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MATERIALS INFORMATION

U.S. Fish and Wildlife Biological Opinion; Permit number 08ESMF00-2015-F-0015-2

Water Source Information - Bay Area Recycled Water Commercial Truck Fill Facilities Location Guide (June 2015)

Foundation Report for Russian River Viaducts Seismic Restoration date June 19, 2015

Preliminary Hydraulic Report for Seismic Retrofit Work on the Russian River Viaducts (Bridge Numbers 20--0071 and 20-0072) Dated April 13, 2015

United States Department of the Interior

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

In Reply Refer to:
08ESMF00-
2015-F-0015-2

APR 0 8 2015

Ms. JoAnn Cullom
California Department of Transportation
Environmental Division, MS-8E
111 Grand Avenue
Oakland, California 94612

Subject: Biological Opinion for the State Route 116 Bridge Seismic Restoration Russian River Viaducts Project, Sonoma County, California (Caltrans EA 0G641)

Dear Ms. Cullom:

This Biological Opinion (BO) is in response to your December 31, 2014, request for consultation with the U.S. Fish and Wildlife Service (Service) on the proposed State Route (SR) 116 Bridge Seismic Restoration Russian River Viaducts Project, Sonoma County, California (Caltrans EA 0G641) in Sonoma County, California. The proposed project is to retrofit two viaducts for seismic reliability. The California Department of Transportation (Caltrans) requested formal consultation on the threatened California red-legged frog (*Rana draytonii*). Critical habitat has been designated for the California red-legged frog but does not occur within the action area. This document represents the Service's biological opinion on the effects of the proposed action on the California red-legged frog and has been prepared in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 *et seq.*)(Act).

Caltrans determined that the project may affect, but is unlikely to adversely affect the threatened northern spotted owl (*Strix occidentalis caurina*). The Service concurs with this determination because: (1) the project is not located within a known activity center; (2) vegetation removal will be minimal (0.18 acre of mixed riparian understory) and will be conducted between September 15 and January 31 to avoid the owl's typical breeding season; (3) the project does not include the removal of large trees; (4) equipment will be operated and maintained to minimize noise generation and exhaust systems will be muffled; and (5) the proposed construction activities are unlikely to exceed the baseline noise and activity levels associated with highway traffic.

Moving Ahead for Progress in the 21st Century Act (MAP-21) was signed into law on July 6, 2012. Effective October 1, 2012, MAP-21 includes provisions to promote streamlined and accelerated project delivery. Caltrans was approved to participate in the MAP-21 Surface Transportation Project Delivery Program through the National Environmental Policy Act (NEPA) Assignment Memorandum of Understanding (MOU). The MOU allows Caltrans to assume the Federal Highway Administration's (FHWA) responsibilities under NEPA as well as FHWA's consultation and coordination responsibilities under Federal environmental laws for most highway projects in California. Caltrans is exercising this authority as the Federal nexus for section 7 consultation on this project.

This BO is based on: (1) Caltrans' December 31, 2014, letter and accompanying December 2014 Biological Assessment (BA); (2) an October 23, 2014, field visit; (3) Caltrans' January 26, 2015, electronic mail (e-mail) message; (4) Caltran's response to the March 13, 2015 draft BO; and (5) other information available to the Service.

Consultation History

October 2, 2014	Caltrans contacted the Service to introduce the proposed project and request technical assistance.
October 23, 2014	The Service visited the proposed project site and discussed the proposed project description with Caltrans.
October 29, 2014	The Service provided technical assistance to Caltrans via an e-mail message.
December 31, 2014	The Service received Caltrans' December 31, 2014, request for formal consultation accompanied by the December 2014 BA.
January 23, 2015	The Service sent Caltrans comments regarding our review of their December 2014 BA. The comments were included in an e-mail message and were the functional equivalent of a 30-day letter.
January 26, 2015	Caltrans provided a response to our January 23, 2015 e-mail message. The response provided the information needed to complete the BO.
March 13, 2015	The Service issued a draft BO (Service File #08ESMF00-2015-F-0015-1).
March 30, 2015	The Service received Caltrans' comments regarding the March 13, 2015 draft BO with a request for revisions and issuance of a final.

