FOR CONTRACT NO.: 04-2A4304

INFORMATION HANDOUT

PERMITS

STATE OF CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
1602 STREAMBED ALTERATION AGREEMENT
NOTIFICATION NO. 1600-2013-0103-3

AGREEMENTS

UNITED STATES FISH AND WILDLIFE SERVICE (Biological Opinion)

MATERIALS INFORMATION

FOUNDATION REPORT FOR TWO SOIL NAIL WALLS
DATED OCTOBER 31, 2012

FOUNDATION REPORT FOR SOLDIER PILE WALL
DATED DECEMBER 11, 2012

STORM WATER INFORMATION HANDOUT
DATED JUNE 27, 2013

ROUTE: 04-SCl-9-2.5/7.0

State of California – The Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558
(707) 944-5500
www.wildlife.ca.gov

***EDMUND G. BROWN JR.**, Governor*
***CHARLTON H. BONHAM,** Director*

June 7, 2013

Jeffrey G. Jensen
California Department of Transportation
111 Grand Ave
Oakland, CA 94623

Subject: Final Lake or Streambed Alteration Agreement
Notification No. 1600-2013-0103-3
State Route 9 Curve Correction

Dear Mr. Jensen:

Enclosed is the final Streambed Alteration Agreement ("Agreement") for the State Route 9 Curve Correction in Santa Clara County ("Project"). Before the Department may issue an Agreement, it must comply with the California Environmental Quality Act ("CEQA"). In this case, the Department, acting as a responsible agency, filed a notice of determination ("NOD") on June 7, 2013, based on information contained in the Environmental Impact Report, the lead agency prepared for the Project.

Under CEQA, filing a NOD starts a 30-day period within which a party may challenge the filing agency's approval of the project. You may begin your project before the 30-day period expires if you have obtained all necessary local, state, and federal permits or other authorizations. However, if you elect to do so, it will be at your own risk.

If you have any questions regarding this matter, please contact, Melissa Escaron, Staff Environmental Scientist, at (925)786-3045 or Melissa.Escaron@wildlife.ca.gov.

Sincerely,

for Scott Wilson
Acting Regional Manager
Bay Delta Region

cc: Ryan Graybehl – ryan_graybehl@dot.ca.gov
Lieutenant Nores
Warden Jarrett

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
BAY DELTA REGION
7329 SILVERADO TRAIL
NAPA, CALIFORNIA 94558
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STREAMBED ALTERATION AGREEMENT
NOTIFICATION NO. 1600-2013-0103-R3
Saratoga Creek

CALIFORNIA DEPARTMENT OF TRANSPORTATION
STATE ROUTE 9 SIGHT DISTANCE IMPROVEMENT PROJECT

This Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Wildlife (CDFW) and the California Department of Transportation (Permittee), as represented by Jeffrey G. Jensen.

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, Permittee notified CDFW on March 25, 2013 that Permittee intends to complete the project described herein.

WHEREAS, pursuant to FGC section 1603, CDFW has determined that the project could substantially adversely affect existing fish or wildlife resources and has included measures in the Agreement necessary to protect those resources.

WHEREAS, Permittee has reviewed the Agreement and accepts its terms and conditions, including the measures to protect fish and wildlife resources.

NOW THEREFORE, Permittee agrees to complete the project in accordance with the Agreement

PROJECT LOCATION

The project is located along State Route 9 in Santa Clara County, near the City of Saratoga, at three locations between Post Miles (PM) 2.5 and 7.0.

PROJECT DESCRIPTION

Caltrans proposes to improve safety by increasing sight distance at three locations on State Route 9. Impacts CDFW 1602 jurisdiction will occur as follows:

Location 1, Post Mile 2.5 to 2.7- Two existing drainage inlets will be replaced and the existing 24-inch pipe culverts will be extended by up to 8 feet.

Location 2, Post Mile 5.9 to 6.2- A pipe culvert will be replaced. To allow for utility relocations, 2 California bay laurel tees will be trimmed.

Location 3, Post Mile 6.7 to 7.0- Approximately 440 square feet 1602 jurisdiction will be permanent affected by the construction of a new soil nail wall and widened shoulder. Redwood trees will be trimmed to accommodate utility relocations.

PROJECT IMPACTS

Existing fish or wildlife resources the project could substantially adversely affect include:

- Riparian habitat
- Aquatic invertebrates
- Nesting birds
- California red legged frogs and habitat

The adverse effects the project could have on the fish or wildlife resources identified above include:

- Riparian habitat degradation
- Sensitive species mortality
- Disruption of bird nesting
- Water quality degradation
- Short-term release of contaminants

MEASURES TO PROTECT FISH AND WILDLIFE RESOURCES

1. Administrative Measures

Permittee shall meet each administrative requirement described below.

1.1 Documentation at Project Site. Permittee shall make the Agreement, any extensions and amendments to the Agreement, and all related notification materials and California Environmental Quality Act (CEQA) documents, readily available at the project site at all times and shall be presented to CDFW personnel, or personnel from another state, federal, or local agency upon request.

1.2 Providing Agreement to Persons at Project Site. Permittee shall maintain onsite at all times, a copy of the Agreement and any extensions and amendments to the Agreement.

1.3 Notification of Conflicting Provisions. Permittee shall notify CDFW if Permittee determines or learns that a provision in the Agreement might conflict with a provision imposed on the project by another

local, state, or federal agency. In that event, CDFW shall contact Permittee to resolve any conflict.

1.4 Project Site Entry. Permittee agrees that DFG personnel may, with notification of the Resident Engineer, enter the project site at any time to verify compliance with the Agreement.

2. Avoidance and Minimization Measures

To avoid or minimize adverse impacts to fish and wildlife resources identified above, Permittee shall implement each measure listed below. These conditions apply only to CDFW jurisdiction as described in the Project Description above.

2.1 To minimize adverse impacts to fish and wildlife all work within the bed, bank, channel, and associated riparian habitat shall be confined to the period of April 15 to October 15. Revegetation work is not confined to this time period.

2.2 No trees within CDFW 1602 jurisdiction will be removed.

2.3 At least 30-days prior to commencing project activities covered by this Agreement, the Permittee shall submit to DFG, for review and approval, the qualifications for a number of biologists (Qualified Biologist) that shall oversee the implementation of the conditions in this Agreement. At a minimum, the Qualified Biologists shall have a combination of academic training and professional experience in biological sciences and related resource management activities. The Qualified Biologists shall communicate to the Resident Engineer when any activity is not in compliance with this Agreement and the Resident Engineer shall immediately stop the activity that is not in compliance with this Agreement.

2.4 If Project activities will occur between February 15 and September 1, a Qualified Biologist shall conduct pre-construction surveys for nesting birds no more than one week prior to construction. Surveys shall consist of multiple days of observations. If nests are found the Qualified Biologist shall establish an appropriate buffer to be in compliance with Migratory Bird Treaty Act (MBTA) and Fish and Game Code 3503. The Qualified Biologist shall perform at least two hours of pre-construction monitoring of the nest to characterize "typical" bird behavior. The Qualified Biologist shall monitor the nesting birds and shall increase the buffer if the Qualified Biologist determines the birds are showing signs of unusual or distressed behavior by Project activities. Atypical nesting behaviors which may cause reproductive harm include, but are not limited to, defensive flights/vocalizations directed towards Project personnel, standing up from a brooding position, and flying away from the nest. The Qualified Biologist shall have authority, through the Resident Engineer, to order the cessation of all Project activities if the nesting birds exhibit atypical behavior which may cause reproductive failure (nest abandonment and loss of eggs and/or young) until an appropriate buffer is established.

To prevent encroachment, the established buffer(s) shall be clearly marked by high visibility material. The established buffer(s) shall remain in effect until the young have fledged or the nest has been abandoned as confirmed by the Qualified Biologist. Any sign of nest abandonment shall be reported to CDFW within 48 hours.

2.5 A Qualified Biologist shall conduct Pre-construction surveys immediately prior to the initiation of any ground disturbing activities within or adjacent to suitable California red-legged frog (CRLF) habitat. These surveys will comprise walking transects while conducting visual encounter surveys within areas that will be subject to staging, vegetation clearing, grubbing, grading, cut and fill, or other ground disturbing activities. All mammal burrows shall be inspected for signs of CRLF usage to the maximum extent practicable.

2.6 A Qualified Biologist shall be present onsite to monitor for CRLF during construction activities located within suitable CRLF habitat. Through communication with the Resident Engineer, a Qualified Biologist may stop work if deemed necessary for any reason to protect CRLF and will advise the Resident Engineer on how to proceed accordingly. A Qualified Biologist will conduct clearance surveys at the beginning of each day within or adjacent to suitable CRLF and habitat and regularly throughout the workday when construction is occurring within or adjacent to suitable CRLF. If CRLF are encountered in the action area, work within 50 feet of the animal will cease immediately and the Resident Engineer and a United States Fish and Wildlife Service (USFWS)/DFG-approved biologist will be notified. At no time shall work occur within 50 feet of a CRLF without a Qualified Biologist present.

2.7 Prior to handling and relocation, a USFWS/CDFW-approved Qualified Biologist will take precaution to prevent introduction of amphibian diseases in accordance with the Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog (USFWS 2005). CRLF will be captured by hand, dipnet, or other USFWS-approved methodology, transported by hand, dipnet or temporary holding container, and release as soon as practicable the same day of capture. Handling of CRLF will be minimized to the maximum extent practicable Holding/transporting containers and dipnets will be thoroughly cleaned and disinfected and will be rinsed with freshwater onsite immediately prior to usage unless doing so would result in the injury or death of the animal due to the time delay. CRLF will be relocated to the nearest suitable habitat outside of the area where actions would not result in harm or harassment. The individual(s) will be released within suitable habitat in the Caltrans right-of-way or another property acceptable to the property owner, and the USFWS and CDFW will be notified. If suitable habitat cannot be identified, the USFWS and CDFW shall be contacted to determine an acceptable alternative.

2.8 To prevent inadvertent entrapment of CRLF, or other animals during construction, all excavated, steep-walled holes or trenches more than 2 feet deep will be covered with plywood or similar materials at the end of each workday or the holes or trenches will contain one or more escape ramps constructed of earth fill or wooden

planks. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals.

2.9 To the extent practicable, Permittee shall leave the root masses of removed trees and shrubs in place. Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations.

2.10 All slopes or unpaved areas temporarily affected will be restored to pre-project conditions to the maximum extent practicable. Slopes and bare ground will be reseeded with native grasses and shrubs to stabilize and prevent erosion. Hydroseed mixes shall not contain exotic plant species. Prohibited exotic plant species include those identified in the California Exotic Pest Plant Council's database, which is accessible at: http://www.cal-ipc.org/ip/inventory/weedlist.php.

2.11 Permittee shall comply with all applicable state and federal laws, including the California and Federal Endangered Species Act. This Agreement does not authorize the take of any state or federally endangered listed species. Liability for any take or incidental take of such species remains the responsibility of the Permittee for the duration of the project. Any unauthorized take of listed species may result in prosecution and nullification of the Agreement.

2.12 If any wildlife is encountered during the course of project activities, said wildlife shall be allowed to leave the area unharmed and on their own volition.

2.13 The perimeter of the work site shall be adequately fenced using high visibility Environmentally Sensitive Area (ESA) fencing to prevent damage to adjacent riparian habitat. No construction activities, within the riparian zone, will be allowed within the habitat protected by the ESA fencing.

2.14 Prior to the start of construction, Wildlife Exclusion Fencing (WEF) shall be installed along the project footprint in all areas where sensitive species could enter the work site. The location of the WEF will be determined by the Resident Engineer, in consultation with a Qualified Biologist based on habitat suitability. The final project plans will show where and how the WEF will be installed. The bid solicitation package special provisions will clearly describe acceptable fencing material and proper WEF installation and maintenance.

2.15 Permittee shall conduct work defined in the above project description, and within the project area, during periods of dry weather. The project area is defined as the bed, bank, channel, and associated riparian habitat. The Permittee shall monitor forecasted precipitation. When ¼ inch or more of precipitation is forecasted to occur, the Permittee shall stop work before precipitation commences. No activity of the project may be started if its associated erosion control measures cannot be completed prior to the onset of precipitation. After any storm event, the Permittee shall inspect all sites currently under construction and all sites scheduled to begin construction within the next

72 hours for erosion and sediment problems and take corrective action as needed. Seventy-two hour weather forecasts from National Weather Service shall be consulted and work shall not start back up until runoff ceases and there is less than a 30% forecast for precipitation for the following 24-hour period.

2.16 Permittee shall utilize erosion control measures throughout all phases of operation where sediment runoff from exposed slopes threatens to enter waterways. At no time shall silt laden runoff be allowed to enter the stream or directed to where it may enter the stream. Erosion control installations shall be monitored for effectiveness and shall be repaired or replaced as recommended by a Water Quality Monitor to the Resident Engineer or designated representative. As needed to prevent sediment transport, Permittee shall deploy soil stabilizer such as hydroseeding, netting, erosion control mats, mulch, fiber rolls, silt fences, check dams, and flow velocity dissipation devices. Permittee shall stabilize and equip construction site entrances and exits with tire washing capability. Materials containing monofilament or plastic shall not be used. Erosion and sediment control measures shall be installed prior to unseasonable rain storms.

2.17 Staging and storage areas for equipment, materials, fuels, lubricants and solvents, shall be located outside of the creek channel and banks. Stationary equipment such as motors, pumps, generators, compressors and welders, located within or adjacent to the creek shall be positioned over drip pans. Any equipment or vehicles driven and/or operated above or adjacent to the stream must be checked and maintained daily, to prevent leaks of materials that if introduced to water could be deleterious to aquatic life.

2.18 Refueling of mobile construction equipment and vehicles shall not occur within 50 feet of any water body, or anywhere that spilled fuel could drain to a water body. Refueling of stationary equipment requiring breakdown and setup to move will remain in place. All equipment shall be refueled with appropriate drip pans, absorbent pads, and water quality Best Management Practices. Equipment and vehicles operating in the project area shall be checked and maintained daily to prevent leaks of fuels, lubricants, or other liquids.

CONTACT INFORMATION

Any communication that Permittee or CDFW submits to the other shall be in writing and any communication or documentation shall be delivered to the address below by U.S. mail, fax, or email, or to such other address as Permittee or CDFW specifies by written notice to the other.

To Permittee:

California Department of Transportation
Mr. Jeffrey G. Jensen

111 Grand Ave.
Oakland, Ca 94623
Jeffrey.jensen@dot.ca.gov

To CDFW:

California Department of Fish and Wildlife
Bay Delta Region
7329 Silverado Trail
Napa, California 94558
Attn: Lake and Streambed Alteration Program – Melissa Escaron
Notification #1600-2013-0103-R3
Fax (707) 944-5553
Melissa.escaron@wildlife.ca.gov

LIABILITY

Permittee shall be solely liable for any violations of the Agreement, whether committed by Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents or contractors and subcontractors, to complete the project or any activity related to it that the Agreement authorizes.

This Agreement does not constitute CDFW's endorsement of, or require Permittee to proceed with the project. The decision to proceed with the project is Permittee's alone.

SUSPENSION AND REVOCATION

CDFW may suspend or revoke in its entirety the Agreement if it determines that Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, is not in compliance with the Agreement.

Before CDFW suspends or revokes the Agreement, it shall provide Permittee written notice by certified or registered mail that it intends to suspend or revoke. The notice shall state the reason(s) for the proposed suspension or revocation, provide Permittee an opportunity to correct any deficiency before CDFW suspends or revokes the Agreement, and include instructions to Permittee, if necessary, including but not limited to a directive to immediately cease the specific activity or activities that caused CDFW to issue the notice.

ENFORCEMENT

Nothing in the Agreement precludes CDFW from pursuing an enforcement action against Permittee instead of, or in addition to, suspending or revoking the Agreement.

Nothing in the Agreement limits or otherwise affects CDFW's enforcement authority or that of its enforcement personnel.

OTHER LEGAL OBLIGATIONS

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from obtaining any other permits or authorizations that might be required under other federal, state, or local laws or regulations before beginning the project or an activity related to it.

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from complying with other applicable statutes in the FGC including, but not limited to, FGC sections 2050 et seq. (threatened and endangered species), 3503 (bird nests and eggs), 3503.5 (birds of prey), 5650 (water pollution), 5652 (refuse disposal into water), 5901 (fish passage), 5937 (sufficient water for fish), and 5948 (obstruction of stream).

Nothing in the Agreement authorizes Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, to trespass.

AMENDMENT

CDFW may amend the Agreement at any time during its term if CDFW determines the amendment is necessary to protect an existing fish or wildlife resource.

Permittee may amend the Agreement at any time during its term, provided the amendment is mutually agreed to in writing by CDFW and Permittee. To request an amendment, Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the corresponding amendment fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

TRANSFER AND ASSIGNMENT

This Agreement may not be transferred or assigned to another entity, and any purported transfer or assignment of the Agreement to another entity shall not be valid or effective, unless the transfer or assignment is requested by Permittee in writing, as specified below, and thereafter CDFW approves the transfer or assignment in writing.

The transfer or assignment of the Agreement to another entity shall constitute a minor amendment, and therefore to request a transfer or assignment, Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form

and include with the completed form payment of the minor amendment fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

EXTENSIONS

In accordance with FGC section 1605(b), Permittee may request one extension of the Agreement, provided the request is made prior to the expiration of the Agreement's term. To request an extension, Permittee shall submit to CDFW a completed CDFW "Request to Extend Lake or Streambed Alteration" form and include with the completed form payment of the extension fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5). CDFW shall process the extension request in accordance with FGC 1605(b) through (e).

If Permittee fails to submit a request to extend the Agreement prior to its expiration, Permittee must submit a new notification and notification fee before beginning or continuing the project the Agreement covers (Fish & G. Code, § 1605, subd. (f)). .

EFFECTIVE DATE

The Agreement becomes effective on the date of CDFW's signature, which shall be: 1) after Permittee's signature; 2) after CDFW complies with all applicable requirements under the California Environmental Quality Act (CEQA); and 3) after payment of the applicable FGC section 711.4 filing fee listed at http://www.wildlife.ca.gov/habcon/ceqa/ceqa_changes.html.

TERM

This Agreement shall expire on December 31, 2017, unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as FGC section 1605(a)(2) requires.

AUTHORITY

If the person signing the Agreement (signatory) is doing so as a representative of Permittee, the signatory hereby acknowledges that he or she is doing so on Permittee's behalf and represents and warrants that he or she has the authority to legally bind Permittee to the provisions herein.

AUTHORIZATION

This Agreement authorizes only the project described herein. If Permittee begins or completes a project different from the project the Agreement authorizes, Permittee may be subject to civil or criminal prosecution for failing to notify CDFW in accordance with FGC section 1602.

