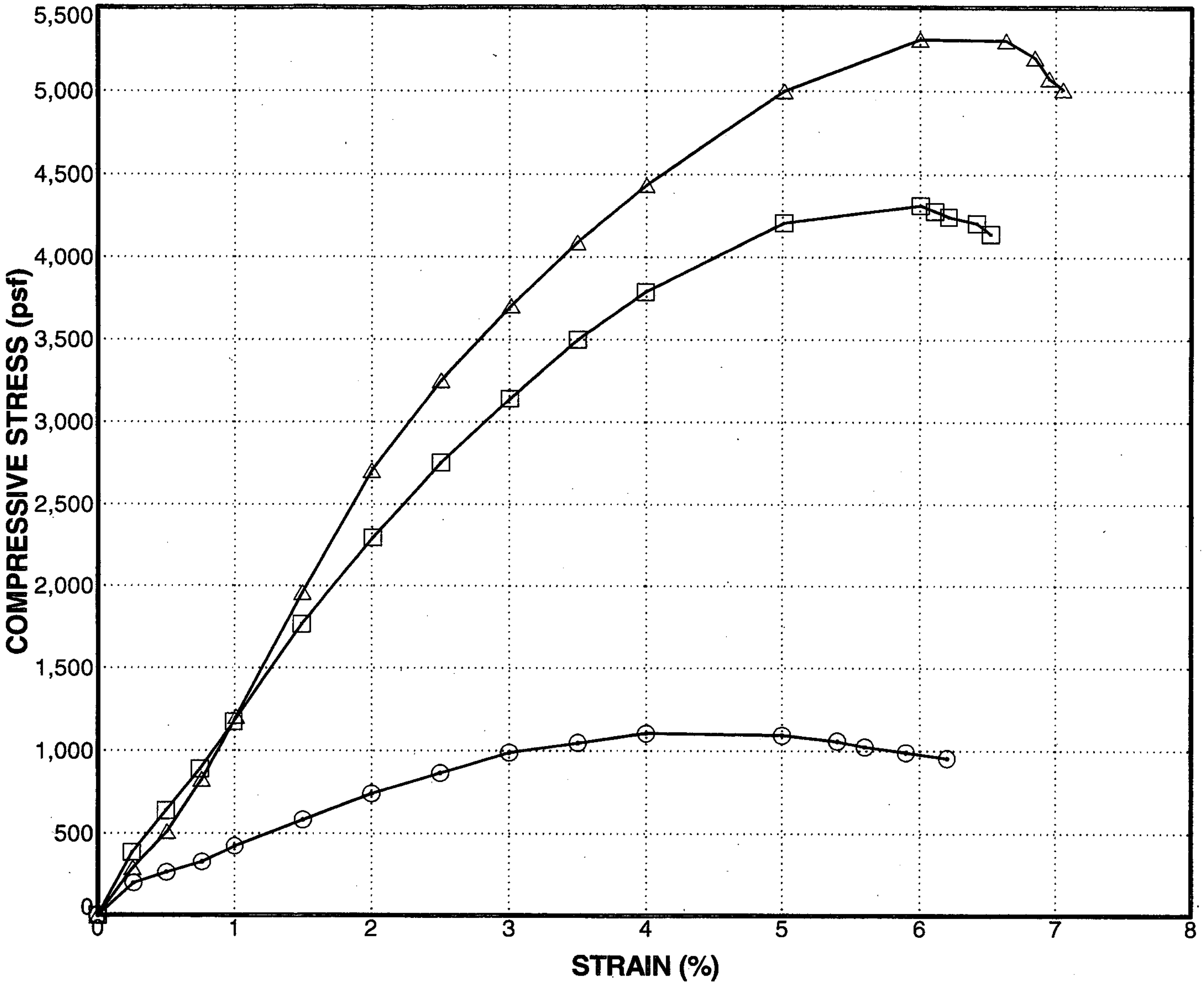
PROJECT NUMBER **82400** DATE **8/14/2008**

PARTICLE SIZE ANALYSIS

Sir Francis Drake Blvd. Pavement
Rehabilitation Project
Marin County, California

PLATE
B-2

Data Template:
SA - KLEINFELDER SANTA ROSA 5-8-08 .GDT - 8/14/08 15:53 - U:\NEW GINT PROJECTS\82400 SIR FRANCIS DRAKE RD REHAB\LOGS_7-11-07.GPJ