BIOLOGICAL OPINION

Description of the Action

The project consists of two elevated roadway segments along SR 116. The segments are supported by viaducts that allow the northern shoulder and a portion of the westbound lane to be anchored into the steep hillside while the eastbound lane extends outward, "floating" over the descending topography below. The "floating" roadway is similar to a bridge in its appearance and support. The viaducts consist of reinforced concrete continuous slab spans supported on composite (concrete and steel) pile bents. The proposed project includes strengthening the viaduct by retrofitting the support structures.

The northernmost viaduct is 253 feet long and the southern viaduct is 252 long. Both viaduct segments are 31 feet wide. The retrofit consists of attaching standard seat extenders to the existing expansion joints on the underside of the viaduct. The seat extenders involve an assembly of bolts, plates, and steel tubes to provide the additional support.

The additional infrastructure will be contained underneath the existing viaduct. Some vegetation clearing will be required to create a clear foot path to access the underside of the viaduct. The path would be created at the ends of the viaducts and will parallel the outside edge of the "floating"

roadway above. The construction will require excavation to create flat work areas underneath the roadway. Excavations will be backfilled after use. Access under the roadway will be on foot and excavation will be completed by hand. No large equipment or tracked and wheeled equipment will be needed below or beyond the existing pavement and road shoulder. The project does not include utility relocation. All material staging will be confined to the existing SR 116 roadway and parking will be confined to existing gravel pull-outs in the project area.

The construction footprint will be approximately 0.86 acre, consisting of 0.68 acre of existing pavement and gravel shoulder area and 0.18 acre of understory riparian habitat needed for foot access.

Caltrans anticipates that the project will take 20 working days to complete. Tree trimming will be conducted sometime between September 15 and January 31, while project construction will occur sometime between June 15 and October 15. All work will be completed during daylight hours. The site activities will proceed in the following order.

1. Site preparation.

2. Vegetation removal and tree trimming.

3. Drilling on the roadway and excavation under the roadway to place the seat extenders.

4. Placement and attachment of seat extenders under the roadway.

5. Backfill of the excavated areas, restoration, and revegetation.

Equipment expected to be used to complete the project include hand tools such as shovels and picks, chainsaws, chippers, dump trucks, traffic signals and back-up generators, rig-mounted drills, augers, compressors, rig-mounted cranes, and manlifts.

Vegetation Removal
Any vegetation that is within the cut-and-fill line or is growing in locations where it impedes safe access for on-foot workers accessing the area under the viaduct roadway 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 construction. The intent is to promote the plants' ability to reproduce vegetatively or resprout. All clearing and trimming of woody vegetation will occur by hand. 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.

Restoration
A revegetation plan will be prepared for restoration of temporary work areas. Pavement and base will be removed, topography will be blended with the surrounding area, and (where practicable) topsoil will be salvaged from the new alignment area to be placed over the restored area. Temporarily disturbed areas will be restored to the preconstruction ecological function and value to the maximum extent practicable. Exposed slopes and bare ground will be reseeded with native grasses and shrubs to stabilize and prevent erosion. Where disturbance includes the removal of woody shrubs, native species will be replanted based on local species composition. The revegetation plan will be provided to the Service for review and approval prior to the start of construction.

Conservation Measures
Caltrans proposes to reduce adverse effects to the California red-legged frog by implementing the following measures:

1. Caltrans will submit the names and qualifications of proposed biological monitor(s) for Service approval at least 30 calendar days prior to initiating construction activities for the proposed project. Only Service-approved biological monitors will implement the monitoring duties outlined in the project description including delivery of the Worker Environmental Awareness Training Program. The Service-approved biologist(s) will be onsite during any ground-disturbing activities that may risk impacts to the California red-legged frog. The biologist(s) has authority to contact the Resident Engineer or his or her designee if any work may result in take of a listed species. The Resident Engineer may act on this information by stopping the work. If the biologist(s) exercises this authority, the Service will be notified by telephone and e-mail message within 24 hours. The Service contact will be the Coast-Bay Division Chief in the Sacramento Fish and Wildlife Office at (916) 414-6600. During construction, a Service-approved biological monitor will conduct daily daytime visual pedestrian surveys for the California red-legged within the active construction area, enclosed by the project boundary fencing, until all ground disturbing work within the site has been completed. After that, surveys will be conducted once per week.