CONCURRENCE

The undersigned accepts and agrees to comply with all provisions contained herein.

FOR CALIFORNIA DEPARTMENT OF TRANSPORTATION

Carie D. Montes for — 6/5/13

Jeffrey G. Jensen — Date

Office Chief

FOR DEPARTMENT OF FISH AND WILDLIFE

6/7/13

for Scott Wilson — Date

Acting Regional Manager

Prepared by: Melissa Escaron
Staff Environmental Scientist

Date Prepared: May 21, 2013
Date Sent: May 29, 2013
Revision Sent: June 5, 2013

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In Reply Refer To:
81420-2010-F-0299-2

DEC 10 2010

Mr. Jim Richards
Attn: Ryan Graybehl
Office of Biological Sciences and Permits
California Department of Transportation
P.O. Box 23660
Oakland, California 94623-0660

Subject: Biological Opinion on the Effects of the Proposed State Route 9 Safety Improvement Project, Santa Clara County, California (Caltrans EA 2A4300) on the Endangered Robust Spineflower (*Chorizanthe robusta* var. *robusta*) and the Threatened California Red-Legged Frog (*Rana draytonii*)

Dear Mr. Richards:

This letter responds to a letter from the California Department of Transportation (Caltrans), dated January 21, 2010, requesting formal consultation for the proposed State Route 9 (SR-9) Safety Improvement Project located in Santa Clara County, California. Your letter was received by the U.S. Fish and Wildlife Service (Service) on January 22, 2010. This document represents the Service's Biological Opinion on the effects of the project on the threatened California red-legged frog (*Rana draytonii*) under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) legislation (23 U.S.C. 327) allows the Secretary of the U.S. Department of Transportation (USDOT) acting through the Federal Highway Administration (FHWA) to establish a Surface Transportation Project Delivery Pilot Program, whereby a State may assume the FHWA responsibilities under the National Environmental Policy Act (NEPA) for environmental review, agency consultation and other actions pertaining to the review or approval of a specific project. Caltrans assumed these responsibilities for the FHWA on July 1, 2007, through a Memorandum of Understanding (MOU) within the State of California: http://www.dot.ca.gov/ser/downloads/MOUs/nepa_delegation/sec6005mou.pdf.

Based on the information Caltrans provided in the January 21, 2010, formal consultation initiation letter and biological assessment, Caltrans has determined that the project, as proposed, is likely to adversely affect the California red-legged frog and is not likely to adversely affect the endangered robust spineflower (*Chorizanthe robusta* var. *robusta*). Caltrans did not request concurrence for the robust spineflower determination; however, we have determined based on the

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habitat suitability and survey results provided by Caltrans (2010) that the project is not likely to adversely affect this species. This biological opinion is based on: (1) the *Biological Assessment: Santa Clara State Route 9 Safety Improvement Project* (BA) dated January 2010; (2) letter from Caltrans to the Service dated January 21, 2010; (3) project meeting and site visit conducted by the Service and Caltrans on February 11, 2010; (4) miscellaneous correspondence and electronic mail concerning the proposed action between Caltrans and the Service; and (5) other information available to the Service.

Consultation History

January 22, 2010	The Service received a letter requesting initiation of formal consultation dated January 21, 2010, and the BA for the SR-9 Safety Improvement Project.
January 25, 2010	The Service received an electronic copy of the BA dated January 2010.
February 11, 2010	The Service attended a project meeting and site visit with Caltrans to review the review the project, biological findings, effects determination, project timing and scheduling, and avoidance and minimization measures.
January 25, 2010 - November 17, 2010	Electronic and phone correspondence between Robert Atanasio, Ryan Graybehl and Margaret Gabil of Caltrans, and Jerry Roe of the Service.

BIOLOGICAL OPINION

Description of the Proposed Action

The following project description, inclusive of the proposed compensation and proposed conservation measures, was provided by Caltrans and is an excerpt from the January 2010 BA (Caltrans 2010) with minor modifications for reasons of clarity and accuracy provided by the Service.

Project Description

The proposed action would improve sight distance at three spot locations on State Route 9 (SR 9) in Santa Clara County from Post Mile (PM) 2.5 to PM 7.0. The proposed action would occur within existing Caltrans right-of-way (ROW) and will also require acquisition of additional ROW. The existing roadway in the action area consists of two 11-foot lanes separated by a solid double yellow stripe. Paved shoulders vary from less than 1 foot to greater than 8 feet in width. At many locations, the existing edge of shoulder abuts the toe of slope of steep hills. According to the last approved Route Concept Report, SR 9 is to remain a conventional two-lane highway (Caltrans 1985 cited in Caltrans 2010).

This safety project will reduce the occurrence of cross-centerline accidents at three locations on SR 9 in Santa Clara County, east of the SR 35, Skyline Boulevard (PM 2.5) to the 6th Street intersection (PM 7.0). The proposed project includes improving sight distances on curves, upgrading the existing lanes and shoulders, increasing the super-elevation (i.e., road slope to counteract sideway acceleration around curves), installing metal beam guardrail (MBGR), and

placing warning signs along the corridor. The specific activities at the three locations are discussed below.

Location 1:

Location 1 (PM 2.5 to PM 2.7) is the most westerly and northerly of the project sites. It is also the highest in elevation at approximately 1,700 feet. This location is approximately 2.4 miles southeast of the intersection of SR 9 with SR 35 (Skyline Boulevard).

Existing Conditions:

Within location 1, SR 9 is a two-lane undivided highway with northbound lane width varying from 10.6 to 11.4 feet and southbound lane width varying from 10 to 12 feet. Northbound shoulder width varies from 0 to 2 feet and southbound shoulder width varies from 2 to 7 feet. The existing ROW varies from 20 to 40 feet south of the centerline and 20 to 43 feet north of the centerline. MBGR is in place along an approximately 70-foot portion of the northern shoulder.

Proposed Improvements:

To improve the sight distance through this location, Caltrans will cut back the existing south-side slope and install a 290-foot soil-nail retaining wall. The height of the retaining wall will vary from 4 to 40 feet. The proposed action includes construction of a minimum 4-foot-wide shoulder on the south side of the road. Reconstruction of the road structural section will improve the existing super-elevation. Additional safety improvements will include the removal and replacement of existing MBGR and installation of an additional 308 feet of MBGR on the north shoulder.

This construction will require improving the existing drainage on the south shoulder. These improvements will remove the existing drainage inlet. Caltrans will extend the drainage pipe to the limits of the widened south shoulder and construct a new drainage inlet over the extended pipe.

Location 2:

Location 2 (PM 5.9 to PM 6.2) is adjacent to Saratoga Creek in the eastern portion of the Santa Cruz Mountains. Location 2 is between Location 1 and Location 3 and is approximately 0.4-mile east of Pierce Road.

Existing Conditions:

Within location 2, SR 9 is a two-lane undivided highway. The northbound lane width varies from 10.5 to 11.9 feet and the southbound lane varies from 10.0 to 11.3 feet wide. Northbound shoulder width varies from 1 to 3 feet and southbound shoulder width varies from 2 to 3 feet. The existing ROW changes in width from 15 to 20 feet to the south and from 30 to 35 feet to the north of the centerline. Existing MBGR runs along approximately 219 feet at the edge of the south shoulder.

Proposed Improvements:

Cutting back the north side slope up to 25 feet will improve sight distance at this location. Caltrans proposes to construct a 722-foot-long soil-nail retaining wall along this cut. The height of the retaining wall will vary from 4 to 25 feet. A minimum 4-foot-wide north shoulder will be constructed. Reconstruction of the existing structural section of the roadbed will improve the

super-elevation. The existing MBGR at the south shoulder will be removed and replaced and an additional 195 feet of MBGR will be installed.

This construction will require improvements to the existing drainage system. The existing 18-inch corrugated metal pipe is damaged and will be replaced. Caltrans will also construct a new drainage inlet at the widened shoulder. Additional ROW will be acquired 20 feet north of the current ROW in order to cut back the slope. Distance between the existing ROW and the necessary permanent easement for the retaining wall will be up to 50 feet. Caltrans will relocate existing power poles from 13 feet and 21 feet south of the centerline to 35 feet south of the centerline.

Location 3:

Location 3 (PM 6.7 to PM 7.0) is just west of the town of Saratoga and has the lowest elevation of the three sites. It is 1.5 miles from downtown Saratoga and the most easterly of the three locations.

Existing Conditions:

Within location 3, SR 9 is a two-lane undivided highway. The northbound lane width varies from 10.9 to 11.6 feet and the southbound lane varies from 10.9 to 11.5 feet. Northbound shoulder width varies from 2 to 3 feet and southbound shoulder width varies from 2 to 4 feet. The existing ROW changes in width from 29 to 34 feet to the south and from 26 to 31 feet to the north of the centerline. Existing MBGR is approximately 69 feet long at the south shoulder and 753 feet long at the north shoulder edge.

Proposed Improvements:

Cutting back the south side slope up to 30 feet will improve sight distance through this location. Caltrans will construct a 213-foot soil-nail retaining wall along this cut. The height of the retaining wall will vary from 5 to 30 feet. Caltrans will widen the south shoulder so that the shoulder width varies from 2 to 8 feet. The existing drainage pipe will be extended to the edge of the new shoulder. Reconstruction of the roadbed's existing structural section will improve the super-elevation.

Additional ROW will be acquired up 40 feet south of the current ROW in order to cut back the slope. Distance between the existing ROW and the necessary permanent easement for the retaining wall will vary from 0 to 80 feet. Caltrans will relocate existing utility poles 20 to 30 feet south of the centerline to 32 feet south of the centerline.

<u>Construction Actions</u>

The project footprint is the area subject to direct permanent and temporary construction effects. All construction activities will occur within the project footprint. Additional activities such as site preparation, staging, access, and detours will occur within the project footprint. Construction work will occur during the day; nighttime construction is not anticipated.

Site Preparation

Site preparation activities will include:

1. Installation of Environmentally Sensitive Area (ESA) fencing,
2. Installation of Wildlife Exclusion Fencing, and
3. A pre-construction survey will be done before any vegetation is removed during the non-nesting season for migratory birds.

These activities are described in the following subsections. In addition, all clearing and grubbing will be completed by hand or by using backhoes and excavators.

Access, Staging, and Laydown

The proposed action will not require special haul roads. Easements will be obtained for the placement of soil-nail walls. Caltrans will use one-way traffic control and lane closures to accomplish construction activities. K-Rail will be used to close lanes and the available paved surfaces behind the K-rail will provide temporary storage, staging, or lay-down areas. Placement or removal of K-rail and hauling may require completely closing SR 9 at the three project locations for a brief time. These closures will occur during low-volume traffic hours.

Sequence of Construction Actions

Caltrans anticipates that construction will begin in spring of 2012 and will be completed in 180 days. The proposed action does not require special stage construction. Generally, construction work at each location will occur in this order:

1. Set up temporary K-rail lane closure and one-way traffic control system,
2. Clear and grub,
3. Roadway excavation and cutting back of slopes,
4. Construction of soil-nail wall and roadway improvements,
5. Remove temporary K-rail and one-way traffic control system, and
6. Roadway delineation and roadway rehabilitation.

Site Clean-up and Restoration

All construction-related materials including the ESA fencing will be removed after construction activities are complete. The temporarily disturbed areas and staging areas will be cleaned up, recontoured to original grade, and revegetated with appropriate native species, as necessary. Permanent erosion control, including soil stabilization measures such as hydroseeding and coir netting, will be applied to all temporarily affected project areas to minimize erosion after construction.

General Avoidance and Minimization Measures

To reduce potential effects to sensitive biological resources, Caltrans proposes to incorporate construction Best Management Practices (BMPs) and avoidance and minimization measures into the proposed project. These measures will be communicated to the contractor through the use of

special provisions included in the contract bid solicitation package. These measures include the following:

1. **Seasonal Avoidance**. Construction actions will be scheduled to minimize effects on listed species and habitats. Work within drainages inlets will be conducted outside the rainy season from October 15 through April 15.

2. **Environmentally Sensitive Areas (ESA)**. Prior to the start of construction, ESA – defined as areas containing sensitive habitats adjacent to or within construction work areas for which physical disturbance is not allowed – will be clearly delineated using high-visibility orange fencing. Construction work areas include the active construction site and all areas providing support for the project including areas used for vehicle parking, equipment and material storage and staging, access roads, etc. The ESA fencing will remain in place throughout the duration of the project, while construction activities are ongoing and will prevent the encroachment of construction equipment/personnel from entering sensitive habitat areas. The final project plans will depict all locations where ESA fencing will be installed and how it will be installed. The bid solicitation package special provisions will clearly describe acceptable fencing material and prohibited construction-related activities, vehicle operation, material and equipment storage, and other surface-disturbing activities within ESAs. In addition, hydrological features (i.e., topographic depressions, drainage ditches, culverts, etc.) outside of the project footprint will not be manipulated (i.e., re-routed, dredged, filled, graded, etc.). This will avoid potential effects to wetlands and waters outside of the project footprint that are hydrologically connected to wetland features within the project footprint. The project engineer will have the ESA alignment surveyed during project development and will provide the survey data to the contractor.

3. **Environmental Awareness Training**. Before the onset of construction activities, a qualified biologist will conduct an education program for construction personnel. At a minimum the training will include a description of California red-legged frog, robust spineflower and other listed species; migratory birds and their habitats; the occurrence of these species within the action area; an explanation of the status of these species and protection under the Act and Migratory Bird Treaty Act (MBTA); the measures to be implemented to conserve listed species and their habitats as they relate to the work site; and boundaries within which construction may occur. A fact sheet conveying this information will be prepared and distributed to all construction crews and project personnel entering the project footprint. Upon completion of the program, personnel will sign a form stating that they attended the program and understand all the avoidance and minimization measures and implications of the Act.

4. **Best Management Practices (BMP).** Storm Water Pollution Prevention Plans (SWPPP) and erosion-control BMPs will be developed to minimize any wind or water-related erosion and will be in compliance with the requirements of the Regional Water Quality Control Board. The SWPPP will provide guidance for design staff to include provisions in construction contracts for measures to protect sensitive areas and prevent and minimize stormwater and non-stormwater discharges. Protective measures will include, but are not limited to, these restrictions:

    a. No discharge of pollutants from vehicle and equipment cleaning will be allowed into any storm drains or watercourses.

b. Vehicle and equipment fueling and maintenance operations will be at least 50 feet away from watercourses, except at established commercial gas stations or established vehicle maintenance facility.

c. Concrete wastes will be collected in washouts and water from curing operations will be collected and disposed. Neither will be allowed into watercourses.

d. Spill containment kits will be maintained onsite at all times during construction operations and/or staging or fueling of equipment.

e. Dust control measures will include use of water trucks and dust palliatives to control dust in excavation-and-fill areas and the covering of temporary stockpiles when weather conditions require.

f. Coir rolls or straw wattles will be installed along or at the base of slopes during construction to capture sediment.

g. Protection of graded areas from erosion using a combination of silt fences, fiber rolls along toes of slopes or along edges of designated staging areas, and erosion control netting (such as jute or coir) as appropriate on sloped areas.

h. Bio-filtration strips and swales will be used to receive storm water discharges from the highway or other impervious surfaces.

5. **Construction Site Management Practices**. The following site restrictions will be implemented to avoid or minimize effects on listed species and their habitats:

a. A speed limit of 15 mph in the project footprint in unpaved areas will be enforced to reduce dust and excessive soil disturbance.

b. Temporary construction easements will be outside of any designated ESAs.

c. Access routes and the number and size of staging and work areas will be limited to existing paved surfaces.

d. Routes and boundaries of roadwork will be clearly marked prior to initiating construction or grading.

e. All food and food-related trash items will be enclosed in sealed trash containers and removed completely from the site at the end of each day.

f. No pets from construction personnel will be allowed anywhere in the action area during construction.

g. All equipment will be maintained to prevent leaks of automotive fluids, such as gasoline, oils, or solvents, and a Spill Response Plan will be prepared.

h. Hazardous materials, such as fuels, oils, solvents, etc., will be stored in sealable containers in a designated location that is at least 100 feet from wetlands and aquatic habitats.

6. **Vegetation Removal**. Any vegetation that is within the cut and fill line or growing in locations where permanent structures will be placed (e.g., road alignment, shoulder widening, soil-nail walls, etc.) will be cleared. Vegetation will be cleared only where necessary and will be cut above soil level except in areas that will be excavated for roadway construction. This will allow plants that reproduce vegetatively to resprout after construction. A Service-approved biologist will be present during all vegetation clearing and grubbing activities. If at any point California red-legged frogs or other listed species are discovered during these activities, the protocol for observance and handling California red-legged frogs outlined below will be implemented. All clearing and grubbing of woody vegetation will occur by hand or using light construction equipment such as backhoes and excavators. If clearing and grubbing occurs between February 1 and August 31, a qualified biologist(s) will survey for nesting birds within the area(s) to be disturbed including a perimeter buffer of 100 feet for passerines and 500 feet for raptors before clearing activities begin. All nest avoidance requirements of the MBTA and California Department of Fish and Game (CDFG) Code will be observed. All cleared vegetation will be removed from the project footprint to prevent attracting animals to the project site. The contractor will be responsible for obtaining all permits, licenses and environmental clearances for properly disposing of such materials. After project completion, all temporarily affected areas will be returned to original grade and contours to the maximum extent practicable, protected using appropriate erosion control methods, and revegetated with native species appropriate for the region and habitat communities on site.

7. **Reduce Spread of Invasive Species**. To reduce the spread of invasive non-native plant species and minimize the potential decrease of palatable vegetation for wildlife species, Caltrans will comply with Executive Order 13112. This order is provided to prevent the introduction of invasive species and provide for their control in order to minimize the economic, ecological, and human health impacts. In the event that high- or medium-priority noxious weeds, as defined by the California Department of Food and Agriculture or the California Invasive Plant Council, are disturbed or removed during construction-related activities, the contractor will contain the plant material associated with these noxious weeds and dispose of it in a manner that will not promote the spread of the species. The contractor will be responsible for obtaining all permits, licenses and environmental clearances for properly disposing of materials. Areas subject to noxious weed removal or disturbance will be replanted with fast-growing native grasses or a native erosion control seed mixture. If seeding is not possible, the area should be covered to the extent practicable with heavy black plastic solarization material until the end of the project.

8. **Restore On-Site Habitat**. All slopes or unpaved areas temporarily affected by the proposed action will be restored to pre-project conditions to the maximum extent practicable. Slopes and bare ground will be reseeded with native grasses and shrubs to stabilize and prevent erosion. Where disturbance includes the removal of trees or plants, native species will be replanted.