Sample Source	Classification	Type of Test	Confinement Pressure (psf)	Shear Strength (psf)	Strain (%)	Dry Density (pcf)	Moisture Content (%)
⊙ K- 9 @ 3.5'	Sandy Clay (CL)	UC	0	553	4	112	17.7
⊡ K-10 @ 3.5'	Sandy Clay/Clayey Sand (CL/SC)	UC	0	2157	6	113	16.3
△ K-10 @ 4.0'	Sandy Clay/Clayey Sand (CL/SC)	UC	0	2655	6	107	20.4

UC = Unconfined Compression

TX/UU = Unconsolidated Undrained Triaxial

KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER **82400** DATE **8/14/2008**

STRENGTH TEST DATA

Sir Francis Drake Blvd. Pavement Rehabilitation Project Marin County, California

PLATE

B-3

Data Template:
NEW UC - KLEINFELDER SANTA ROSA 5-8-08 .GDT - 8/14/08 15:55 - U:\NEW GINT PROJECTS\82400 SIR FRANCIS DRAKE RD REHAB\LOGS_7-11-07.GPJ

KLEINFELDER
LABORATORY TESTING SERVICES

Project Name: Sir Francis Drake Blvd
Project Number: 82400
Report Date: July 23, 2007
Sample ID: K-9- @ 6-9'
Material Description: Sandy Clay (CL)

Expansion Index Test (UBC 18-2)

Expansion Index:	25
Dry Density (PCF):	115.7
Initial Moisture Content (%)	11.5
Final Moisture Content (%)	16.4

Classification of expansive soil

Expansion Index	Expansion Potential
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
Above 130	Very High

Reviewed By_______________

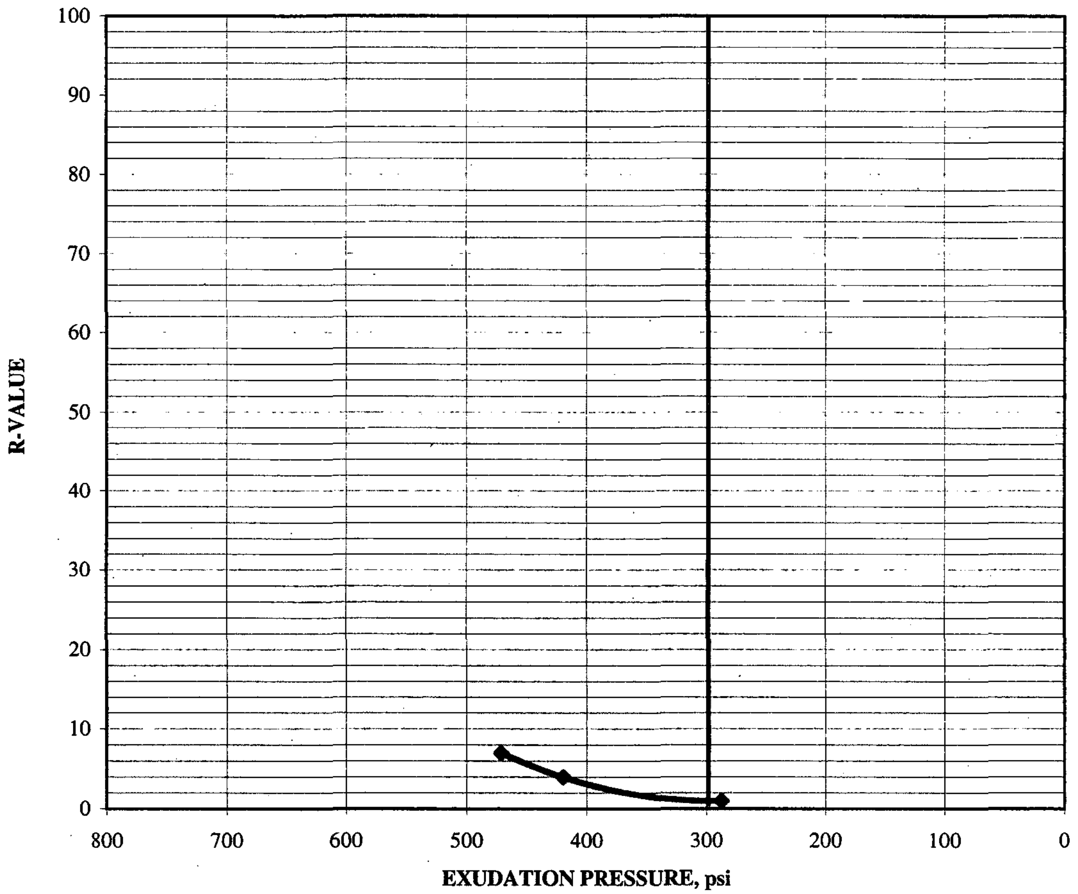
KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER 82400 DATE July 2007