2. Preconstruction surveys will be conducted by a Service-approved biologist. Visual encounter surveys will be conducted within 24 hours prior to work within areas subject to ground-disturbing and clearance immediately prior to ground disturbing (including tree trimming, vegetation clearing, and excavation). Suitable habitat within the project footprint, including refugia habitat (such as under shrubs, downed logs, small woody debris, and burrows), will be thoroughly inspected. Fossorial mammal burrows will be inspected for signs of frog usage to the maximum extent practicable. If it is determined that a burrow may be occupied by a California red-legged frog, the burrow will be excavated by hand, if possible, and the individual(s) will be relocated in accordance with the observation and handling protocol promulgated by the Service.

3. All construction activities will occur above the ordinary high water mark (OHWM) of the Russian River. The limits of the construction zones will be delineated and identified with high-visibility indicators such as 4 foot high fencing or flagging to discourage encroachment into habitat areas not considered in this consultation. The final project plans will show the location of the boundary fencing, at least 40 feet above the OHWM. The special provisions in the bid solicitation package will clearly describe acceptable fencing material and prohibited construction-related activities, vehicle operation, material and equipment storage, and other surface-disturbing activities beyond the described project footprint. The boundary fencing will remain in place throughout the duration of project-related construction and site restoration activities and will be regularly inspected and maintained.

4. Construction personnel will attend a mandatory environmental education program delivered by the Service-approved biologist prior to any work, vegetation clearing, or construction activities on the project site. The program will focus on the conservation measures that are relevant to an employee's personal responsibility and will include an explanation as how to best avoid take of California red-legged frog. At a minimum, the training will include a description of the California red-legged frog and their habitats within the action area; their status and protection; and the relevant *Conservation Measures* and *Terms and Conditions* of the BO. A fact sheet conveying this information will be prepared and distributed to all

construction and project personnel. Distributed materials will include cards with a distinctive California red-legged frog photograph, compliance reminders, and relevant contact information. As needed, training will be conducted in Spanish for Spanish-language speakers. Documentation of the training, including sign-in sheets, will be kept on file and available to the Service on request.

5. Vegetation clearing and understory tree trimming prior to construction (necessary to provide access to on-foot workers) will occur outside of the migratory bird nesting season and northern spotted owl breeding season (February 1 to September 15). All remaining ground-disturbing construction work will be limited to the period from June 15 to October 15 to protect aquatic habitats and avoid impacts to water quality.

6. No work will be performed during night hours.

7. A Service-approved biologist will be present during all vegetation clearing activities and other ground disturbing activities associated with the construction of this project.

8. If, at any time, a California red-legged frog is discovered, the Resident Engineer and the biological monitor will be informed immediately. The biological monitor will determine if relocating the species is necessary and will work with Service prior to handling or relocating unless otherwise authorized.

9. If a California red-legged frog is encountered in the project footprint, work within 50 feet of the animal will cease immediately, the Resident Engineer and the Service-approved biologist will be immediately notified, and the Service will be notified within 24 hours. Based on the professional judgment of the approved biologist, if project activities can be conducted without harming or injuring the animal(s), they may be left at the location of discovery and monitored by the approved biologist. Project personnel will be notified of the finding, and at no time will work occur within 50 feet of the animal without a biological monitor present. If it is determined by the approved biologist that relocating the California red-legged frog is necessary, the following steps will be taken:

   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 handling amphibians after working in other aquatic habitats.

   b. California red-legged frogs will be captured by hand, dip net, or other Service-approved methodology; transported by hand, dip net, 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 dip nets will be thoroughly cleaned and disinfected prior to entering the work site and will be rinsed with freshwater onsite immediately prior to usage unless doing so will result in the injury or death of the animal(s) due to the time delay.

10. The Service-approved biological monitor(s) will check all excavated steep-walled holes or trenches greater than 1 foot deep for California red-legged frogs. To prevent inadvertent entrapment of the California red-legged frog during construction, 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. Alternatively, an additional 4-foot-high vertical barrier, independent of exclusionary fences, will be used to further prevent the inadvertent entrapment of the California red-legged frog. If it is not feasible to cover an excavation or provide an additional 4-foot-high vertical barrier independent of exclusionary fences, one or more escape ramps constructed of earth fill or wooden planks will be installed. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals. If at any time a trapped listed animal is discovered, the biologist will immediately place escape ramps or other appropriate structures to allow the animal to escape, and the Service will be notified.

11. Construction pipes, culverts, or similar structures; construction equipment; and construction debris left overnight within the project footprint will be inspected by the Service-approved biological monitor prior to use. Materials left onsite overnight will be inspected because California red-legged frogs are attracted to cavity-like structures such as pipes and may seek refuge under construction equipment or debris. California red-legged frogs may become trapped or injured if such materials are moved without first inspecting them.