Robust Spineflower Protective Measures

9. **Focused Plant Surveys**. Caltrans will conduct additional focused plant surveys for robust spineflower at locations 2 and 3. The survey timing will generally occur from May to early June but will be adjusted based on regional conditions during the survey year. The surveys will be coordinated with the Service to determine the appropriate survey

period. If possible, the surveyors will view a known reference population prior to the survey event to confirm the species identification and blooming status of the species. A short description of the survey methods and results will be provided to the Service. In the event that robust spineflowers are detected within the action area, Caltrans will reinitiate consultation with the Service to assess the effects to the species and determine the appropriate avoidance, minimization, and compensation measures.

California Red-Legged Frog Protective Measures

10. **Biological Monitoring**. A Service-approved biologist will be present onsite to monitor for California red-legged frogs. Through communication with the Resident Engineer or their designee, the Service-approved biologist may stop work if deemed necessary for any reason to protect listed species and will advise the Resident Engineer or designee on how to proceed accordingly. The Service-approved biologist will be present during all construction activities where take of a listed species could occur. The biologist will conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction is occurring within or adjacent to suitable California red-legged frog habitat.

11. **Preconstruction Surveys**. Preconstruction surveys will be conducted by a Service approved biologist immediately prior to the initiation of any ground disturbing activities within or adjacent to suitable California red-legged frog habitat. Visual encounter surveys will be conducted within areas subject to ground disturbing activities. All suitable aquatic and upland habitat including refugia habitat (i.e., under shrubs, downed logs, small woody debris, burrows, etc.) will be thoroughly inspected. If a California red-legged frog is observed, the individual(s) will be evaluated and relocated in accordance with the observation and handling protocol promulgated by the Service.

12. **Wildlife Exclusion Fencing (WEF)**. Prior to the start of construction, WEF will be installed along the project footprint in all areas where California red-legged frogs could enter the project site. The location of the fencing will be determined by the Resident Engineer and Service-approved biologist based on habitat suitability in cooperation with the Service. The final project plans will show where and how the WEF will be installed. The bid solicitation package special provisions will clearly describe acceptable fencing material and proper WEF installation and maintenance. The WEF will remain in place throughout the duration of the project, while construction activities are ongoing, and will be regularly inspected and fully maintained. Upon project completion the WEF will be completely removed and the areas returned to original condition or better.

13. **Protocol for Species Observation and Handling**. If California red-legged frogs are encountered in the project area, work within 50 feet of the animal will cease immediately and the Resident Engineer and Service-approved biologist will be notified. Based on the professional judgment of the Service-approved biologist, if project activities can be conducted without harming or injuring California red-legged frog(s), it may be left at the location of discovery and monitored by the Service-approved biologist. All project personnel will be notified of the finding and at no time shall work occur within 50 feet of the California red-legged frog without a biological monitor present. If it is determined by the Service-approved biologist that relocating the California red-legged frog(s) is necessary, the following steps will be followed:

a. Prior to handling and relocation the Service-approved biologist will take precautions to prevent introduction of amphibian diseases in accordance with the *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (Service 2005). Disinfecting equipment and clothing is especially important when biologists are coming to the action area to handle amphibians after working in other aquatic habitats.

b. California red-legged frogs will be captured by hand, dipnet or other Service approved methodology, transported by hand, dipnet or temporary holding container, and released as soon as practicable the same day of capture. Handling of California red-legged frogs will be minimized to the maximum extent practicable. Holding/transporting containers and dipnets will be thoroughly cleaned and disinfected prior to transporting to the action area and will be rinsed with freshwater onsite immediately prior to usage unless doing so would result in the injury or death of the California red-legged frog(s) due to the time delay.

c. California red-legged frogs will be relocated to the nearest suitable habitat outside of the area where actions would not result in harm or harassment, and released on the same side of SR-9 where they were discovered. The individual(s) will be released within suitable habitat in the Caltrans right-of-way or another property acceptable to the property owner, and the Service will be notified. If suitable habitat cannot be identified, the Service should be contacted to determine an acceptable alternative. Transporting California red-legged frogs to a location other than the location described herein will require written authorization of the Service.

14. **Avoidance of Entrapment**. To prevent inadvertent entrapment of animals during construction, all excavated, steep-walled holes or trenches more than 1-foot deep will be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled they must be thoroughly inspected for trapped animals. All replacement pipes, culverts, or similar structures stored in the action area overnight will be inspected before they are subsequently moved, capped and/or buried. If at any time a listed species is discovered, the Resident Engineer and Service-approved biologist will be immediately informed. The Service-approved biologist will determine if relocating the species is necessary and will work with the Service prior to handling or relocating unless otherwise authorized.

15. **Proper Use of Erosion Control Devices**. To prevent California red-legged frogs from becoming entangled or trapped in erosion control materials, plastic mono-filament netting (i.e., erosion control matting) or similar material will not be used within the action area. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.

Analytical Framework for Jeopardy

Jeopardy Determinations

In accordance with policy and regulation, the jeopardy analysis in this Biological Opinion relies on four components: (1) *Status of the Species*; (2) *Environmental Baseline*, which evaluates the

California red-legged frog range-wide conditions, the factors responsible for that condition, and their survival and recovery needs; and evaluates the condition of these species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of these species; (3) *Effects of the Action*, which determines the direct and indirect effects of the proposed Federal action and the effects of any interrelated or interdependent activities on these species; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on them.

In accordance with policy and regulation, this jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the California red-legged frog current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of this species in the wild.

The jeopardy analysis in this Biological Opinion places an emphasis on consideration of the range-wide survival and recovery of the California red-legged frog and the role of the action area in the survival and recovery of species as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the proposed action, the Service considers the action area to comprise the three sections of SR-9 between PM 2.5-2.7 (2.33 acres), PM 5.9-6.2 (3.50 acres) and PM 6.7-7.0 (1.76 acres). Caltrans defined the Biological Study Area as the area inclusive of the project footprint and adjacent land extending to the limits of the Caltrans ROW; an area comprising approximately 7.59 acres. The action area extends beyond this area to encompass the project footprint, roadside staging and vehicle parking areas, Caltrans right-of-way (ROW) limits, temporary construction easements within the ROW, and adjacent lands in some cases extending several hundred feet from the project footprint depending on the nature of the disturbance and sensitivity of the species to disturbance, that may result in take of listed species due to disturbance from noise, vibration, heavy equipment operation and increased human activity.

Status of the Species and Environmental Baseline

California Red-legged Frog

Listing Status: The California red-legged frog was listed as a threatened species on May 23, 1996 (Service 1996). Critical habitat was designated for this species on April 13, 2006 (Service 2006) and revisions to the critical habitat designation were published on March 17, 2010 (Service 2010). At this time, the Service recognized the taxonomic change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer *et al.* 2010). A recovery plan was published for the California red-legged frog on September 12, 2002 (Service 2002).

Description: The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949), ranging from 1.5 to 5.1 inches in length (Stebbins 2003). The abdomen and hind legs of adults are largely red, while the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or

reddish background color. Dorsal spots usually have light centers (Stebbins 2003), and dorsolateral folds are prominent on the back. Larvae (tadpoles) range from 0.6 to 3.1 inches in length, and the background color of the body is dark brown and yellow with darker spots (Storer 1925).

Distribution: The historic range of the California red-legged frog extended from the vicinity of Elk Creek in Mendocino County, California, along the coast inland to the vicinity of Redding in Shasta County, California, and southward to northwestern Baja California, Mexico (Fellers 2005; Jennings and Hayes 1985; Hayes and Krempels 1986). The species was historically documented in 46 counties but the taxa now remains in 238 streams or drainages within 23 counties, representing a loss of 70 percent of its former range (Service 2002). California red-legged frogs are still locally abundant within portions of the San Francisco Bay area and the Central California Coast. Isolated populations have been documented in the Sierra Nevada, northern Coast, and northern Transverse Ranges. The species is believed to be extirpated from the southern Transverse and Peninsular ranges, but is still present in Baja California, Mexico (CDFG 2010).

Status and Natural History: California red-legged frogs predominately inhabit permanent water sources such as streams, lakes, marshes, natural and manmade ponds, and ephemeral drainages in valley bottoms and foothills up to 4,921 feet in elevation (Jennings and Hayes 1994, Bulger et al. 2003, Stebbins 2003). However, it also have been found in ephemeral creeks and drainages and in ponds with minimal riparian and emergent vegetation. This amphibian breeds between November and April, although earlier breeding records have been reported in southern localities, in still or slow-moving water often with emergent vegetation, such as cattails (*Typha* spp.), tules (*Scirpus* spp.) or overhanging willows (*Salix* spp.) (Storer 1925, Hayes and Jennings 1988). California red-legged frogs have paired vocal sacs and vocalize in air (Hayes and Krempels 1986). Female frogs deposit egg masses on emergent vegetation so that the egg mass floats on or near the surface of the water (Hayes and Miyamoto 1984). Individuals occurring in coastal drainages are active year-round (Jennings et al. 1992), whereas those found in interior sites are normally less active during the cold season.

During other parts of the year, habitat includes nearly any area within 1-2 miles of a breeding site that stays moist and cool through the summer (Fellers 2005). According to Fellers (2005), this may include vegetated areas with coyote brush (*Baccharis pilularis*), California blackberry thickets (*Rubus ursinus*), and root masses associated with willow and California bay (*Umbellularia californica*) trees. Sometimes the non-breeding habitat used by California red-legged frogs is extremely limited in size. For example, non-breeding individuals have been found in a 6 foot wide coyote brush thicket growing along a tiny intermittent creek surrounded by heavily grazed grassland (Fellers 2005). Sheltering habitat for California red-legged frogs is potentially all aquatic, riparian, and upland areas within the range of the species and includes any landscape features that provide cover, such as existing animal burrows, boulders or rocks, organic debris such as downed trees or logs, and industrial debris. Agricultural features such as drains, watering troughs, spring boxes, abandoned sheds, or hay stacks may also be used. Incised stream channels with portions narrower and depths greater than 18 inches also may provide important summer sheltering habitat. Accessibility to sheltering habitat is essential for the survival of California red-legged frogs within a watershed, and can be a factor limiting frog population numbers and survival.

California red-legged frogs do not have a distinct breeding migration (Fellers 2005). Adults are often associated with permanent bodies of water. Some individuals remain at breeding sites year-round, while others disperse to neighboring water features. Dispersal distances are typically less

than 0.5-mile, with a few individuals moving up to 1-2 miles (Fellers 2005). Movements are typically along riparian corridors, but some individuals, especially on rainy nights, move directly from one site to another through normally inhospitable habitats, such as heavily grazed pastures or oak-grassland savannas (Fellers 2005).

In a study of California red-legged frog terrestrial activity in a mesic area of the Santa Cruz Mountains, Bulger *et al.* (2003) categorized terrestrial use as migratory and non-migratory. The latter occurred from one to several days and was associated with precipitation events. Migratory movements were characterized as the movement between aquatic sites and were most often associated with breeding activities. Bulger *et al.* (2003) reported that non-migrating frogs typically stayed within 200 feet of aquatic habitat 90 percent of the time and were most often associated with dense vegetative cover, i.e., California blackberry, poison oak (*Toxicodendron diversilobum*) and coyote brush. Dispersing frogs in northern Santa Cruz County traveled distances from 0.25-mile to more than 2 miles without apparent regard to topography, vegetation type, or riparian corridors (Bulger et al. 2003).

In a study of California red-legged frog terrestrial activity in a xeric environment in eastern Contra Costa County, Tatarian (2008) noted that a 57 percent majority of frogs fitted with radio transmitters in the Round Valley study area stayed at their breeding pools, whereas 43 percent moved into adjacent upland habitat or to other aquatic sites. Her study reported a peak seasonal terrestrial movement occurring in the fall months associated with the first 0.2-inch of precipitation and tapering off into spring. Upland movement activities ranged from 3 to 233 feet, averaging 80 feet, and were associated with a variety of refugia including grass thatch, crevices, cow hoof prints, ground squirrel (*Spermophilus beecheyi*) burrows at the base of trees or rocks, logs, and under man-made structures; others were associated with upland sites lacking refugia (Tatarian 2008). The majority of terrestrial movements lasted from 1 to 4 days; however, one adult female was reported to remain in upland habitat for 50 days (Tatarian 2008). Upland refugia closer to aquatic sites were used more often and were more commonly associated with areas exhibiting higher object cover, e.g., woody debris, rocks, and vegetative cover. Subterranean cover was not significantly different between occupied upland habitat and non-occupied upland habitat.

California red-legged frogs are often prolific breeders, laying their eggs during or shortly after large rainfall events in late winter and early spring (Hayes and Miyamoto 1984). Egg masses containing 2,000 to 5,000 eggs are attached to vegetation below the surface and hatch after 6 to 14 days (Storer 1925, Jennings and Hayes 1994). In coastal lagoons, the most significant mortality factor in the pre-hatching stage is water salinity (Jennings *et al.* 1992). Eggs exposed to salinity levels greater than 4.5 parts per thousand resulted in 100 percent mortality (Jennings and Hayes 1990). Increased siltation during the breeding season can cause asphyxiation of eggs and small larvae. Larvae undergo metamorphosis 3½ to 7 months following hatching and reach sexual maturity 2 to 3 years of age (Storer 1925; Wright and Wright 1949; Jennings and Hayes 1985, 1990, 1994). Of the various life stages, larvae probably experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings *et al.* 1992). California red-legged frogs may live 8 to 10 years (Jennings *et al.* 1992). Populations can fluctuate from year to year; favorable conditions allow the species to have extremely high rates of reproduction and thus produce large numbers of dispersing young and a concomitant increase in the number of occupied sites. In contrast, the animal may temporarily disappear from an area when conditions are stressful (e.g., during periods of drought, disease, etc.).

The diet of California red-legged frogs is highly variable and changes with the life history stage. The diet of the larvae is not well studied, but is likely similar to that of other ranid frogs, feeding on algae, diatoms, and detritus by grazing on the surface of rocks and vegetation (Fellers 2005; Kupferberg 1996a, 1996b, 1997). Hayes and Tennant (1985) analyzed the diets of California red-legged frogs from Cañada de la Gaviota in Santa Barbara County during the winter of 1981 and found invertebrates (comprising 42 taxa) to be the most common prey item consumed; however, they speculated that this was opportunistic and varied based on prey availability. They ascertained that larger frogs consumed larger prey and were recorded to have preyed on Pacific chorus frogs (*Pseudacris regilla*), three-spined stickleback (*Gasterosteus aculeatus*) and, to a limited extent, California mice (*Peromyscus californicus*), which were abundant at the study site (Hayes and Tennant 1985, Fellers 2005). Although larger vertebrate prey was consumed less frequently, it represented over half of the prey mass eaten by larger frogs suggesting that such prey may play an energetically important role in their diets (Hayes and Tennant 1985). Juvenile and subadult/adult frogs varied in their feeding activity periods; juveniles fed for longer periods throughout the day and night, while subadult/adults fed nocturnally (Hayes and Tennant 1985). Juveniles were significantly less successful at capturing prey and all life history stages exhibited poor prey discrimination, feeding on several inanimate objects that moved through their field of view (Hayes and Tennant 1985).

Metapopulation and Patch Dynamics: The direction and type of habitat used by dispersing animals is especially important in fragmented environments (Forys and Humphrey 1996). Models of habitat patch geometry predict that individual animals will exit patches at more "permeable" areas (Buechner 1987; Stamps *et al.* 1987). A landscape corridor may increase the patch-edge permeability by extending patch habitat (La Polla and Barrett 1993), and allow individuals to move from one patch to another. The geometric and habitat features that constitute a "corridor" must be determined from the perspective of the animal (Forys and Humphrey 1996).

Because their habitats have been fragmented, many endangered and threatened species exist as metapopulations (Verboom and Apeldom 1990; Verboom et al. 1991). A metapopulation is a collection of spatially discrete subpopulations that are connected by the dispersal movements of the individuals (Levins 1970; Hanski 1991). For metapopulations of listed species, a prerequisite to recovery is determining if unoccupied habitat patches are vacant due to the attributes of the habitat patch (food, cover, and patch area) or due to patch context (distance of the patch to other patches and distance of the patch to other features). Subpopulations on patches with higher quality food and cover are more likely to persist because they can support more individuals. Large populations have less of a chance of extinction due to stochastic events (Gilpin and Soule 1986). Similarly, small patches will support fewer individuals, increasing the rate of extinction. Patches that are near occupied patches are more likely to be recolonized when local extinction occurs and may benefit from emigration of individuals via the "rescue" effect (Hanski 1982; Gotelli 1991; Holt 1993; Fahrig and Merriam 1985). For the metapopulation to persist, the rate of patches being colonized must exceed the rate of patches going extinct (Levins 1970). If some subpopulations go extinct regardless of patch context, recovery actions should be placed on patch attributes. Patches could be managed to increase the availability of food and/or cover.

Movements and dispersal corridors likely are critical to California red-legged frog population dynamics, particularly because the animals likely currently persist as metapopulations with disjunct population centers. Movement and dispersal corridors are important for alleviating over-crowding and intraspecific competition, and also they are important for facilitating the recolonization of areas where the animal has been extirpated. Movement between population centers maintains gene flow and reduced genetic isolation. Genetically isolated populations are

at greater risk of deleterious genetic effects such as inbreeding, genetic drift, and founder effects. The survival of wildlife species in fragmented habitats may ultimately depend on their ability to move among patches to access necessary resources, retain genetic diversity, and maintain reproductive capacity within populations (Hilty and Merenlender 2004; Petit *et al.* 1995; Buza *et al.* 2000).

Most metapopulation or meta-population-like models of patchy populations do not directly include the effects of dispersal mortality on population dynamics (Hanski 1994; With and Crist 1995; Lindenmayer and Possingham 1996). Based on these models, it has become a widely held notion that more vagile species have a higher tolerance to habitat loss and fragmentation than less vagile species. But models that include dispersal mortality predict exactly the opposite: more vagile species should be more vulnerable to habitat loss and fragmentation because they are more susceptible to dispersal mortality (Fahrig 1998; Casagrandi and Gatto 1999). This prediction is supported by Gibbs (1998), who examined the presence-absence of five amphibian species across a gradient of habitat loss. He found that species with low dispersal rates are better able than more vagile species to persist in landscapes with low habitat cover. Gibbs (1998) postulated that the land between habitats serves as a demographic "drain" for many amphibians. Furthermore, Bonnet *et al.* (1999) found that snake species that use frequent long-distance movements have higher mortality rates than do sedentary species.