EXPANSION INDEX
Sir Francis Drake Blvd
Pavement Rehabilitation project
Marin County, California

PLATE
B-4

PROJECT NAME: Sir Francis Drake Blvd
PROJECT No: 82400
SAMPLE No: K-2 @ 0.5-5'
MATERIAL DESCRIPTION: Clayey Gravel with Sand (GC)
REPORT DATE: 7/19/2007



Specimen No.	A	B	C
Moisture at Test, %	21.4	22.7	24.3
Dry Unit Weight at Test, pcf	109.2	107.4	104.2
Expansion Pressure, psf	0	0	0
Exudation Pressure, psi	471	419	287
Resistance Value	7	4	1

R - VALUE AT 300 PSI EXUDATION PRESSURE **<5**

Test Procedure: ASTM D2844

Reviewed By: ______________

KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER 82400 DATE July-07

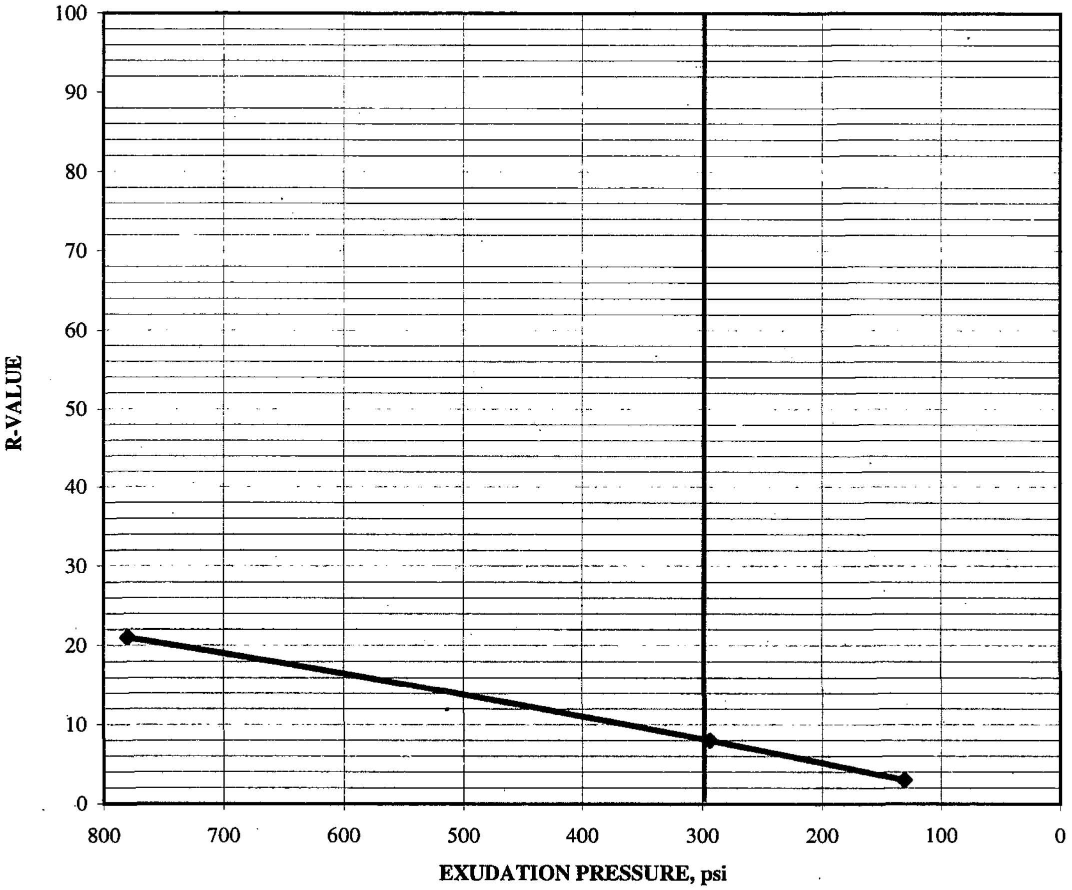
RESISTANCE VALUE

Sir Francis Drake Blvd
Pavement Rehabilitation project
Marin County, California

PLATE

B-5

PROJECT NAME: Sir Francis Drake Blvd
PROJECT No: 82400
SAMPLE No: K-5,K-6 & K-7 Combined
MATERIAL DESCRIPTION: Gravel with Silt & Sand (GM)
REPORT DATE: 7/20/2007



Specimen No.	A	B	C
Moisture at Test, %	11.4	9.4	10.9
Dry Unit Weight at Test, pcf	124.9	129.9	124.0
Expansion Pressure, psf	0	4	0
Exudation Pressure, psi	130	780	294
Resistance Value	3	21	8

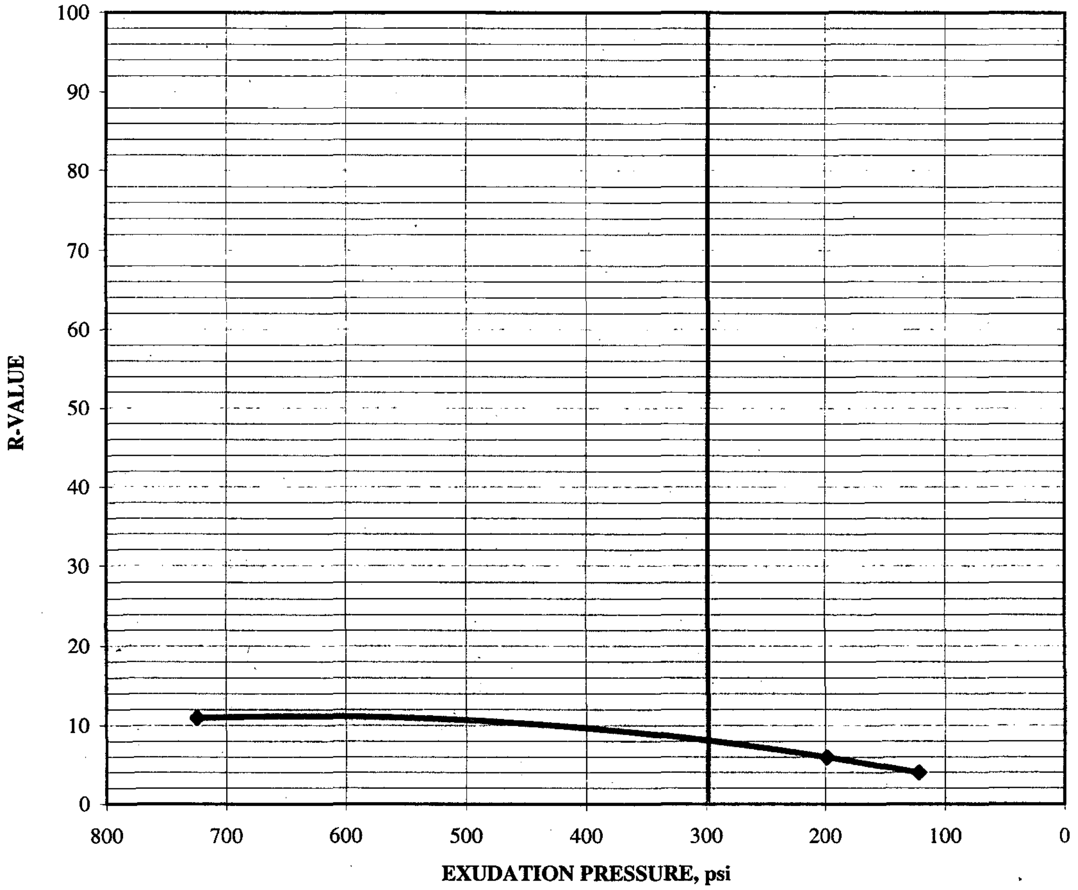
R - VALUE AT 300 PSI EXUDATION PRESSURE **8**