12. The Service-approved biologist will be onsite during vegetation removal and initial ground-disturbing activities. Otherwise they will visit the site once a week, upon request, or for occasional compliance verification. When the Service-approved monitor is not onsite, the Resident Engineer or their designee will be responsible for implementing the *Conservation Measures* and *Terms and Conditions* of this BO and will be the point of contact for the project. The Resident Engineer or their designee will maintain a copy of the BO onsite whenever construction is taking place. Their name and telephone number will be provided to the Service at least thirty (30) calendar days prior to groundbreaking. Prior to groundbreaking, the Resident Engineer will submit a letter to the Service verifying that they possess a copy of the BO and understands the *Terms and Conditions*. The Resident Engineer will halt work and immediately contact the Service-approved biologist(s) in the event that a California red-legged frog gains access to a construction zone. The Resident Engineer will suspend construction activities that could reasonably result in take of a California red-legged frog within a 50-foot radius of the frog until the animal leaves the site voluntarily or until the Service-approved biologist relocates the frog as described above. The Caltrans biologist will contact the Service within 24 hours of the occurrence.

13. A Stormwater Pollution Prevention Plan and erosion control best management practices (BMPs) will be developed and implemented to minimize any wind- or water-related erosion. These BMPs will be in compliance with the *Caltrans Construction General Permit* and the California Regional Water Quality Control Board requirements. Protective measures will include, at a minimum:

    a. Discharge of pollutants from vehicle and equipment cleaning into any storm drains or watercourses will be forbidden.

    b. Fueling and maintenance operations will be conducted at least 50 feet away from watercourses, except at established commercial gas stations or established vehicle maintenance facilities.

    c. Concrete wastes and water from curing operations will be collected in washouts and properly 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. Water trucks and dust palliatives will be used to control dust in excavation and fill areas.

f. Temporary access road entrances and exits will be covered with rock (rocking).

g. Temporary stockpiles will be covered when weather conditions require.

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

i. Graded areas will be protected from erosion with a combination of silt fences, fiber rolls, and erosion control netting (such as jute or coir) as appropriate.

j. Permanent erosion control measures, such as biofiltration strips and swales, will be established to receive stormwater discharges from the highway or other impervious surfaces.

14. Construction Site Management Practices.

a. A speed limit of 15 miles per hour will be enforced in the project footprint in unpaved and paved areas, except on the current highway, to reduce dust and excessive soil disturbance.

b. Construction access, staging, storage, and parking areas will be located within the existing paved and disturbed gravel areas of the roadway.

c. Access routes, staging and storage areas, and contractor parking will be limited to the minimum necessary to construct the proposed project.

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

e. Pets will be prohibited from within the project footprint during construction.

f. Firearms will be prohibited from within the project footprint, except for those carried by authorized security personnel or local, state, or Federal law enforcement officials.

g. Equipment will be maintained to prevent the leakage of fluids (such as gasoline, oils, or solvents) and a Spill Response Plan will be developed.

h. Hazardous materials (such as fuels, oils, and solvents) will be stored in sealable containers in a designated location that is at least 50 feet from aquatic habitats.

15. To reduce the spread of invasive, nonnative plant species and to 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 to provide for their control to minimize the economic, ecological, and human health effects. In the event that noxious weeds are disturbed or removed during construction-related activities,

the contractor will be required to contain the plant material associated with these noxious weeds and dispose of them 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 areas within the project footprint will be covered to the extent practicable with heavy black plastic solarization material until the end of the project.

Action Area

An 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 purposes of the effects assessment, the action area for this project encompasses a 0.86-acre construction footprint plus a 300 foot buffer from the footprint boundary. Within this buffer area, California red-legged frogs have the potential to be affected by noise, visual disturbance, and barrier effects.

Analytical Framework for the Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this BO relies on four components: (1) the *Status of the Species*, which evaluates California red-legged frog range-wide conditions, the factors responsible for those conditions, and the species' survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the listed species in the action area, the factors responsible for those conditions, and the relationship of the action area to the survival and recovery of the California red-legged frog; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the California red-legged frog; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the listed species.

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

The jeopardy analysis in this BO places an emphasis on consideration of the range-wide survival and recovery needs of the California red-legged frog and the role of the action area in the survival and recovery of this listed 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.