Threats: Habitat loss, non-native species introduction, and urban encroachment are the primary factors that have adversely affected the California red-legged frog throughout its range. Several researchers in central California have noted the decline and eventual local disappearance of California and northern red-legged frogs in systems supporting bullfrogs (*Rana catesbeiana*) (Jennings and Hayes 1990; Twedt 1993), red swamp crayfish (*Procambarus clarkii*), signal crayfish (*Pacifastacus leniusculus*), and several species of warm water fish including sunfish (*Lepomis* spp.), goldfish (*Carassius auratus*), common carp (*Cyprinus carpio*), and mosquitofish (*Gambusia affinis*) (Moyle 1976; Barry 1992; Hunt 1993; Fisher and Schaffer 1996). This has been attributed to predation, competition, and reproduction interference. Twedt (1993) documented bullfrog predation of juvenile northern red-legged frogs (*Rana aurora*), and suggested that bullfrogs could prey on subadult California red-legged frogs as well. Bullfrogs may also have a competitive advantage over California red-legged frogs. For instance, bullfrogs are larger and possess more generalized food habits (Bury and Whelan 1984). In addition, bullfrogs have an extended breeding season (Storer 1933) during which an individual female can produce as many as 20,000 eggs (Emlen 1977). Furthermore, bullfrog larvae are unpalatable to predatory fish (Kruse and Francis 1977). Bullfrogs also interfere with California red-legged frog reproduction by eating adult male California red-legged frogs. Both California and northern red-legged frogs have been observed in amplexus (mounted on) with both male and female bullfrogs (Jennings and Hayes 1990; Twedt 1993; Jennings 1993). Thus bullfrogs are able to prey upon and out-compete California red-legged frogs, especially in sub-optimal habitat.

The urbanization of land within and adjacent to California red-legged frog habitat has also affectedthe threatened amphibian. These declines are attributed to channelization of riparian areas, enclosure of the channels by urban development that blocks dispersal, and the introduction of predatory fishes and bullfrogs. Diseases may also pose a significant threat, although the specific effects of disease on the California red-legged frog are not known. Pathogens are suspected of causing global amphibian declines (Davidson et al. 2003). Chytridiomycosis and ranaviruses are a potential threat because these diseases have been found to adversely affect other amphibians, including the listed species (Davidson et al. 2003; Lips et al. 2006). Mao *et al.* (1999 cited in Fellers 2005) reported northern red-legged frogs infected with an iridovirus, which

was also presented in sympatric threespine sticklebacks in northwestern California. Non-native species, such as bullfrogs and non-native tiger salamanders that live within the range of the California red-legged frog have been identified as potential carriers of these diseases (Garner *et al.* 2006). Human activities can facilitate the spread of disease by encouraging the further introduction of non-native carriers and by acting as carriers themselves (i.e., contaminated boots, waders or fishing equipment). Human activities can also introduce stress by other means, such as habitat fragmentation, that results in the listed species being more susceptible to the effects of disease.

Negative effects to wildlife populations from roads and pavement may extend some distance from the actual road. The phenomenon can result from vehicle-related mortality, habitat degradation, noise and light pollution, and invasive exotic species. Forman and Deblinger (1998) described the area affected as the "road effect" zone. One study along a 4-lane road in Massachusetts determined that this zone extended for an average of 980 feet to either side of the road for an average total zone width of approximately 1,970 feet. However, in places they detected an effect greater than 0.6-mile from the road. The road effect zone can also be subtle. Van der Zandt *et al.* (1980) reported that lapwings (*Vanellus vanellus*) and black-tailed godwits (*Limosa limosa*) feeding at 1,575 to 6,560 feet from roads were disturbed by passing vehicles. The heart rate, metabolic rate and energy expenditure of female bighorn sheep (*Ovis canadensis*) increases near roads (MacArthur *et al.* 1979). Trombulak and Frissell (2000) described another type of "road-zone" effect due to contaminants. Heavy metal concentrations from vehicle exhaust were greatest within 66 feet of roads and elevated levels of metals in soil and plants were detected at 660 feet of roads. The "road-zone" varies with habitat type and traffic volume. Based on responses by birds, Forman (2000) estimated the road-zone along primary roads of 1,000 feet in woodlands, 1,197 feet in grasslands, and 2,657 feet in natural lands near urban areas. Along secondary roads with lower traffic volumes, the effect zone was 656 feet. The road-zone with regard to California red-legged frogs has not been adequately investigated.

The necessity of moving between multiple habitats and breeding ponds means that many amphibian species, such as the California red-legged frog are especially vulnerable to roads and well-used large paved areas in the landscape. Van Gelder (1973) and Cooke (1995) have examined the effect of roads on amphibians and found that because of their activity patterns, population structure, and preferred habitats, aquatic breeding amphibians are more vulnerable to traffic mortality than some other species. High-volume highways pose a nearly impenetrable barrier to amphibians and result in mortality to individual animals as well as significantly fragmenting habitat. Hels and Buchwald (2001) found that mortality rates for anurans on high traffic roads are higher than on low traffic roads. Vos and Chardon (1998) found a significant negative effect of road density on the occupation probability of ponds by the moor frog (*Rana arvalis*) in the Netherlands. In addition, incidences of very large numbers of road-killed frogs are well documented (Asley and Robinson 1996), and studies have shown strong population level effects of traffic density (Carr and Fahrig 2001) and high traffic roads on these amphibians (Van Gelder 1973; Vos and Chardon 1998). Most studies regularly count road mortalities from slow moving vehicles (Hansen 1982; Rosen and Lowe 1994; Drews 1995; Mallick *et al.* 1998) or by foot (Munguira and Thomas 1992). These studies assume that every victim is observed, which may be true for large conspicuous mammals, but may be an incorrect assumption for small animals, such as the California red-legged frog. Amphibians appear especially vulnerable to traffic mortality because they readily attempt to cross roads, are small and slow-moving, and thus are not easily avoided by drivers (Carr and Fahrig 2001).

Status of the Species: The recovery plan for the California red-legged frog identifies eight recovery units (Service 2002). The establishment of these recovery units is based on the determination that various regional areas of the species' range are essential to its survival and recovery. The status of the California red-legged frog was considered within the small scale recovery units as opposed their overall range. These recovery units are delineated by major watershed boundaries as defined by U.S. Geological Survey hydrologic units and the limits of its range. The goal of the recovery plan is to protect the long-term viability of all extant populations within each recovery unit. Within each recovery unit, core areas have been delineated and represent contiguous areas of moderate to high California red-legged frog densities that are relatively free of exotic species such as bullfrogs. The goal of designating core areas is to protect metapopulations. Thus when combined with suitable dispersal habitat, will allow for the long term viability within existing populations. This management strategy will allow for the recolonization of habitats within and adjacent to core areas that are naturally subjected to periodic localized extinctions, thus assuring the long-term survival and recovery of California red-legged frogs.

Environmental Baseline

The action area is not located within designated critical habitat, but is located in the Central Coast Recovery Unit and is 1.3 miles east of the South San Francisco Bay Core Area (Unit 18) (Service 2002). The conservation needs for the South San Francisco Bay Core Area, which based on the proximity can be applied to the action area, are to: (1) protect existing populations; (2) control non-native predators; (3) increase connectivity between populations; (4) reduce erosion; (5) implement guidelines for recreation activities to reduce impacts; (6) implement forest practice guidelines; and (7) reduce impacts of urbanization. According to the BA (Caltrans 2010), the project is located within the known range of the California red-legged frog. Suitable breeding habitat is present within the reach of Saratoga Creek within the action area adjacent to locations 2 and 3. Caltrans characterized the stream habitat within this reach as having areas of slow-moving water with deep in-stream and side-channel pools, emergent vegetation, and well-developed riparian woodland with thick duff comprising moist leaf litter. Based on the February 11, 2010, site visit, this reach of Saratoga Creek also has complex stream banks comprising undercut banks, overhanging vegetation, small woody debris, rocks and dense vegetation that provide escape cover during high flows and protection from predators. Saratoga Creek provides suitable breeding, rearing and non-breeding aquatic habitat for all life history stages. Suitable non-breeding aquatic habitat is present within the seasonal wetland adjacent to the east end of Location 2 and in the settling pond at the Congress Springs Water Facility. The seasonal wetland was fully saturated at the time of the February 11, 2010, site visit and measured 1-4 inches in depth; providing suitable foraging and non-breeding aquatic habitat for California red-legged frogs. The settling pond across from the wetland is routinely fed by outflow pumps within the Congress Springs Water Facility. Caltrans (2010) identified this pond as potential breeding habitat based on its perennial water of sufficient depth and presence of emergent vegetation.

SR-9 parallels the Saratoga Creek at locations 2 and 3, cutting through progressively steeper topography heading from east to west. Location 1 is approximately 3.2 miles west of Location 2 and occurs at an elevation of approximately 1,650 feet within Douglas fir forest. With the exception of the roadside drainage, no hydrologic features are present at Location 1. Locations 2 and 3 are situated within upland habitat comprised of southern sycamore-alder riparian woodland with sections encroaching into residential and ornamental landscaped areas. Caltrans (2010) identified the southern sycamore-alder riparian woodland and Douglas fir forest habitats at

Locations 1, 2 and 3 as suitable upland (i.e., foraging and refugia) and dispersal habitat; however, the topography of the upland habitat within these areas is too steep to be used by California red-legged frogs.

Four occurrences have been reported within 5 miles of the project footprint dating from 1997 to 2007 comprising all life history stages located in a variety of perennial streams within woodland and landscaped habitats to the north (CDFG 2010). The nearest occurrence was reported immediately adjacent from Location 3 consisting of a single subadult in a seep next to Saratoga Creek. Caltrans conducted non-protocol visual encounter surveys on April 14, 2009, within the action area; however, no California red-legged frogs were observed (Caltrans 2010). Habitat connectivity between the project footprint and these sightings is relatively uninterrupted and consists of intact, medium to high quality habitat comprising Douglas fir forest, riparian woodland, mixed evergreen forests, annual grasslands, intermittent and perennial streams, stock ponds and other suitable water bodies that may support one or more life history stages.

Based on the prevalence of California red-legged frogs within the region, connectivity to adjacent occupied habitats and the presence of suitable habitat within the action area, the Service has determined there is a reasonable potential for California red-legged frogs to inhabit or disperse through the action area.

Effects of the Action

The proposed project will likely adversely affect the threatened California red-legged frog by killing, harming and/or harassing juveniles and adults inhabiting areas of suitable non-breeding aquatic, upland and dispersal habitat. Caltrans has minimized the extent of the project effects by reducing the project footprint to the minimum area necessary to construct the proposed project and avoiding physically disturbing potential breeding habitat within the action area. The project as described in the BA (Caltrans 2010) and in the project description of this biological opinion would affect 1.60 acre of marginal California red-legged frog upland and dispersal habitat, i.e. permanent removal of 1.14 acre and temporary disturbance to 0.46-acre, comprising steep, Douglas fir forest and southern sycamore-alder riparian woodland. The Service has determined that the permanent and temporary loss and/or degradation of California red-legged frog habitat will result in take of all California red-legged frogs within these areas as a direct result of habitat loss; however, because of the steep topography this effect is minimal.

The Service defines temporary and permanent effects as areas denuded, manipulated, or otherwise modified from their pre-project conditions, thereby removing one or more essential components of a listed species' habitat as a result of project activities that include, but are not limited to, construction, staging, storage, lay down, vehicle access, parking, etc. Temporary effects are limited to one or more consecutive seasons, and at a minimum, are fully restored to baseline habitat values or better within one calendar year following initial disturbance. Permanent effects are not temporally limited and include all effects not fulfilling the criteria for temporary effects. Areas subject to ongoing operations and maintenance are also considered permanent.

Aspects of the proposed action most likely to affect the California red-legged frog are largely confined to the construction phase, i.e. realignment of the roadway and installation of soil-nail walls. The construction of soil-nail walls will create a vertical hazard for California red-legged frogs, fragment habitat, and will present a movement barrier where existing habitat features currently provide access to habitats on either side of SR 9, albeit some of which are steep

topographical features. The soil-nail walls will affect the ability of California red-legged frogs to disperse across SR 9 and may result in individuals spending more time on the road and roadside verge in an attempt to reach habitat on the other side of the highway, thereby subjecting them to an increased risk of mortality or harm from vehicle strikes. Temporal loss of habitat will result from the removal and/or disturbance of vegetation within the project footprint comprising California red-legged frog upland and dispersal habitat. Construction noise, vibration, and increased human activity during the construction phase of the project may interfere with normal behaviors – feeding, sheltering, movement between refugia and foraging grounds, and other essential behaviors – resulting in avoidance of areas that have suitable habitat but intolerable levels of disturbance. Caltrans proposes to minimize these effects by restricting work to the dry season from April 15 to October 15, locating construction staging, storage and parking areas outside of sensitive habitat; clearly marking construction work boundaries with high-visibility ESA fencing, conducting preconstruction surveys and environmental monitoring during ground disturbing activities, and restoring all unpaved areas disturbed by project activities. Preconstruction surveys and the relocation of individual California red-legged frogs may avoid injury or mortality; however, capturing and handling California red-legged frogs may result in stress and/or inadvertent injury during handling, containment, and transport. Caltrans proposes to minimize these effects by using qualified Service-approved biologists, limiting the duration of handling, and relocating amphibians to suitable nearby habitat in accordance with Service guidance.

If unrestricted, the construction activities proposed have the potential to result in the introduction of chemical contaminants to the site. California red-legged frogs using these areas could be exposed to contaminants that are present at the site. Exposure pathways could include inhalation, dermal contact, direct ingestion, or secondary ingestion of contaminated soil, plants or prey species. Exposure to contaminants could cause short- or long-term morbidity, possibly resulting in reduced productivity or mortality. However, Caltrans proposes to eliminate these risks by implementing a SWPPP, erosion control BMP's and a Spill Response Plan, which will consist of refueling, oiling or cleaning of vehicles and equipment a minimum of 50 feet from aquatic resources; installing coir rolls, straw wattles and/or silt fencing to capture sediment and prevent runoff or other harmful chemicals from entering the wetland; and locating staging, storage and parking areas away from aquatic habitats.

If unrestricted, biologists and construction workers traveling to the action area from other project sites may transmit diseases by introducing contaminated equipment. The chance of a disease being introduced into a new area is greater today than in the past due to the increasing occurrences of disease throughout amphibian populations in California and the United States. It is possible that chytridiomycosis, caused by chytrid fungus (*Batrachochytrium dendrobatidis*), may exacerbate the effects of other diseases on amphibians or increase the sensitivity of the amphibian to environmental changes (e.g., water pH) that reduce normal immune response capabilities (Bosch *et al.* 2001, Weldon *et al.* 2004). Caltrans proposes to eliminate these risks by implementing proper decontamination procedures prior to and following aquatic surveys and handling amphibians. These will minimize the risk of transferring diseases through contaminated equipment or clothing. Relocation of California red-legged frogs out of construction areas that would otherwise result in mortality or injury if capture and relocation was not implemented increases the likelihood of survival of those individuals when they are handled properly and released nearby.

The amount of take resulting from construction activities and the removal of habitat will be partially minimized by installing wildlife exclusion fencing to deter California red-legged frogs

from wandering onto the construction site; educating workers about the presence of California red-legged frogs, their habitat, identification, regulatory laws, and avoidance and minimization measures; requiring a Service-approved biologist to be present to monitor project activities during construction; and restoring temporarily disturbed habitats.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The Service is not aware of any projects currently planned for the area surrounding the proposed action. However, numerous activities that could negatively impact California red-legged frogs in and near the action area could result from private actions that may occur without consultation with or authorization by the Service. Effects resulting from these activities could include increased predation by domestic pets associated with recreational activity and introduction of non-native species that prey upon or compete with California red-legged frogs.

The global average temperature has risen by approximately 0.6 degrees Celsius during the 20th Century (IPPC 2001, 2007; Adger et al 2007). There is an international scientific consensus that most of the warming observed has been caused by human activities (IPPC 2001, 2007; Adger *et al.* 2007), and that it is "very likely" that it is largely due to manmade emissions of carbon dioxide and other greenhouse gases (Adger *et al.* 2007). Ongoing climate change (Anonymous 2007; Inkley *et al.* 2004; Adger *et al.* 2007; Kanter 2007) likely imperils several listed species including the California red-legged frog and the resources necessary for their survival. Since climate change threatens to disrupt annual weather patterns, it may result in a loss of their habitats and/or prey, and/or increased numbers of their predators, parasites, and diseases. Where populations are isolated, a changing climate may result in local extinction, with range shifts precluded by lack of habitat.

Conclusion

After reviewing the current status of the California red-legged frog; the environmental baseline for the action area; the effects of the proposed SR-9 Safety Improvement Project and the cumulative effects; it is the Service's biological opinion that the project, as proposed, is likely to result in take of California red-legged frog, but is not likely to jeopardize the continued existence of this species. Although the existing road way and the proposed modifications will permanently reduce habitat for California red-legged frogs, and could result in the harm, harassment, injury and/or mortality of individuals within the action area, the effects to the larger population within western Santa Clara County is unlikely to significantly affect the recovery of this species.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat

modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by Caltrans so that they become binding conditions of any grant or permit issued to Caltrans, as appropriate, in order for the exemption in section 7(o)(2) to apply. Caltrans has a continuing duty to regulate the activity covered by this incidental take statement. If Caltrans (1) fails to require its contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

The Service anticipates that incidental take of the California red-legged frog will occur and may be difficult to detect due to their cryptic nature and wariness of humans. Losses of this species may also be difficult to quantify due to a lack of baseline survey data and seasonal/annual fluctuations in their numbers due to environmental or human-caused disturbances. There is a risk of harm, harassment, injury and mortality as a result of the proposed construction activities, the permanent and temporary loss/degradation of suitable habitat, and capture and relocation efforts; therefore, the Service is authorizing take incidental to the proposed action as (1) the injury and mortality of no more than one adult or juvenile California red-legged frog, and (2) the capture, harm and harassment of all California red-legged frogs within the 7.59 acres action area inclusive of the 1.60 acres of permanent and temporary effects. Incidental take of eggs or larval California red-legged frogs is not anticipated, since the project will not affect breeding or rearing habitat. Upon implementation of the following Reasonable and Prudent incidental take associated with the SR-9 Safety Improvement Project will become exempt from the prohibitions described under section 9 of the Act. No other forms of take are exempted under this opinion

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the California red-legged frog, and is not likely to jeopardize the continued existence of these species.

Reasonable and Prudent Measures

The following reasonable and prudent measure is necessary and appropriate to minimize the effect of the proposed action on the California red-legged frog:

1. Harm, harassment, injury, capture and mortality to the California red-legged frog shall be minimized by fully implementing the Conservation Measures in this Biological Opinion, and adhering to the minimization measures described below in the Terms and Conditions.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, Caltrans shall ensure compliance with the following terms and conditions, which implement the reasonable and prudent measure described above.