Test Procedure: ASTM D2844

Reviewed By: ____________

KLEINFELDER Bright People. Right Solutions.	**RESISTANCE VALUE** Sir Francis Drake Blvd Pavement Rehabilitation project Marin County, California	**PLATE** **B-6**
PROJECT NUMBER 82400 DATE July-07		

PROJECT NAME: Sir Francis Drake Blvd
PROJECT No: 82400
SAMPLE No: K-9 & K-10
MATERIAL DESCRIPTION: Combined
REPORT DATE: 7/19/2007



Specimen No.	A	B	C
Moisture at Test, %	17.8	15.2	16.5
Dry Unit Weight at Test, pcf	109.6	115.6	111.0
Expansion Pressure, psf	22	26	4
Exudation Pressure, psi	122	724	198
Resistance Value	4	11	6

R - VALUE AT 300 PSI EXUDATION PRESSURE **8**

Test Procedure: ASTM D2844

Reviewed By: ______________

KLEINFELDER
Bright People. Right Solutions.

PROJECT NUMBER 82400 DATE July-07

RESISTANCE VALUE

Sir Francis Drake Blvd
Pavement Rehabilitation project
Marin County, California

PLATE

B-7

Appendix C

PAVEMENT SURVEY : Sir Francis Drake Rehabilitation

Survey Date(s) : June 27th and 28th, 2007
Surveyor : Dennis Gatchilian

General Concrete Slab Dimensions =	33	Length (ft)
	18	Width (ft)
General Asphalt Concrete Survey Size Dimensions =	22	Width (ft)
	100	Length (ft)

NOTES: Severity is measured based on low (L), medium (M) or high (H) distress. Distress was common near culvert crossings, areas near steep embankments, and areas near water.

Description of pavement stress condition based on *Pavement Condition Index Distress Identification for Jointed Portland Cement Concrete Pavements (Oct 1991, 1st Edition)* and *Asphalt and Surface Treatment Pavements (Feb 1986, 2nd Edition,* Metropolitan Transportation Commission (MTC)

PCC	Portland Cement Concrete
AC	Asphalt Concrete
L&T	Longitudinal and Transverse
sta	Station (feet)

Station (ft)		Distress Type (PCC)						Distress Type (AC)			COMMENTS
Start	End	Corner Break	Shattered Slab	Faulting	L&T Crack	Patch	Scaling/Map Cracking	L&T Crack	Fatigue	Reflective Cracking (AC over PCC)	
0	700		(L) Sta 300-400; (M) Sta 400-700		(M) Sta 0-200 (Asphalt)				(M) Sta 200-700, 2' to 3' AC shoulders	(M) sta 200-300	**Start:** west end of bridge; AC pavement first 200 ft (AC over PCC?); AC along center-line (3' wide, sta 500-600); sta 600 and 280, Mile Markers 15.38/15.32, respectively, culverts
700	1,400		(M)						(L) 2' to 3' AC shoulders	(L) sta 850-1050 and sta 1170-1200	sta 1200, Mile Marker 15.49; sta 1030, Mile Marker 15.46; sta 970, Mile Marker 15.45; sta 860, Mile Marker 15.43, culverts
1,400	2,100		(M)							(M) westbound lane	sta 1815, Mile Marker 15.61, culvert
2,100	2,800		(H)							(M) westbound lane and shoulder (6' width)	
2,800	3,500		(M)							(M) sta 2993-3092	variable AC shoulder widths, 3' to 8' wide

Station (ft)		Distress Type (PCC)						Distress Type (AC)			COMMENTS
Start	End	Corner Break	Shattered Slab	Faulting	L&T Crack	Patch	Scaling/Map Cracking	L&T Crack	Fatigue	Reflective Cracking (AC over PCC)	
3,500	4,200		(M) sta 3500-3900		(M) sta 3900-4200					(M) sta 3680-3820; sta 3953-3980	running water on eastbound side; 2' shoulders
4,200	4,900		(M)							(M) sta 4200-4400	
4,900	5,600		(M)						(M) Sta 5000-5100, 2' to 3' AC shoulders	(M) sta 5334-5341	sta 5300 Mile Marker 16.27
5,600	6,300		(M)							(L) sta 5765 (20'x20'); sta 5859-6300 (westbound)	
6,300	7,000		(M)								sta 6587 Mile Marker 16.54; Bridge from sta 6587-6647
7,000	7,700		(M)							(-) sta 7600-7700	Overhead Bridge, sta 7275; Mile Marker 16.75, sta 7695
7,700	8,400		(M)							(L) sta7800-8400	sta 7,700, Mile Marker 16.81(creek); sta 8100-8300 multiple lifts of AC overlay scraped smooth to surface; sta 8200 Mile Marker 16.85, culvert