1. The following Terms and Conditions implement Reasonable and Prudent Measure one (1)

    a. Caltrans shall require all contractors to comply with the Act in the performance of the action and shall perform the action as outlined in the Project Description of this Biological Opinion as provided by Caltrans in the BA dated January 2010, letters from Caltrans to the Service dated January 21, 2010, and all other supporting documentation submitted to the Service in support of the action. Caltrans shall include language in their contracts that expressly requires contractors and subcontractors to work within the boundaries of the project footprint identified in this Biological Opinion, including vehicle parking, vehicle parking, staging, batch plants, storage yards and access roads. Changes to the Project Description or performance of work outside the scope of the Project Description are subject to the requirements of reinitiation of formal consultation as described herein.

    b. Caltrans shall ensure the Resident Engineer or their designee shall have full authority to implement and enforce all Conservation Measures and Terms and Conditions of this Biological Opinion. The Resident Engineer or their designee shall maintain a copy of this Biological Opinion onsite whenever construction is in progress. Their name(s) and telephone number(s) shall be provided to the Service at least thirty (30) calendar days prior to ground-breaking at the project. Prior to ground-breaking, the Resident Engineer shall submit a letter to the Service verifying he/she is in possession of a copy of this Biological Opinion, and has read and understands the Conservation Measures and Terms and Conditions of this Biological Opinion.

    c. A Service-approved biologist(s) shall be onsite during all activities that may result in take of California red-legged frogs. The qualifications of the biologist(s) shall be presented to the Service for review and written approval at least thirty (30) calendar days prior to ground-breaking at the project site. The Service-approved biologist(s) shall keep a copy of this Biological Opinion in their possession when onsite. Through the Resident Engineer or their designee, the Service-approved biologist(s) shall be given the authority to communicate verbally or by telephone, email or hardcopy with Caltrans personnel, construction personnel or any other person(s) at the project site or otherwise associated with the project. Through the Resident Engineer or their designee, the Service-approved biologist(s) shall have the authority to stop project activities if he/she determines any of the Conservation Measures or Terms and Conditions of this Biological Opinion is not being fulfilled. If the Service-approved biologist(s) exercises this authority, the Service shall be notified by telephone and email within 24 hours. The Service contact is Division Chief, Endangered Species Program, Sacramento Fish and Wildlife Office at telephone (916) 414-6600.

d. The Service-approved biologist shall maintain monitoring records that include: (1) the beginning and ending time of each day's monitoring effort; (2) a statement identifying the listed species encountered, including the time and location of the observation; (3) the time the specimen was identified and by whom and its condition; and (4) a description of any actions taken. The Service-approved biologist shall maintain complete records in their possession while conducting monitoring activities and shall immediately surrender records to the Service, CDFG, and/or their designated agents upon request. All monitoring records shall be provided to the Service upon completion of the monitoring work.

e. If verbally requested through the Resident Engineer or their designee, before, during, or upon completion of ground breaking and construction activities, Caltrans shall ensure the Service, CDFG, and/or their designated agents can immediately and without delay, access and inspect the action area for compliance with the Project Description, Conservation Measures, and Terms and Conditions of this Biological Opinion.

Reporting Requirements

Proof of environmental training shall be provided to the Endangered Species Program, Sacramento Fish and Wildlife Office, 2800 Cottage Way, Room W-2605, Sacramento, California 95825-1846. Observations of California red-legged frogs or any listed or rare species should be reported to the California Natural Diversity Database within thirty (30) calendar days of the observation.

Injured California red-legged frogs must be cared for by a licensed veterinarian or other qualified person, such as the Service-approved biologist. Dead animals shall be placed in a zip-lock® plastic storage bag with a piece of paper indicating the date, time, location and name of the person who found it. The bag shall be placed in a freezer located in a secure location until instructions are received from the Service regarding the disposition of the specimen or until the Service takes custody of the specimen. The Service must be notified within 24 hours of the discovery of death or injury resulting from project-related activities or is observed at the project site. Notification shall include the date, time, and location of the incident or finding of a dead or injured animal clearly indicated on a USGS 7.5-minute quadrangle and other maps at a finer scale, as requested by the Service, and any other pertinent information. The Service contacts are Division Chief, Endangered Species Program, Sacramento Fish and Wildlife Office at (916) 414-6600, and Resident Agent-in-Charge of the Service's Law Enforcement Division at (916) 414-6660.

Caltrans shall submit a post-construction compliance report prepared by the on-site biologist to the Sacramento Fish and Wildlife Office within sixty (60) calendar days of the date of the completion of construction activity. This report shall detail (1) dates that construction occurred; (2) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (3) an explanation of failure to meet such measures, if any; (4) known project effects on the California red-legged frog and San Francisco garter snake, if any; (5) incidental take of these species, if any; (6) documentation of employee/contractor environmental education; and (7) other pertinent information.

Caltrans shall report to the Service any information about take or suspected take of listed wildlife species not authorized by this Biological Opinion. Caltrans must notify the Service via electronic mail and telephone within twenty-four (24) hours of receiving such information. Notification must include the date, time, location of the incident or of the finding of a dead or injured animal, and photographs of the specific animal. The individual animal shall be preserved, as stated above, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species and critical habitat. Conservation recommendations are discretionary measures to further minimize the effects to listed species and critical habitat. They also serve as suggestions of how action agencies can assist species conservation in furtherance of their responsibilities under section 7(a)(1) of the Act, or recommend studies improving an understanding of a species' biology or ecology. Wherever possible, conservation recommendations should be tied to tasks identified in recovery plans. The Service is providing the following conservation recommendations:

1. Caltrans should assist the Service in implementing recovery actions identified in the Recovery Plan for the California red-legged frog (Service 2002).
2. Caltrans should consider participating in the planning for a regional habitat conservation plan for the California red-legged frog and other listed and sensitive species.
3. Caltrans should consider establishing functioning preservation and creation conservation banking systems to further the conservation of the California red-legged frog and other appropriate species. Such banking systems also could possibly be utilized for other required compensation (i.e., seasonal wetlands, riparian habitats, etc.) where appropriate.
4. Caltrans should incorporate culverts, tunnels, or bridges on highways and other roadways that allow safe passage by California Red-legged frogs and other listed animals.
5. Caltrans should include photographs, plans, and other information in their biological assessments if they incorporate "wildlife friendly" crossings into their projects.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed and/or proposed species or their habitats, the Service requests notification of the implementation of these recommendations.

REINITIATION--CLOSING STATEMENT

This concludes formal consultation on the proposed SR-9 Safety Improvement Project, Santa Clara County, California. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, including work outside of the project footprint analyzed in this opinion and including vehicle parking, staging, lay down areas, and access roads; (3) the agency action is subsequently modified in a manner that

causes an effect to the listed species or critical habitat that was not considered in this opinion including use of vehicle parking, staging, laydown areas, batch plants, storage yards and access roads; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have questions concerning this opinion on the proposed State Route 9 Safety Improvement Project, Santa Clara County, California, please contact Jerry Roe or Ryan Olah at the letterhead address or at (916) 414-6600.

Sincerely,

Cay C. Moore

Susan K. Moore
Field Supervisor

cc:
Margaret Gabil, California Department of Transportation, Oakland, CA
Melissa Escaron, California Department of Fish and Game, Oakland, CA

LITERATURE CITED

Adger, N., P.Aggarwal, S. Agrawala, J. Alcamo, A. Allali, O. Anisimov, N. Arnell, M. Boko, O. Canziani, T. Carter, G. Cassa, U. Confalonieri, R. Cruz, E. de Alba Alcaraz, W. Eastreling, C. Field, A. Fischlin, B. Fitzharris, C.G. Garcia, C. Hanson, H. Harasawa, K. Hennessy, S. Huq, R. Jones, L. K. Bogataj, D. Karoly, R. Klein, Z. Kundzewicz, M. Lal, R. Lasco, G. Love, X. Lu, G. Magrin, L.J. Mata, R. McLean, B. Menne, G. Midgley, N. Mimura, M.Q. Mirza, J. Moreno, L. Mortsch, I. Niang-Diop, R. Nichols, B. Novaky, L. Nurse, A. Nyon, M. Oppenheimer, J. Palutikof, M. Parry, A. Patwardhan, P. R. Lankao, C. Rosenzweig, S. Schneider, S. Semenov, J. Smith, J. Stone, J van Ypersele, D. Vaughan, C. Vogel, T. Wilbanks, P. Wong, S. Wu, and G. Yohe. 2007. Working Group II Contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report. Climate Change 2007: Climate Change Impacts, Adaptation and Vulnerability. Brussels, Belgium.

Anonymous. 2007. Global Warming is Changing the World. Science 316:188-190.

Ashley, E.P., and J.T. Robinson. 1996. Road Mortality of Amphibians, Reptiles and Other Wildlife on the Long Point Causeway, Lake Erie, Ontario. Canadian Field-Naturalist 110(3):403-412.

Barry, S. 1992. Letter to Marvin L. Plenert, Regional Director, U.S. Fish and Wildlife Service, Portland, Oregon, regarding proposed listing.

Bonnet, X., G. Naulleau, and R. Shine. 1999. The Dangers of Leaving Home: Dispersal and Mortality in Snakes. Biological Conservation 89: 39-50.

Bosch J, I. Martínez-Solano, M. García-París. 2001. Evidence of a Chytrid Fungus Infection Involved in the Decline of the Common Midwife Toad (*Alytes obstetricans*) in Protected Areas of Central Spain. Biological Conservation 97:331–337.

Buechner, M. 1987. Conservation in Insular Parks: Simulation Models of Factors Affecting the Movement of Animals Across Park Boundaries. Biological Conservation 41:57-76.

Bulger, J. B., N. J. Scott Jr., and R. B. Seymour. 2003. Terrestrial Activity and Conservation of Adult California Red-Legged Frogs *Rana aurora draytonii* in Coastal Forests and Grasslands. Biological Conservation 110:85-95.

Bury, R.B and J.A. Whelan. 1984. Ecology and Management of the Bullfrog. Fish and Wildlife Service/Resource Publication 155.

Buza, L., A. Young and P. Thrall. 2000. Genetic Erosion, Inbreeding and Reduced Fitness in Fragmented Populations of the Endangered Tetraploid Pea *Swainsona recta*. Biological Conservation 93:177–186.

California Department of Fish and Game (CDFG). 2010. California Natural Diversity Data Base (CNDDB) RAREFIND. Natural Heritage Division, Sacramento, California.

California Department of Transportation (Caltrans). 2010. Santa Clara State Route 9 Safety Improvement Project. Caltrans District 04. Santa Clara County. State Route 9. PM 2.5-7.0. EA 04-2A4300.

Carr, L.W., and L. Fahrig. 2001. Effect of Road Traffic on Two Amphibian Species of Differing Vagility. Conservation Biology 15:1071-1078.

Casagrandi, R., and M. Gatto. 1999. A Mesoscale Approach to Extinction in Fragmented Habitats. Nature 400: 560-562.

Cooke, A.S. 1995. Comparison of Survey Methods for Crested Newts (*Triturus cristatus*) and Night Counts at a Secure Site, 1983–1993. Herpetological Journal 5: 221–228.

Davidson, E. W., M. Parris, J. P. Collins, J. E. Longcore, A. P. Pessier, J. Brunner. 2003. Pathogenicity and Transmission of *Chytridiomycosis* in Tiger Salamanders (*Ambystoma tigrinum*). Copeia 2003(3):601–607.

Drews, C. 1995. Road Kills of Animals by Public Traffic in Mikumi National Park, Tanzania, with Notes on Baboon Mortality. African Journal of Ecology 33: 89-100.

Emlen, S. T. 1977. "Double Clutching" and its Possible Significance in the Bullfrog. Copeia 1977(4):749-751.

Fahrig, L. 1998. When Does Fragmentation of Breeding Habitat Affect Population Survival? Ecological Modeling 105: 273-292.

Fahrig, L., and G. Merriam. 1985. Habitat Patch Connectivity and Population Survival. Ecology 6:1762-1768

Fellers, G. 2005. *Rana draytonii* Baird and Girard, 1852b California Red-Legged Frog. Pages 552-554 in M. Lannoo (editor). Amphibian Declines: The Conservation Status of United States Species. University of California Press. Berkeley, California.

Fisher, R. N., and H. B. Schaffer. 1996. The Decline of Amphibians in California's Great Central Valley. Conservation Biology 10(5):1387-1397.

Forman, R.T. 2000. Estimate of the Area Affected Ecologically by the Road System in the United States. Conservation Biology 14(1): 31-35.

Forman, R. T. T., and R. D. Deblinger. 1998. The ecological road-effect zone for transportation planning, and a Massachusetts highway example. Pages 78-96 *in* G. L. Evink, P. Garrett, D. Zeigler, and J. Berry, editors. Proceedings of the International Conference on Wildlife Ecology and Transportation. Publication FL-ER-69-98. Florida Department of Transportation, Tallahassee

Forys, E.A. and S.R. Humphrey. 1996. Use of population viability analysis to evaluate management options for the endangered Lower Keys marsh rabbit. Journal of Wildlife Management 63(1)251-260.

Garner, T. W. J., M. W. Perkins, P. Govindarajulu, D. Seglie, S. Walker, A. A. Cunningham, and M. C. Fisher. 2006. The emerging amphibian pathogen *Batrachochytrium dendrobatidis* globally infects introduced populations of the North American bullfrog, *Rana catesbeiana*. Biology Letters 2:455-459.

Gibbs, J.P. 1998. Amphibian movements in response to forest edges, roads, and streambeds in southern New England. Journal of Wildlife Management 62: 584-589.

Gilpin, M.E. and M.E. Soule. 1986. Minimum viable populations: processes of species extinction. Pages 19-34 *in:* M. E. Soule (editor), Conservation Biology: Science of Scarcity and Diversity. Sinauer, Sunderland, Masssachusetts.

Gotelli, N.J. 1991. Metapopulation models: the rescue effect, the propagule rain, and the core-satellite hypothesis. American Naturalist 138:768–776.

Hansen, L. 1982. Trafikdræbte dyr i Danmark (Road kills in Denmark, in Danish). Dansk Ornitologisk Forenings Tidsskrift 76: 97–110.

Hanski, I. 1982. Dynamics of regional distribution: the core and satellite hypothesis. Oikos 38:210-221.

_____ 1991. Single Species Metapopulation Systematics: Concepts, Models and Observations. Biological Journal of the Linnean Society 42:3-16.

_____ 1994. A practical model of metapopulation dynamics. Journal of Animal Ecology 63:151-162.

Hayes, M. P., and M. R. Jennings. 1988. Habitat Correlates of Distribution of the California Red-Legged Frog (*Rana aurora draytonii*) and the Foothill Yellow-Legged Frog (*Rana boylii*): Implications for Management. Pages 144-158 in R. Sarzo, K. E. Severson, and D. R. Patton (technical coordinators). Proceedings of the Symposium on the Management of Amphibians, Reptiles, and Small Mammals in North America. United States Department of Agriculture, Forest Service, Rocky Mountain Range and Experiment Station, Fort Collins, Colorado. General Technical Report (RM-166): 1-458.

Hayes, M. P. and D. M. Krempels. 1986. Vocal Sac Variation among Frogs of the Genus Rana from Western North America. Copeia 1986(4):927-936.

Hayes, M. P. and M. M. Miyamoto. 1984. Biochemical, Behavioral and Body Size Differences between *Rana aurora aurora* and *R. a. draytonii*. Copeia 1984(4):1018-1022.

Hayes, M. P., and M. R. Tennant. 1985. Diet and Feeding Behavior of the California Red-Legged Frog, *Rana aurora draytonii* (Ranidae). Southwestern Naturalist 30(4): 601-605.

Hels, T. and E. Buchwald. 2001. The effect of road kills on amphibian populations. Biological Conservation 99: 331-340.

Hilty, J. A. and A. M. Merenlender. 2004. Use of riparian corridors and vineyards by mammalian predators in northern California. Conservation Biology 18(1):126-135.

Holt, R.D. 1993. Ecology at the mesoscale: the influence of regional processes on local communities. Pages 77-88 *in* R. Ricklefs and D. Schluter (editors). Species diversity in ecological communities: historical and geographic perspectives. University of Chicago Press, Chicago.

Hunt, L. 1993. Letter to Marvin L. Plenert, Regional Director, U.S. Fish and Wildlife Service, Portland, Oregon, regarding proposed listing.

Inkley, D.B., M.G. Anderson, A.R. Blaustein, V.R. Burkett, B. Felzer, B. Griffith, J. Price and T.L. Root. 2004. Global Climate Change and Wildlife in North America. Technical Review 04-2, The Wildlife Society, Bethesda, Maryland.

International Panel on Climate Change. 2001. Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Houghton, J.T., Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson (editors)]. Cambridge University Press, Cambridge, United Kingdom and New York, New York. 881 pp. Available at http://www.ipcc.ch/

_____ 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Alley, R., T. Berntsen, N.L. Bindoff, Z. Chen, A. Chidthaisong, P. Friedlingstein, J. Gregory, G. Hegerl, M. Heimann, B. Hewitson, B. Hoskins, F. Joos, J. Jouzel, V. Kattsov, U. Lohmann, M. Manning, T. Matsuno, M. Molina, N. Nicholls, J. Overpeck, D.

Qin, G. Raga, V. Ramaswamy, J. Ren, M. Rusticucci, S. Solomon, R. Somerville, T.F. Stocker, P. Stott, R.F. Stouffer, P. Whetton, R.A. Wood, D. Wratt. 21 pp. Available at http://www.ipcc.ch/.

Jennings, M. R. 1993. Letter to Peter C. Sorensen, U.S. Fish and Wildlife Service, Sacramento, California.

_____ 2004. An annotated checklist of the amphibians and reptiles of California and adjacent waters. California Fish and Game 90(4):161-213.

Jennings, M. R., and M. P. Hayes. 1985. Pre-1900 Overharvest of California Red-Legged Frogs (*Rana aurora draytonii*): The Inducement for Bullfrog (*Rana catesbeiana*) Introduction. Herpetological Review 31(1):94-103.

_____ 1990. Final Report of the Status of the California Red-Legged Frog (*Rana aurora draytonii*) in the Pescadero Marsh Natural Preserve. Final report prepared for the California Department of Parks and Recreation, Sacramento, California, through Agreement (4-823-9018). Department of Herpetology, California Academy of Sciences, Golden Gate Park, San Francisco, California. 30 pages.

_____ 1994. Amphibian and Reptile Species of Special Concern in California. Report prepared for the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California. 255 pages.

Jennings, M. R., M. P. Hayes, and D. C. Holland. 1992. A Petition to the U.S. Fish and Wildlife Service to Place the California Red-Legged Frog (*Rana aurora draytonii*) and the Western Pond Turtle (*Clemmys marmorata*) on the List of Endangered and Threatened Wildlife and Plants. 21 pages.

Kanter, J. 2007. Scientists Detail Climate Changes, Poles to Tropics. New York Times. April 10, 2007.

Kruse, K. C. and M. G. Francis. 1977. A Predation Deterrent in Larvae of the Bullfrog, *Rana catesbeiana*. Transactions of the American Fisheries Society 106(3):248-252.

Kupferberg, S. J. 1996a. Hydrologic and Geomorphic Factors Affecting Conservation of a River-Breeding Frog (*Rana boylii*). Ecological Applications 6:1322-1344.

_____ 1996b. The Ecology of Native Tadpoles (*Rana boylii* and *Hyla regilla*) and the Impacts of Invading Bullfrogs (*Rana catesbeiana*) in a Northern California River. PhD dissertation. University of California, Berkeley, California.

_____ 1997. Bullfrog (*Rana catesbeiana*) Invasion of a California River: The Role of Larval Competition. Ecology 78(6):1736-1751.

La Polla, V.N. and G.W. Barrett. 1993. Effects of corridor width and presence on the population dynamics of the meadow vole (*Microtus pennsylvanicus*). Landscape Ecology 8:25-37.

Levins, R.A. 1970. Extinction. American Mathematical Society 2:77-107.

Lindenmayer, D.B., and H.P. Possingham. 1996. Modeling the interrelationships between habitat patchiness, dispersal capability and metapopulation persistence of the endangered species, Leadbeater's possum, in Southeastern Australia. Landscape Ecology 11:79-105.

Lips, K. R., F. Brem, R. Brenes, J. D. Reeve, R. A. Alford, J. Voyles, C. Carey, L. Livo, A. P. Pessier, and J. P. Collins. 2006. Emerging Infectious Disease and the Loss of

Biodiversity in a Neotropical Amphibian Community. Proceedings of the National Academy of Sciences 103(9):3165-3170.

MacArthur, R. A., R. H. Johnston, A. Geist. 1979. Factors in Influencing Heart Rate in Free-Ranging Bighorn Sheep: A Physiological Approach to the Study of Wildlife Harassment. Canadian Journal of Zoology 57:2010-2021.

Mallick, S.A., G.J. Hocking, and M.M. Driessen. 1998. Road-Kills of the Eastern Barred Bandicoot (*Perameles gunnii*) in Tasmania: An Index of Abundance. Wildlife Research 25: 139-145.

Moyle, P. B. 1976. Fish Introductions in California: History and Impact on Native Fishes. Biological Conservation 9(1):101-118.

Munguira, M.L. and J.A. Thomas. 1992. Use of road verges by butterfly and moth populations, and the effect of roads on adult dispersal and mortality. Journal of Applied Ecology 29: 316-329.

Petit, L.J., D.R. Petit, and T.E. Martin. 1995. Landscape-level management of migratory birds: looking past the trees to see the forest. Wildlife Society Bulletin 23:420-429.

Rosen, P.C. and C.H. Lowe. 1994. Highway mortality of snakes in the Sonoran desert of southern Arizona. Biological Conservation 68:143-148.

Stamps, J.A., M. Buechner, and V. V. Krishnan. 1987. The effects of edge permeability and habitat geometry on emigration from patches of habitat. American Naturalist 129(4):533-552.

Stebbins, R. C. 2003. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Company, Boston, Massachusetts.

Storer, T. I. 1925. A Synopsis of the Amphibia of California. University of California Publications in Zoology, 27:1-1-342.

_____ 1933. Frogs and their Commercial Use. California Department of Fish and Game 19(3)203-213.

Tatarian, P. J. 2008. Movement Patterns of California Red-Legged Frogs (*Rana Draytonii*) in an Inland California Environment. Herpetological Conservation and Biology 3(2):155-169. November.

Trombulak, S. C., and C. A. Frissell. 2000. The ecological effects of roads on terrestrial and aquatic communities: a review. Conservation Biology 14:18-30.

Twedt, B. 1993. A Comparative Ecology of *Rana aurora* Baird and Girard and *Rana catesbeiana* Shaw at Freshwater Lagoon, Humboldt County, California. Unpublished. Master of Science thesis. Humboldt State University, Arcata, California. 53 pages plus appendix.

U. S. Fish and Wildlife Service (Service). 2002. Recovery Plan for the Red-Legged Frog (*Rana aurora draytonii*). Portland, Oregon. 173 pages.

_____ 2005. Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog.

Van der Zande, A.N., W.J. ter Keurs, and W.J. Van der Weijden. 1980. The impact of roads on the densities of four bird species in an open field habitat - evidence of a long-distance effect. Biological Conservation 18: 299-321.

Van Gelder, J.J. 1973. A quantitative approach to the mortality resulting from traffic in a population of *Bufo bufo* L. Oecologia 13:93-95.

Verboom, B. and R. van Apeldoorn. 1990. Effect of habitat fragmentation on the red squirrel, *Sciurus vulgaris*. Landscape Ecology 4:171-176.

Verboom, B., K. Lankester, and J.A. Metz. 1991. Linking local and regional dynamics in stochastic metapopulation models. Biological Journal of the Linnean Society 42:39-55.

Vos, C.C. and J.P. Chardon. 1998. Effects of habitat fragmentation and road density on the distribution pattern of the moor frog, *Rana arvalis*. Journal of Applied Ecology 35: 44-56.

Weldon, C., L.H. du Preez, R. Muller, A.D. Hyatt, and R. Speare. 2004. Origin of the Amphibian Chytrid Fungus. Emerging Infectious Diseases 10:2100–2105.

With, K.A. and T. O. Crist. 1995. Critical thresholds in species' responses to landscape structure. Ecology 76: 2246-2459.

Wright, A. H. and A. A. Wright. 1949. Handbook of Frogs and Toads of the United States and Canada. Comstock Publishing Company, Inc., Ithaca, New York. 640 pages.

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. MIKE KEEVER
Office Chief
Structure Design – West

Date: October 31, 2012

Attention: Gordon Danke
Rosa Maria Candiotti

File: 04-SCL-9-PM 2.5, 5.9, 6.7
04-2A4301
Soil Nail Walls

From: S. YANG/S. AWAD/V. KHATA-O-KHOTAN
Transportation Engineers
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

HOOSHMAND NIKOUI
Chief, Branch A
Office of Geotechnical Design – West
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Subject: Foundation Report for Two Soil Nail Walls

This Foundation Report is prepared in response to your request dated August 26, 2010 for the proposed two soil nail walls on Route 9 (PM 2.5, 6.7), west of the City of Saratoga, in Santa Clara County. This Report supersedes the previous Report dated April 11, 2011. The previous Report provided foundation recommendations for soil nail walls at all three locations covered by this project (PM 2.5, 5.9, 6.7). However, due to Right of Way issues, the wall at Location 2 (PM 5.9) has been replaced by soldier pile wall. This Report is the same as the previous Report except that foundation recommendations at Location 2 are eliminated. Foundation recommendations for the soldier pile wall at Location 2 are provided in a separate report.

1. SCOPE OF WORK

The following tasks were performed for the preparation of this Foundation Report:

- Field geotechnical exploration, including drilling eight exploratory borings at the project site;
- Laboratory testing for corrosion on selected samples;
- Foundation design analysis; and
- Preparation of this Foundation Report.

2. PROJECT DESCRIPTION

The project proposes to improve sight lines by widening and straightening Route 9 in three critical locations: PM 2.5 to PM 2.7 (Wall #1), PM 5.9 to PM 6.2 (Wall #2), and PM 6.7 to PM 7.0 (Wall #3). Wall #1 is approximately 263 feet long (from Station 10+00 to 12+63.13), with a maximum height of 38 feet. Wall #2 is approximately 687.5 feet long (from Station 10+00 to 16+87.52), with a maximum height of 21.5 feet. Wall #3 is approximately 165.6 feet long (from Station 10+00 to 11+65.63), with a maximum height of 29 feet. Wall #1 and #3 are soil nail walls, whereas Wall #2 is soldier pile wall.

The vertical datum used in this report is NAVD 88. The horizontal datum is NAD 83.

3. EXCEPTION TO POLICY

There is no known exception to Department policy relating to the investigation or design of the proposed soil nail walls.

4. FIELD INVESTIGATION AND TESTING PROGRAM

A total of eight geotechnical exploratory borings were drilled to investigate subsurface soil conditions for soil nail design of the three walls. All were rotary wash borings, using a truck-mounted drill rig. Of the eight borings, three were vertical borings and five were horizontal borings. Table 1 lists the locations and depths of these borings and the dates they were drilled. The horizontal borings were typically 3 to 4 feet above roadway elevation, at a downward inclination of 3 degrees from horizontal. The vertical borings were drilled at the roadway elevation, in front of the proposed walls.

All samples were visually identified and recorded in the field log using standard method. For all borings, Pocket Penetrometer (PP) tests were conducted on soil samples showing apparent cohesion. Further, for rock samples, Rock Quality Determination (RQD) and percent of sample recovery for each run were also recorded. For all horizontal borings, continues core samples were collected in boxes. In the vertical borings, Standard Penetration Tests (SPT) were performed at 5-feet interval.

Table 1. Summary of field borings

Boring ID	Location	Boring Type	Total Length (ft)	Date of completion
R-10-001	1	Vertical	37	6-9-10
R-10-002	3	Vertical	42	6-10-10
R-10-003	2	Horizontal	51	7-15-10
R-10-004	3	Horizontal	75	7-22-10
R-10-005	1	Horizontal	67.5	8-19-10
R-10-006	1	Horizontal	67	8-26-10
R-10-007	3	Horizontal	67	8-31-10
R-10-008	2	Vertical	45	9-1-10

5. LABORATORY TESTING PROGRAM

Soil samples were taken at select horizontal borings from all three locations for corrosion testing. The test results are shown in Section 8 below.

6. SITE GEOLOGY AND SUBSURFACE CONDITIONS

6.1. Regional Geology

The project is located in the Santa Cruz Mountains, part of the Coast Range geomorphic province of California. The Bay Area consists of northwest-trending ridges, gently sloping hills, intermontane valleys, and large elongated depressions. The Santa Cruz Mountains consist of a number of complex ridges or small ranges with rugged slopes.

The San Andreas Fault system, the most prominent geologic feature in the area, includes the San Andreas Fault as well as numerous splays. The major faults within the system are predominately right-lateral strike-slip faults with a compressional component. These act together to form the regional topography. San Francisco Bay, a partially filled, northwest-trending depression extending from the Santa Clara Valley in the south to the Petaluma Valley in the north, is a result of these fault interactions.

The region is highly seismically active, with numerous active and potentially active faults. For most locations in the Santa Cruz Mountains, the San Andreas Fault zone controls the seismic hazard.

6.2. Site Geology

The Geologic Map of San Francisco-San Jose Quadrangle shows Wall 1 (PM 2.5) lies in the Vaqueros Sandstone. Wall 2 (PM 5.9) lies on Franciscan mélange. Wall 3 (PM 6.7) lies in the Santa Clara formation.

The Vaqueros Sandstone is a lower Miocene and Oligocene aged, light-gray to yellow-brown, fine- to medium-grained, locally coarse-grained, arkosic sandstone interbedded with olive- and dark-gray to red and brown mudstone and shale.

The Franciscan complex is a ‘Block-in matrix’ formation, with harder blocks of all sizes randomly distributed in a soft, sheared matrix. Rocks in the Franciscan complex include sheared argillite, serpentine, and greywacke sandstone.
Santa Clara Formation is a lower Pleistocene and upper Pliocene, gray to red-brown poorly indurated conglomerate, sandstone, and mudstone in irregular and lenticular beds. Conglomerate consists mainly of sub-angular to sub-rounded cobbles in a sandy matrix but locally includes pebbles and boulders. Cobbles and pebbles are mainly chert, greenstone, and graywacke with some schist, serpentinite, and limestone.

6.3. Topography

The project is located in the Santa Cruz Mountains. Saratoga Creek runs alongside Highway 9. The road is a narrow, winding, 2-lane road with small or non-existent shoulders and very steep slopes adjacent to the road.

At Wall 1 (PM 2.5-2.7), the road lies at approximately 1650-1670 feet elevation. Steep slopes lay both south and north of the road.

At Wall 2 (PM 5.95-6.2), the road lies north of and parallel to Saratoga Creek, at approximately 640-680 feet elevation. North of the highway the slopes are steep. South of the road, the slope drops 50 feet to Saratoga Creek, which lies within 200 lateral feet of the roadway. Note that there is an underground culvert running across the roadway at Sta. 15+30 approximately.

At Wall 3 (PM 6.7-6.75), topography is similar to Wall 2. The road lies at approximately 527-535 feet elevation. Saratoga Creek runs nearly perpendicular to the road and under the roadway just beyond the limits of the proposed retaining wall at PM 6.75.

6.4. Subsurface Conditions

Wall # 1

The foundation investigations at Location 1 consisted of drilling two horizontal borings (R-10-005 and R-10-006) and one vertical boring (R-10-001) (Table 1).

At the horizontal boring R-10-005, the subsurface materials consisted of approximately 27 feet of medium stiff to stiff sandy lean clay with gravel, followed by intensely to moderately fractured, hard, sandstone rock.

At the horizontal boring R-10-006, the subsurface materials consisted of approximately 24 feet of medium dense to dense well-graded gravel with clay and sand. This was followed by 11 feet of medium dense sand with gravel and clay. The remainder of the boring is intensely fractured, hard, sandstone rock.

At the vertical boring R-10-001, the subsurface materials consisted of approximately 18 feet of dense to very dense sand with gravel, with energy corrected SPT blow count N_{60} varying from 30 to more than 50. This is underlain by interlayers of intensely fractured, hard sandstone, moderately fractured, very soft claystone, and medium dense sandy gravels. The SPT blow count N_{60} varies from 23 to 29.

Wall # 2

The foundation investigations at Location 2 consisted of drilling one horizontal boring (R-10-003) and one vertical boring (R-10-008) (Table 1).

At the horizontal boring R-10-003, the subsurface materials are mostly intensely fractured, hard, sandstone rock.

At the vertical boring R-10-008, the subsurface materials consisted of approximately 25 feet of loose to medium dense well-graded gravel with sand, with SPT blow count N_{60} varying from 6 to 17. This is underlain by intensely fractured, hard, sandstone. It is noted that the top 25 feet of gravel material is probably engineering fill used for roadway embankment.

Wall # 3

The foundation investigations at Location 3 consisted of drilling two horizontal borings (R-10-004 and R-10-007) and one vertical boring (R-10-002) (Table 1).

At the horizontal boring R-10-007, approximately 25 feet of stiff to hard sandy lean clay was encountered. This is followed by 10 feet of mainly dense clayey sand with gravel, intermingled with intensely weathered, intensely fractured sandstone. The remainder of the boring consists of intensely weathered and moderately fractured claystone.

At the horizontal boring R-10-004, the first 40 feet of subsurface material is mostly very soft sandstone and/or well graded, dense sand, with a layer of very soft claystone and/or hard clay at 5 to 11 feet depth. From 40 to 65 feet is soft siltstone, underlain by dense sand and sandstone to the end of the boring (75 feet depth).

At the vertical boring R-10-002, subsurface consisted of approximately 30 feet of hard silt with SPT blow count N_{60} varying from 71 to more than 100. This is underlain by moderately fractured, soft, siltstone with SPT blow count N_{60} varying from 88 to 95.

6.5. Groundwater

Groundwater was encountered in vertical boring R-10-002 (Location 3) at approximately 11 feet below ground surface at the time of drilling (August 2010). Groundwater was not encountered at the other two locations.

7. SCOUR EVALUATION

No scour issue exists at all three wall locations.

8. CORROSION EVALUATION

According to current Caltrans Corrosion Guidelines (2003), a soil is considered non-corrosive for structure foundation elements, if the minimum resistivity is greater than 1000 ohm-cm and the pH value is greater than 5.5. Based on our laboratory corrosion test performed on four soil samples (Table 2), the soils at all three locations are non-corrosive.

Table 2. Soil Corrosion Test Summary

Location	SIC Number	Sample Depth (ft)	Min. Resistivity (ohm-cm)	pH
R-10-006	C4300-H2-01	15-20	6433	6.7
R-10-003	C4300-H3-01	36-39	3101	8.1
R-10-004	C4300-H6-01	35-38	4956	7.3
R-10-007	C4000-H5-01	36-40	2646	7.8

9. SEISMIC RECOMMENDATIONS

The San Andreas Fault zone (Santa Cruz Mountains section) bisects the Hwy 9 between PM 3.25 and 4.75, which is about ¼ mile east of Location 1 and one mile west of Location 2. The San Andreas Fault zone has a Maximum-Moment-Magnitude of 7.9. Monte Vista-Shannon Fault zone is approximately two miles northeast of Location 3. Monte Vista-Shannon Fault Zone has a Maximum-Moment-Magnitude of 6.7. According to USGS fault database, surface rupture potential is minimum at all three soil nail wall locations.

Based on the boring logs, the soil profiles at all three locations are classified as Class C (very dense soil and soft rock) with shear wave velocity of top 100 ft (30 m) V_{S30} ranging from 1200 to 2500 ft/s. Liquefaction potential is minimum at all three locations.

For seismic stability analysis, both probabilistic and deterministic seismic hazard analyses were performed, and the higher Peak Ground Acceleration (PGA) value from the two analyses was used in the stability analysis. The deterministic analysis was performed using Caltrans ARS Online program. The probabilistic analysis was performed using 2008 USGS Probabilistic Seismic Hazard Deaggregation model. According to 2008 FHWA Geotechnical Engineering Circular No. 7 for Soil Nail Walls, the probabilistic hazard corresponds to 10% probability of occurrence in 50 years. The calculated results for all three locations are summarized in Table 3 below. The actual seismic coefficient used in the stability analysis is chosen as K_h= PGA / 3.

Table 3. Calculated Seismic Coefficients Used in Stability Analysis

Location	Vs_{30} (ft/s)	PGA (USGS Probabilistic, 10% in 50 years)	PGA (Caltrans ARS Deterministic)	Seismic coefficient K_h used in analysis
1	1200	0.68	0.6	0.23
	2500	0.63	0.6	
2	1200	0.65	0.71	0.24
	2500	0.59	0.73	
3	1200	0.63	0.78	0.27
	2500	0.58	0.81	

10. FOUNDATION RECOMMENDATIONS

10.1. Soil Nail Design

The design for the soil nailed retaining walls is performed using Caltrans computer program SnailWin Version 3.10. The following limiting criteria were used in the design of the soil nailed walls. Most of them should be included in the contract plan.