Station (ft)		Distress Type (PCC)						Distress Type (AC)			COMMENTS
Start	End	Corner Break	Shattered Slab	Faulting	L&T Crack	Patch	Scaling/Map Cracking	L&T Crack	Fatigue	Reflective Cracking (AC over PCC)	
8,400	9,100		(M)							(L) sta 8400-8700	sta 8439 Mile Marker 16.89, culvert
9,100	9,800		(M)							(M) sta 9100-9500; (-) sta 9431-9622	Mile Marker 17.03 and 17.05; sta 9508 Mile Marker 17.0; sta 9700 Mile Marker 17.14, all culverts
9,800	10,500		(M)								Sta 10200 Mile Marker 17.24, culvert; sta 10300,7' wide AC shoulder (westbound lane)
10,500	11,200		(M) sta 10500-10800;							(M) sta 11153 to 11200	AC (good condition), starts sta 10960 to 11153
11,200	11,900		(M) station 11304 to 11900								sta 11225 to 11304 AC (good condition); Culverts at Mile marker 17.44 and 17.50
11,900	12,600		(M)								Mile Marker 17.64, culvert; AC overlay at sta 12400-12500 (see pic 3011)
12,600	13,300		(M)								sta 12600, Mile Marker 17.73; sta 13075, Mile Marker 17.78; sta 13298, Mile Marker 17.83, all culverts

Station (ft)		Distress Type (PCC)						Distress Type (AC)			COMMENTS
Start	End	Corner Break	Shattered Slab	Faulting	L&T Crack	Patch	Scaling/Map Cracking	L&T Crack	Fatigue	Reflective Cracking (AC over PCC)	
13,300	14,000		(M)								sta 13800, Mile Marker 17.93, culvert; sta 13908 (mile marker 17.94), bridge
14,000	14,700									(M) approximately 200 lineal ft per 100 foot section	sta 14025, AC/PCC starts (both lanes), end sta 14700
14,700	15,400		(M)								sta 14856, Mile Marker 18.12; sta 15223, Mile Marker 18.19, culverts
15,400	16,100		(M)							(M) sta 15600 - 15700 (see pics 3037/3038)	sta 15462 mile marker 18.24;
16,100	16,800								(M) sta 16669 to 16756 (see pics 3044/3045)		AC over PCC, *sta* 16112 to 16184; AC (good condition, eastbound) sta 16331 to 16669; sta 16500, mile marker 18.44, culvert
16,800	17,500								(M) sta 16800-17000 (westbound)		AC (good condition, eastbound) sta 16800 to 17100; sta 17255, AC (good condition, both lanes)
17,500	18,200			(M) sta 18000 to 18200							sta 17850, end of new AC/PCC (ground down pack w/ AC overlay?); sta 18160 mile marker 18.76, culvert

Station (ft)		Distress Type (PCC)						Distress Type (AC)			COMMENTS
Start	End	Corner Break	Shattered Slab	Faulting	L&T Crack	Patch	Scaling/Map Cracking	L&T Crack	Fatigue	Reflective Cracking (AC over PCC)	
18,200	18,900			(M) sta 18200 to 185+39							sta 18532, end of PCC pavement, start AC (width 22'); sta 18900 shoulder settlement (see pic 3064/3065
18,900	19,600							(L) approximately 100 lineal ft per 100 foot section; (M) 30', sta 19400 (see pic 3068/3069)			Sta 18978, Mile marker 18.91, sta 19300, mile marker 18.99, culverts
19,600	20,300							(L) approximately 100 lineal ft per 100 foot section;			**sta 19683 start of weathered sealant**; sta 19757, mile marker 19.06, culvert
20,300	21,000							(L) approximately 50 lineal ft per 100 foot section;			sta 20515, mile marker 19.21, culvert
21,000	21,700							(L) approximately 50 lineal ft per 100 foot section;			sta 21207, mile marker 19.34; sta 21683, mile marker 19.43, culverts
21,700	22,400							(L) approximately 50 lineal ft per 100 foot section;			sta 21800, mile marker 19.46; sta 22128, mile marker 19.52; sta 22228, mile marker 19.54; culverts
22,400	23,100							(L) approximately 100 lineal ft per 100 foot section (sta 22500);			sta 22480, mile marker 19.58; sta 22756, mile marker 19.64, culverts;