1. The minimum factor of safety with seismic loading (pseudo-static analysis),
   $FOS_{dynamic} = 1.1$

2. The minimum factor of safety for staged construction (static analysis),
   $FOS_{construction} = 1.5$

3. Spacing of the nails:
   Maximum vertical spacing of the nails $S_{v,max} = 5$ feet;
   Minimum vertical spacing of the nails $S_{v,min} = 1.5$ feet;
   Horizontal spacing of the nails $S_{h,max} = 5$ feet;
   Maximum horizontal distance between the beginning/end of wall and the first/last soil nail = 2.5 feet;
   Minimum horizontal distance between the beginning/end of wall and the first/last soil nail = 1.5 feet;
   Maximum vertical distance between the bottom of the wall and the lowermost row of soil nails = 3.5 feet;
   Minimum vertical distance between the bottom of the wall to the lowermost row of soil nails = 2 feet;
   Vertical distance between the top of the cut and the topmost row of soil nails = 2 feet;
   Vertical distance between the bottom of the wall and the finished grade = 2 feet;
   If a gutter is constructed behind the wall, then

Maximum vertical distance between the top of the wall and the top of the cut
= 3 feet;
Minimum vertical distance between the top of the wall and the top of the cut
= 0.5 feet;

4. The inclination angle of the nails to the horizontal = 15 degrees.

5. Soil nail profile lines shall be parallel to the top of the wall except for the lowest line, which shall be parallel to the bottom of the wall.

6. Material used for soil nails shall comply with ASTM Designation:
A-615 / A-615M, Grade 420, fs = 60 ksi, #9 or greater bars

7. The average soil parameters used for the design are:

Table 4. Soil Parameters Used in Soil Nail Design

Location	Friction angle ϕ (deg)	Cohesion c (psf)	Total unit weight γ (pcf)
1	28	800	130
3	20	1200	135

8. Ultimate punching shear capacity = 40 kips.
Design pull out resistance = 1.6 kips/ft for all three walls.

9. The embedment depths of the soil nail assemblies have been determined according to the latest wall profiles submitted to our office. The results are as follows:

Table 5. Design Soil Nail Lengths for Wall # 1

Section	Begin Station	End Station	Soil Nail Length from Top to Bottom (ft)
1	10+00	10+60	25, 25, 15, 15
2	10+60	10+90	40, 40, 30, 30, 20, 20
3	10+90	11+97	55, 55, 45, 45, 30, 30, 20, 20
4	11+97	12+17	40, 40, 30, 30, 20, 20
5	12+17	12+60	25, 25, 15, 15

Table 6. Design Soil Nail Lengths for Wall # 3

Section	Begin Station	End Station	Soil Nail Length from Top to Bottom (ft)
1	10+00	10+31	30, 30, 20, 20
2	10+31	11+20	40, 40, 30, 30, 20, 20
3	11+20	11+65	30, 30, 20, 20

10.2. Wall Drainage System

Although groundwater was not encountered or relatively deep during drilling operations, in order to protect against any possible hydrostatic pore pressure build up behind the wall and to direct the surface runoff away from the wall, We recommend constructing proper internal and external draining systems as follows.

10.2.1. Internal drainage system

- Place one foot wide prefabricated geotextile drain strips (with the geotextile side against the ground between the nails) at a horizontal spacing of every 5 feet prior to applying shotcrete. The geotextile drain strips shall start from the bottom of the proposed gutter (see below) and extend to the bottom PVC pipe weep hole.

- Install PVC pipe (2 to 3 inches in diameter) weep holes through the shotcrete face at the center and base of the prefabricated geotextile drainage strips.

10.2.2. External drainage system

- A concrete drainage gutter/ditch is recommended behind the top of the wall to collect the surface water. The slope of the gutter/ditch should follow the top of wall profile.

- A Drainage Inlet (DI) and/or a downdrain may be needed at the beginning and the end of the wall, and at the lower points along the wall height, to collect the surface runoff from the proposed gutter.

- District Hydraulics Office has decided not to use a gutter to collect surface water as recommended above. This is reflected on our soil nail profiles.

10.3. Wall Facing System

The design of the wall facing system is the responsibility of the Office of Structures Design (OSD) and District Landscape Architecture Branch.

11. FIELD TESTING

Soil nail walls are broken into zones for construction control. These wall zones are given in Tables 7 and 8 below.

Table 7. Construction Zones for Wall #1

Wall Zone	Beginning Stationing	End Stationing
1	10+00	11+00
2	11+00	11+70
3	11+70	12+62

Table 8. Construction Zones for Wall #3

Wall Zone	Beginning Stationing	End Stationing
1	10+00	10+70
2	10+70	12+66

11.1. Stability Testing

Stability testing will be required to test the exposed cut slope face for stability if the Contractor elects to use an excavation lift height greater than the soil nail row height (5 feet). The test consists of exposing a 20-foot wide segment of material in each wall zone (specified in the Appendix) to the Contractor's proposed lift height for the proposed exposure duration. This would then serve as the lift height and exposure duration to be used for construction in that wall zone.

11.2. Verification Testing

Field soil nail pull out verification and proof tests are required primarily to assure the design pull out resistance is achievable and also for QA/QC of the Contractor's soil nail installation methods and materials.

Two verification nails are required to be installed and tested in each wall zone (specified in the Appendix) before wall construction, particularly where significant change in the ground condition and soil/rock characteristics are expected. Verification testing serves to verify both the soil nail design and the Contractor's means and methods. The Contractor may commence work in a wall zone once verification tests are successfully completed.

The pull out test procedure described in the standard special provisions shall be followed. Failed verification tests will be resolved through Geotechnical Design and Structure Design. Geotechnical designer will determine the cause of failure. If the design pullout resistance value given on the plans is found to be the cause, the Department will issue revised soil nail lengths or pullout resistance values. If the Contractor's means and methods are determined to be at fault, the installation methods will be rejected and the Contractor will revise his methods and resubmit working drawings at his expense. In either case, the Contractor will be required to install and test additional verification nails.

11.3. Proof Testing

Proof tests are performed during wall construction and are for quality control. Proof test on at least eight sacrificial test nails shall be performed for every one hundred production soil nails. The recommended locations of such proof tests are shown on the Plans. An additional two sacrificial test nails for every one hundred production soil nails may be necessary during construction for further quality assurance. The test method is the same as the verification test but loads are less for proof test nails. Additionally, the Geotechnical Engineer will select and test up to 50% of passing proof nails to verification test load level. Proof nails that fail this secondary testing will still be accepted by the Department as passing for administrative purposes.

12. CONSTRUCTION CONSIDERATIONS

The typical sequence of excavation, nail installation, and facing installation shall follow the Special Provisions for this project.

12.1. Excavation

Where development of a working bench width by excavation is not feasible, other construction methods will be needed. These could include construction of an earth embankment (may or may not be mechanically reinforced) against the existing slope, using a crane and a secured platform to mount the equipment on it and raise them to the desired elevation, or drilling from a working bench at the top of the wall. The Contractor should include the costs associated with one or combination of these methods in accordance with the plans and Special Provisions.

Excavation shall be approved by the Engineer and verified by stability tests as described in the Special Provisions. Each zone of the cut face must be inspected by the Engineer for adverse bedding planes and for seepage of groundwater (if encountered). If such adverse ground conditions are encountered, representatives from our Office must be contacted to assess the situation. Installation of additional soil nail assemblies may be required prior to the excavation of the next stage (lift) if potential blocks are found. These will be paid for according to the Special Provisions.

The contractor must make every effort to minimize the disturbance of the ground to be retained, and must provide a reasonable smooth and regular wall profile. Any loose areas of the face must be removed prior to the facing support being applied.

12.2. Drilling Difficulties

The exploratory borings encountered moderately to intensely fractured and weathered soft to hard sandstones, and gravels. It is anticipated that caving may occur in areas where such materials exist, especially if percussion drilling method is used. Drilling for soil nail holes may need casing to mitigate if such condition occurs. The Contractor shall utilize appropriate drilling method and/or equipment to mitigate such ground conditions. Before bidding, all prospective bidders are encouraged to inspect and examine the representative core samples at Caltrans District 4 Material Laboratory. (This statement should also be included in the SSP.)

12.3. Prefabricated Drain Mats (Geotextile Drain Strips)

As mentioned above, one foot wide prefabricated drain mats, centered between the vertical dowel columns, shall be placed against the cut surface before placing shotcrete to provide drainage behind the shotcrete face. The vertical prefabricated drains must be extended to the base of the soil nail wall with each excavation lift and connected into the weep holes as shown on the plans. If localized damp areas are noted on the cut face, the width of the drainage product should be increased to collect all seepage water.

12.4. Performance Monitoring

Observation and performance monitoring shall include the following:

Monitor for local movement and deflection of the facing using surveying method and visual inspection. The survey points shall be critical locations specified by the Engineer. The Resident Engineer must closely monitor movement of the top of the soil nail retaining wall. Once the shotcrete is placed on the lowermost lift, the wall should be monitored twice a week for the first three weeks and once a week for the following three weeks. Both electronic and hard copies of collected data shall be furnished to our Office for evaluation, following which the need for further monitoring shall be assessed. A movement greater than 3/1000 H (H = final height of the soil nail retaining wall), at any location, would require detailed investigation.

13. DISCLAIMER AND CONTACT INFORMATION

The recommendations contained in this report are based on specific project information regarding structure type and location that have been provided by the Office of Structure Design West. If any conceptual changes are made during final project design, the Office of Geotechnical Design West, Design Branch A should review those changes to determine if our foundation recommendations are still applicable. Any questions regarding the above recommendations should be directed to the attention of Hooshmand Nikoui at (510) 286-4811.

Attachment:

c: TPokrywka, HNikoui, Daily File, Route File, J Stayton (DES Office Engineer)

SYang/mm

REGISTERED PROFESSIONAL ENGINEER
ZHAOHUI YANG
No. 71801
Exp. 12/31/13
CIVIL
STATE OF CALIFORNIA

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. MIKE KEEVER
Office Chief
Office of Bridge Design West

Date: December 11, 2012

Attention: Gordon Danke
Rosa Maria Candiotti

File: 04-SCL-9 (PM 5.9)
EA #: 04-2A4301
E-FIS #: 0400000822
Solider Pile Wall

From: SUNNY YANG / SAMUEL AWAD
Transportation Engineer
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

HOOSHMAND NIKOUI
Chief, Branch A
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

Subject : Foundation Report for Soldier Pile Wall

This Foundation Report is prepared in response to your request dated October 16, 2012 for the proposed solider pile wall at Location 2 on Route 9 (PM 5.9), west of the City of Saratoga, in Santa Clara County. Due to Right of Way issues at this location, the originally proposed soil nail wall was rejected. This Report supersedes our previous Report dated October 31, 2012.

Relevant geological and geotechnical information for this site was provided in our Foundation Report for soil nail walls dated November 8, 2010. Herein, we only provide design recommendations for the newly proposed soldier pile wall.

RECOMMENDATIONS

According to our field exploration, at Location 2, the side slope is composed of moderately hard to hard, intensely fractured sandstone rock. The roadway embankment consists of 10 to 25 feet of loose to medium dense gravel fill material.

The entire wall is approximately 688 feet long, with maximum height of 20 feet. It has been proposed to use soldier pile wall where the soldier piles are drilled piles with W-beam inside.

We recommend 24 inch or greater pile diameter. The embedded pile length should be at least twice the exposed height of the wall. Maximum pile spacing should be limited to 8 ft.

We recommend the following soil properties:

For active pressure against the wall, use the following:

- Internal friction angle $\phi = 45°$, cohesion C = 0, moist unit weight $\gamma = 135$ pcf.
- For earth pressure distribution, use a triangular pressure distribution.
- Seismic uniform earth pressure estimated to be equal to 35H psf, where H is wall height.

For passive pressure against the soldier piles, use the following input:

- Internal friction angle $\phi = 40°$, cohesion C = 0, moist unit weight $\gamma = 125$ pcf.
- Isolation factor = 2.0

The ultimate vertical compression and tension capacities of piles may be calculated using the following design parameters:

- For ultimate compression shaft resistance, use a unit pile shaft friction of 0.35 ksf per unit surface area of the pile length from the dredge line of the wall to 10 feet depth, 1.0 ksf from 10 feet to 20 feet depth, and 1.4 ksf below 20 feet depth.
- Use 60 percent of the compression shaft resistance values mentioned above to calculate the ultimate tension (uplift) resistance of the pile.
- For ultimate pile tip resistance, use bearing pressure of 70 ksf per unit area of pile tip.

The above recommendations are based on parameters established by our field exploration and engineering judgment.

CONSTRUCTION CONSIDERATIONS

- Installation of soldier piles should be performed in accordance with Section 49-4 of 2010 Caltrans Standard Specifications.
- Drilling and concrete placement for soldier piles shall be staggered. No open holes shall be adjacent.
- Hard drilling is anticipated due to presence of moderately hard to hard, intensely fractured sandstone rock. Appropriate drilling equipment should be considered.
- Although groundwater level was not monitored during field exploration, groundwater may be encountered during drilling of soldier piles. Casing may be needed.

DISCLAIMER AND CONTACT INFORMATION

The recommendations contained in this report are based on specific project information regarding structure type and location that have been provided by the Office of Structure Design West. If any conceptual changes are made during final project design, the Office of Geotechnical Design West, Design Branch A should review those changes to determine if these foundation recommendations are still applicable. Any questions regarding the above recommendations should be directed to the attention of Hooshmand Nikoui at (510) 286-4811.

c: TJPokrywka, HNikoui, Daily File, Route File, Translab File

SYang/mm

REGISTERED PROFESSIONAL ENGINEER
ZHAOHUI YANG
No. 71801
Exp. 12/31/13
CIVIL
STATE OF CALIFORNIA

STORM WATER INFORMATION HANDOUT
CONTRACT NO: 04-2A4304
04-SCL-9-PM 2.5/7.0 (3 SPOT LOCATIONS)
IMPROVE SIGHT DISTANCE, UPGRADE, SHOULDERS AND PROVIDE MINOR REALIGNMENT

California Department of Transportation
District 04
Office of Water Quality
111 Grand Avenue, Oakland, CA 94612

June 27, 2013

Disclaimer

A "Disclaimer" is required specifying that the information provided in the Non Storm Water Information Handout is just a guideline and is to be used for information purposes only and should not be considered a sole source document to adhere to the requirements of the new National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP), Number CAS000002, adopted on September 2, 2009. The contractor is required to provide water quality monitoring, sampling and implement best management practices (BMPs) based on standard industry operations, field conditions and conditions encountered based on the contractor's means and methods. The information in this handout is not to be construed in any way as a waiver of the provisions in the CGP. Bidders and contractors are cautioned to make independent investigations and examinations as they deem necessary to satisfy the conditions encountered in performance of work, with respect to the following: sampling and monitoring locations, distribution of watershed areas for sizing of BMPs, and selection of BMPs in order to conform to the requirement of the contract documents and the CGP.

TABLE OF CONTENTS
CONTRACT NO: 04-2A4304

1 PROJECT INFORMATION
- 1A Project Description
- 1B Receiving Water Bodies
- 1C Climate and Rainfall Data

2 CONSTRUCTION GENERAL PERMIT
- 2A Risk Level

3 TEMPORARY CONSTRUCTION SITE BMPs
- 3A Run-on Discharges
- 3B Temporary ESA Fencing

4 PERMITS
- 4A General

5 ATTACHMENTS
- A VICINITY MAP
- B RISK LEVEL DETERMINATION
- C RAINFALL DATA
- D PROJECT DISCHARGE LOCATION PLAN

1 Project Information

1A Project Description

This project proposes to improve sight distance, opgrade, shoulders and provide minor realignment that envolve improving lane and shoulders, overlaying pavement to correct superelevation, installing metal beam guardrail, and placing warning signs, in Santa Clara County in and near the City of Saratoga on Route 9 at various locations namely Location 1 at PM 2.5 to 2.7; Location 2 at PM 5.9 to 6.2 and Location 3 at PM 6.7 to 7.0.

Latitude and Longitude:	Location 1	37.2613, -122.1006
	Location 2	37.2510, -122.0531
	Location 3	37.2543, -122.0390
Construction Start Date		04/15/2014
Construction End Date		10/10/2016
Project Area		2.70 ac
Disturbed Soil Area		2.63 ac

1B Receiving Water Bodies

Location 1 – (PM 2.5/2.7) drains to Stevens Creek
Stevens Creek is listed in the 2002 CWA Section 303(d) List of Water Quality Limited Segment and is located about 1 mile northeast of this location, runs southeast to northeast direction towards the Stevens Creek Reservoir on to the San Francisco Bay.

Location 2 – (PM 5.9/6.2) and Location 3 – (PM 6.7/7.0) discharge to Saratoga Creek which connects to Calabazas Creek.
Saratoga Creek is listed in the 2002 CWA Section 303(d) List of Water Quality Limited Segment. It runs alongside Route 9 at each project location and under crossing at Post Miles 3.61, 4.85, 5.543 and 6.7.

1C Climate and Rainfall Data

A National Oceanic and Atmospheric Administration (NOAA) weather station located in Los Gatos, CA was used to obtain an estimated number of rainy days per year and qualifying rain events. The Compliance Storm Event was also downloaded from the NOAA website.

Rainy days per year (precipitation 0.10 inches or greater)	36.5	days
Qualifying rain events per year	36.5	days
Compliance Storm Event (rainfall total for the 5 year, 24 hr storm	8.48	inches

2 Construction General Permit

A Storm Water Pollution Prevention Plan is required since the disturbed soil area is 2.63 acres and R value is 124.26.

2A Risk Level

R factor	124.26
K factor	0.20
LS factor	12.22
Sediment Risk	303.69
Receiving Water Body Risk	Yes/High
Risk Level	3

3 Temporary Construction Site BMPs

The estimated quantities of temporary construction site BMPs are in the PSE package. Various soil stabilization and sediment barriers are proposed due to the project's direct discharge into the Stevens Creek.

3A Run-on Discharges

Run-on discharges are off-site storm water that can potentially run to the site. Run-on discharges should be calculated based on a rainfall intensity for a 2-year 24-hour event per the PPDG. The Rational Method is typically used to calculate run-on discharges.

Equation: $Q=CiA$
where Q = Run-on discharge (cubic feet per second)
C = Runoff coefficient (see HDM Figure 819.2A)
i = 2-year, 24-hour rainfall intensity (inches/hour)
Locations of Run-on Discharges are as follows:

Location	Area (ac)	Discharges (cfs)
No known		

The project cross-sections in the PSE package do not show areas of run-on adjacent to the roadway that would flow into the project work area; however, the Contractor needs to verify all run-on for the proposed project.

3B Temporary ESA Fencing

Temporary ESA fencing is depicted on the layouts and on the USACE and CDFG impact maps. Adhere to the ESA fencing on the layout plans. The ESA fencing will depict areas where no construction activity can occur. In many locations where temporary silt fence was also required, ESA fencing may be combined with temporary silt fence as temporary reinforced silt fence type 1. These locations will be depicted on the layout maps.

4 Permits

4A General

The permits required for the project note conditions that may call for special consideration from the Contractor. Conditions include work windows for in water work and various job site management, including equipment and stockpiles.

Required permit:

1. Biological Opinion from the U.S. Fish and Wildlife
2. 1600 Permit from the CA Department of Fish and Game

5 ATTACHMENTS

ATTACHMENT A

VICINITY MAP

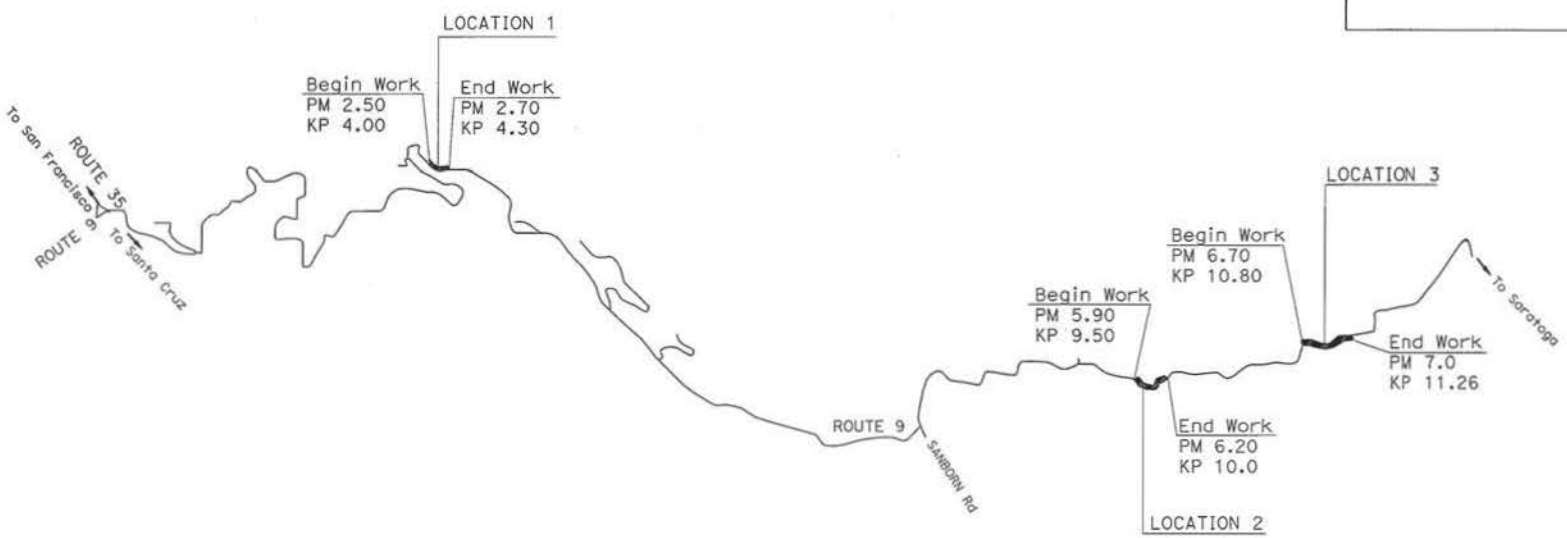
INDEX OF PLANS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ON
STATE HIGHWAY
ON ROUTE 9
IN SANTA CLARA COUNTY
FROM 2.5 MILES EAST OF THE ROUTE 35 TO THE 6th STREET INTERSECTION

TO BE SUPPLEMENTED BY STANDARD PLANS DATED MAY 2006

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SCL	9	2.5/7.0		



NO SCALE

JASVIR SINGH
PROJECT ENGINEER
REGISTERED CIVIL ENGINEER
DATE

REGISTERED PROFESSIONAL ENGINEER
No.
Exp.
CIVIL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."

CONTRACT No.	04-2A4304
PROJECT ID.	0400000822

PROJECT MANAGER
DESIGN ENGINEER JASVIR SINGH

LAST REVISION 07-27-11
DATE PLOTTED => 20-JUN-2012
TIME PLOTTED => 10:19

ATTACHMENT B

RISK LEVEL DETERMINATION

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		124.26
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.2
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		12.22
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	303.69144	
16	**Site Sediment Risk Factor**	**High**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment** (For help with impaired waterbodies please check the attached worksheet or visit the link below) or has a **USEPA approved TMDL implementation plan for sediment**?: 2006 Approved Sediment-impared WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml	**Yes**	**High**
OR		
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp		

Combined Risk Level Matrix

Receiving Water Risk	Sediment Risk: Low	Sediment Risk: Medium	Sediment Risk: High
Low	Level 1	Level 2	
High	Level 2		Level 3

Project Sediment Risk: **High**

Project RW Risk: **High**

Project Combined Risk: **Level 3**

ATTACHMENT C

RAINFALL DATA

Rainfall Intensity can be obtained by the following link:

http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif

Refer to chapters 800, Highway Drainage Design of Highway Design Manual for information on runoff coefficient and shed map. The weighted runoff coefficient of 0.55 is recommended for the project area.

ATTACHMENT D

PROJECT DISCHARGE LOCATION PLAN

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SCL	9	2.5/7.0		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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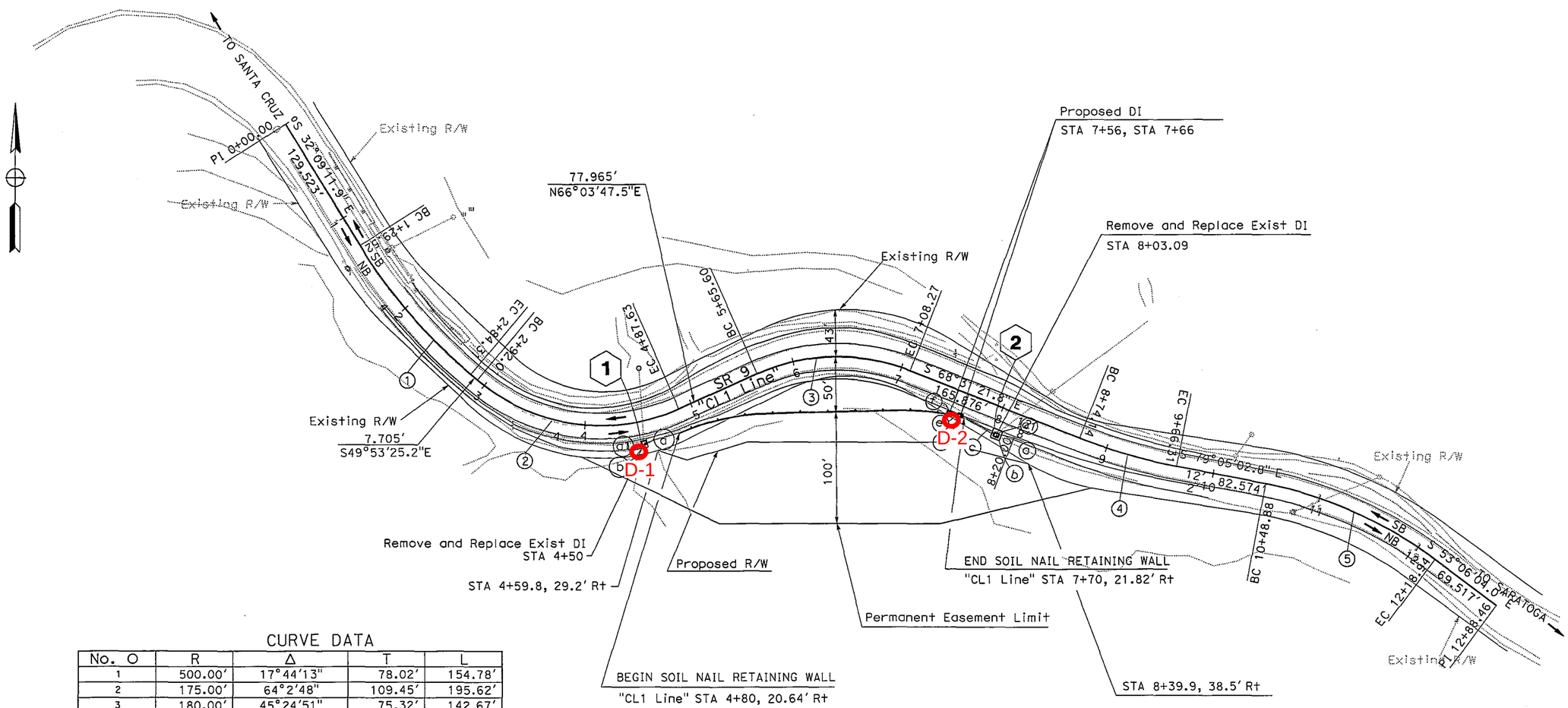
LEGEND:

Existing R/W

Proposed R/W

Permanent Easement Limit

D-X DISCHARGE LOCATION



CURVE DATA

No. O	R	Δ	T	L
1	500.00'	17°44'13"	78.02'	154.78'
2	175.00'	64°2'48"	109.45'	195.62'
3	180.00'	45°24'51"	75.32'	142.67'
4	500.00'	10°33'41"	46.21'	92.17'
5	375.00'	25°58'59"	86.52'	170.06'

DISCHARGE LOCATION PLAN - **D1**

LOCATION 1

PM 2.5 TO 2.7

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	SHAILESH PATEL
CHECKED BY	JASVIR SINGH

FUNCTIONAL SUPERVISOR: ALI ALQATAMI

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

DESIGN

LAST REVISION 06-20-12

DATE PLOTTED => 22-JUN-2012
TIME PLOTTED => 13:44

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SCL	9	2.5/7.0		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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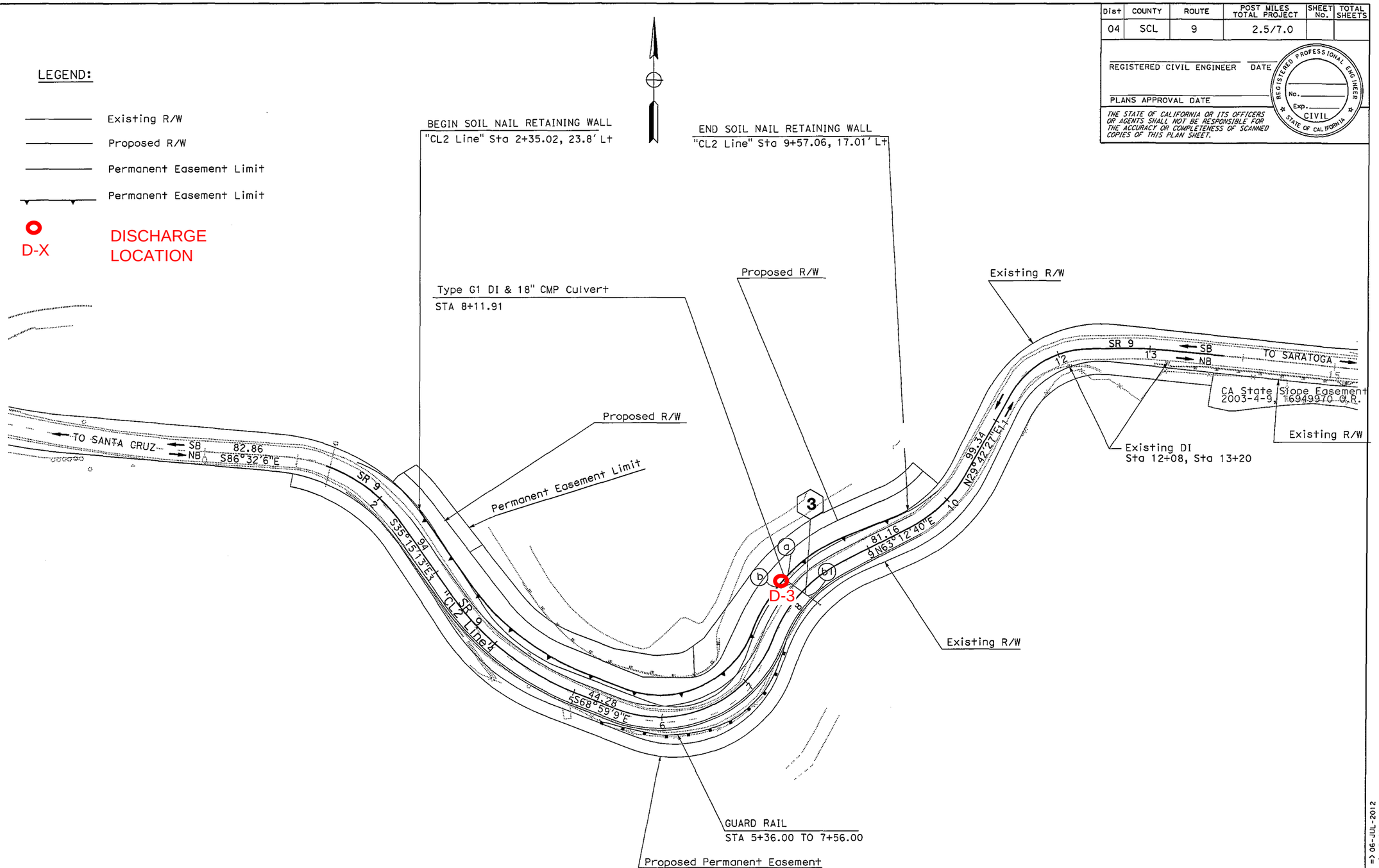
LEGEND:

- Existing R/W
- Proposed R/W
- Permanent Easement Limit
- Permanent Easement Limit
- D-X DISCHARGE LOCATION



DISCHARGE LOCATION PLAN - D2

LOCATION 2

PM 5.9 TO 6.2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

DESIGN

FUNCTIONAL SUPERVISOR: ALI ALQATAMI

CALCULATED-DESIGNED BY: SHAILESH PATEL

CHECKED BY: JASVIR SINGH

REVISED BY | DATE REVISED

LAST REVISION | DATE PLOTTED => 06-JUL-2012 | 07-27-11 | TIME PLOTTED => 13:00

BORDER LAST REVISED 7/2/2010 | USERNAME => s109301 | DGN FILE => 042a430ea02.DGN | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 1458 | PROJECT NUMBER & PHASE 04000008221

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SCL	9	2.5/7.0		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

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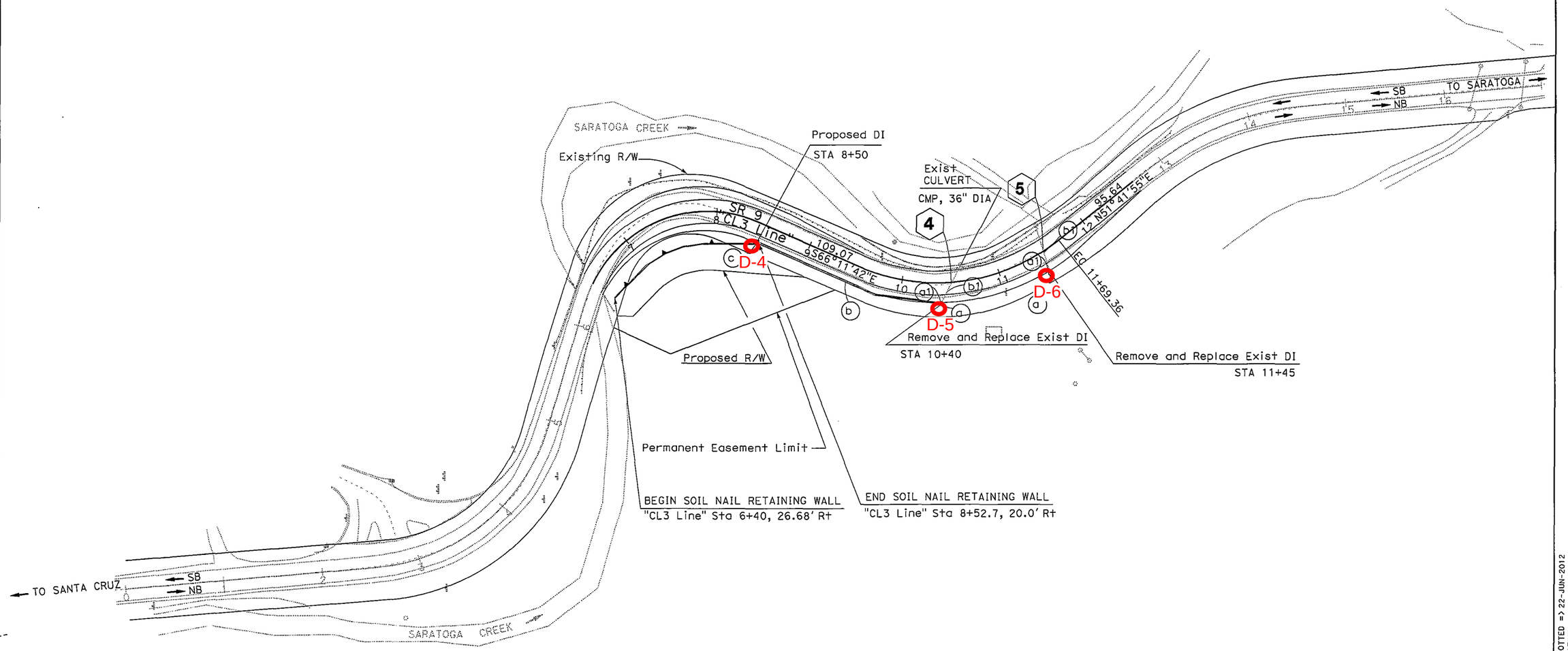
LEGEND:

- Existing R/W
- Proposed R/W
- Permanent Easement Limit
- D-X DISCHARGE LOCATION



DISCHARGE LOCATION PLAN - D3

LOCATION 3

PM 6.7 TO 7.0

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	SHAILESH PATEL
CHECKED BY	JASVIR SINGH
FUNCTIONAL SUPERVISOR	ALI ALQATAMI

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

DESIGN

LAST REVISION 07-27-11 | DATE PLOTTED => 22-JUN-2012 | TIME PLOTTED => 13:58