Station (ft)		Distress Type (PCC)						Distress Type (AC)			COMMENTS
Start	End	Corner Break	Shattered Slab	Faulting	L&T Crack	Patch	Scaling/Map Cracking	L&T Crack	Fatigue	Reflective Cracking (AC over PCC)	
23,100	23,800							(M) approximately 150 lineal ft per 100 foot section at sta 23100;			sta 23595, mile marker 19.80, culverts; Embankment along Eastbound land side
23,800	24,500							(L) approximately 50 lineal ft per 100 foot section; (M) approx. 11 ft, sta 244+56 (see pic 3083)			sta 24033, mile marker 19.88; sta 24312, mile marker 19.94; sta 24485, mile marker 19.97; culverts
24,500	25,200							(L) approximately 150 lineal ft per 100 foot section (both lanes);		(M) 12' x 3' (westbound lane)	sta 24771, mile marker 20.03 culverts
25,200	25,900							(L) approximately 100 ft per 100 ft section at sta 25200 and 25800 (westbound shows higher distress)			sta 25274, mile marker 19.13, bridge; sta 25641, mile marker 20.19; sta 25853, mile marker 20.23; culverts
25,900	26,600							(L) approximately 150 lineal ft per 100 foot section at sta 26400 (eastbound shows higher distress)			sta 26128, mile marker 20.28 culverts
26,600	27,300							(M) approximately 150 lineal ft per 100 foot section at sta (both lanes, equal distress)			sta 26685, mile marker 20.39 culverts **END survey:** 27218
27,300	28,000										

APPENDIX I

SLOPE INSTABILITY PRELIMINARY GEOTECHNICAL MEMORANDUM

This page intentionally left blank.

KLEINFELDER
Bright People. Right Solutions.

TECHNICAL MEMORANDUM

Geotechnical Engineering
Materials Testing & Inspection
Environmental Science & Engineering
Water Resources
Earthquake Engineering
Air Quality

Date: April 30, 2009

To: Mr. Robert Stevens, Associate
BKF Engineers
2737 North Main Street, Suite 200
Walnut Creek, CA 94597

From: Jeff Richmond, C.E.G.

PROFESSIONAL GEOLOGIST
JEFFREY CHASE RICHMOND
No. 2424
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Kleinfelder Project: 82400/1

Subject: Preliminary Geologic/Geotechnical Reconnaissance
Slope Instability
Sir Francis Drake Boulevard P.M. 15.43
Samuel P. Taylor State Park
Marin County, California

Kleinfelder is pleased to present this memorandum summarizing our preliminary reconnaissance of the slope instability feature located at Post Mile (P.M.) 15.43 of Sir Francis Drake Boulevard in Marin County, California. Kleinfelder performed a geotechnical investigation assessing the existing pavement conditions of Sir Francis Drake Boulevard between Shafter Bridge and Platform Bridge Road in August of 2008. The investigation report provided recommendations for pavement rehabilitation, but did not assess existing or potential roadway instability features. The purpose of this preliminary reconnaissance was to provide a general characterization of the instability feature located at P.M. 15.43, and provide recommendations for subsurface investigation and further design studies. As indicated, this is a preliminary reconnaissance and is based on conditions and exposures encountered at the surface only. No exploratory borings or laboratory testing were performed as part of this study.

1 SITE DESCRIPTION

In the vicinity of the slope instability feature, Sir Francis Drake Boulevard parallels Lagunitas Creek, located immediately east/northeast of the roadway. At P.M. 15.43, both the roadway and the creek are at the approximate apex of a sweeping north radius (bend). In this location, the roadway was constructed across a broad, east-facing colluvial drainage, which likely required placement of fill along the outside edge of the roadway. Pavement in this location consists of portland cement concrete with an apron of asphalt concrete along the outside (east) edge, and a narrow (1 to 2 feet) gravel shoulder. Localized asphalt concrete overlays of variable thickness were noted at the location of the slope instability feature.

Flow from one of the channels within the colluvial drainage is currently collected within a culvert intake structure located on the west edge of the roadway (directly across from the instability feature) and discharges onto the slope face east of the roadway; no energy dissipation structure was observed at the culvert outfall, which has resulted in localized, concentrated erosion of the slope. The roadway gradient in both lanes at the location appears to direct sheet flow to the outside edge of the roadway, and thus onto the slope face below.

The instability feature involves approximately 60 linear feet of the roadway and extends up to the edge of the existing pavement. In this area, the gravel shoulder has settled 1 to 2 feet below the roadway surface, locally. The slope below the shoulder extends approximately 25 to 30 feet down to the current creek level at a gradient ranging from 0.9H:1V (Horizontal : Vertical) to near vertical, locally, and shallows at the base of the slope. The slope face is covered with loose, detrital soil and rock fragments, with localized bedrock outcrops at the base of the slope. Vegetation on the slope face consists of redwood saplings and mature trees, ferns, and blackberry vines.

2 CONCLUSIONS

The asphalt concrete apron along the roadway edge at P.M. 15.43 has been thickened by previous overlays to maintain roadway grade; efforts to raise the grade of the gravel shoulder with asphalt concrete and gravel fill were also observed. The portland cement concrete pavement appears largely unaffected. These observations suggest the instability feature is relatively shallow, and currently involves the loose fill and colluvial soils beneath the apron at the edge of the roadway, as well as soils exposed on the shoulder and the slope face, but does not preclude the possibility of a future, deeper seated failure potentially involving the entire roadway, given certain environmental conditions.

The slope instability appears to be the result of a combination of factors. The roadway fill prism is likely of un-engineered, cast fill construction (i.e. fill placed on the pre-existing slope face without keying/benching or compactive effort), lacking subdrainage. As a result, the fill and colluvial soils may be subject to settlement and/or lateral movement over time. The fill prism was placed or has subsequently eroded to an over-steepened (and thus unstable) gradient, subjecting the slope face to accelerated erosion, localized raveling, and shallow failure. The erosion and shallow failure of the slope face is likely exacerbated by the unabated culvert discharge, sheet flow from the roadway, impinging creek flow at the toe of the slope, and rapid draw down affects during periods of high storm flow within Lagunitas Creek.

3 RECOMMENDATIONS

We recommend investigation of the subsurface conditions in the vicinity of the instability feature, in order to provide recommendations for the most viable engineered mitigation solution. The proposed geotechnical investigation would include, but not be limited to the following:

- Geologic mapping of the site and site vicinity
- Construction of multiple cross sections through the site
- Two to three exploratory borings
- Laboratory testing
- Engineering analysis
- Recommendations for site drainage improvements and mitigation/repair of the feature

It has been our experience that the County of Marin prefers construction of pier-supported, cantilever or tie-back concrete retaining structures in close proximity to the roadway edge in order to support the roadway and fill prism. Alternatively, slope reconstruction can conceivably be achieved. This alternative, however, would likely require temporary roadway closure, excavation within or immediately adjacent to the creek requiring permits, and construction of a drained, geogrid reinforced slope protected from surface erosion with rip-rap armor.

Please contact us if would like us to prepare a proposal for a geotechnical investigation for this site.

4 LIMITATIONS

This memorandum has been prepared by Kleinfelder for the exclusive use of the BKF Engineers and their consultants for development of the proposed project described in this report.

Our services consist of professional opinions and conclusions developed in accordance with generally accepted geotechnical engineering principles and practices. We provide no other warranty, either expressed or implied. Our conclusions are based on the information developed by Kleinfelder during this investigation, other work performed in the vicinity of the site, and professional judgment. The conclusions drawn in this memorandum are based solely on surficial exposures found on the site and should be considered preliminary only.

Site conditions and cultural features described in the text of this report are those existing at the time of our investigation, and may not necessarily be the same or comparable at other times.

This report may be used only by BKF Engineers and only for the purposes stated, within a reasonable time from its issuance, but in no event later than 2 years from the date of the report. Land or facility use, on and off-site conditions, regulations, or other factors may change over time, and additional work may be required with the passage of time. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party and client agrees to defend, indemnify, and hold harmless Kleinfelder from any claim or liability associated with such unauthorized use or non-compliance.

5 CLOSURE

If you have any questions regarding the information provided herein, please contact us at (707) 571-1883.