Status of the Species

Listing Status

The California red-legged frog was listed as a threatened species on May 23, 1996 (Service 1996). Critical habitat was re-designated for this species on March 17, 2010 (Service 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. Dorsal spots usually have light centers (Stebbins 2003), and dorsolateral folds are prominent on the back. California red-legged frogs have paired vocal sacs and vocalize in air (Hayes and Krempels 1986). 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 red-legged frog extended coastally from the vicinity of Elk Creek in Mendocino County, California, and inland from the vicinity of Redding, Shasta County, California, southward to northwestern Baja California, Mexico (Jennings and Hayes 1985; Hayes and Krempels 1986; Fellers 2005). The red-legged frog was historically documented in 46 California counties but the taxon 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 Coast. Within the remaining distribution of the species, only isolated populations have been documented in the Sierra Nevada, northern Coast Range, northern Transverse Ranges, southern Transverse Ranges, and Peninsular Ranges.

Status and Natural History

California red-legged frogs predominately inhabit permanent water sources such as streams, lakes, marshes, natural and man-made 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, California red-legged frogs also have been found in ephemeral creeks and drainages and in ponds that may or may not have riparian vegetation. California red-legged frogs also can be found in disturbed areas such as channelized creeks and drainage ditches in urban and agricultural areas. For example, an adult California red-legged frog was observed in a shallow isolated pool on North Slough Creek in the American Canyon area of Napa County (C. Gaber, PG&E, pers. comm., 2008). This frog location was surrounded by vineyard development. Another adult California red-legged frog was observed under debris in an unpaved parking lot in a heavily industrial area of Burlingame (P. Kobernus, Coast Ridge Ecology, pers. comm., 2008). This frog was likely utilizing a nearby drainage ditch. Caltrans also has discovered California red-legged frog adults, tadpoles, and egg masses within a storm drainage system within a major cloverleaf intersection of Millbrae Avenue and SR 101 in a heavily developed area of San Mateo County (Caltrans 2007). California red-legged frog has the potential to persist in disturbed areas as long as those locations provide at least one or more of their life history requirements.

California red-legged frogs typically breed between November and April in still or slow-moving water at least 2.5 feet in depth with emergent vegetation, such as cattails, tules or overhanging willows (Hayes and Jennings 1988). There are earlier breeding records from the southern portion of their range (Storer 1925). 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 areas are active year-round (Jennings *et al.* 1992), whereas those found in interior sites are normally less active during the cold and dry seasons.

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 can

include vegetated areas with coyote brush, California blackberry thickets, and root masses associated with willow and California bay trees. Sometimes the non-breeding habitat used by California red-legged frogs is extremely limited in size. For example, non-breeding California red-legged frogs have been found in a 6-foot wide coyote brush thicket growing along a small 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 structures, 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). Adult frogs are often associated with permanent bodies of water. Some frogs remain at breeding sites all year while others disperse. Dispersal distances are typically less than 0.5 mile, with other 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 over 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 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, Tatarian (2008) noted that 57 percent of frogs fitted with radio transmitters in the Round Valley study area in eastern Contra Costa County stayed at their breeding pools, whereas 43 percent moved into adjacent upland habitat or to other aquatic sites. This study reported a peak of seasonal terrestrial movement occurring in the fall months, with movement commencing with the first 0.2 inch of precipitation. Movements away from the source pools tapered 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 burrows at the bases of trees or rocks, logs, and a downed barn door; others were associated with upland sites lacking refugia (Tatarian 2008). The majority of terrestrial movements lasted from 1-4 days; however, an adult female was reported to remain in upland habitat for 50 days (Tatarian 2008). Uplands closer to aquatic sites were used more often and frog refugia 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 2,000-5,000 eggs are attached to vegetation below the surface and hatch after 6-14 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 results 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 3.5-7 months following hatching and reach sexual maturity at 2-3 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). Sexual maturity normally is reached at 3-4 years of age (Storer 1925; Jennings and Hayes 1985). California red-legged frogs may live 8-10 years (Jennings *et al.* 1992). Populations of California red-legged frogs fluctuate from year to year. When conditions are favorable California red-legged frogs can experience 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, California red-legged frogs may temporarily disappear from an area when conditions are stressful (*e.g.*, drought).

California red-legged frogs have a diverse diet which changes as they mature. The diet of larval California red-legged frogs is not well studied, but is likely similar to that of other ranid frogs, which feed on algae, diatoms, and detritus by grazing on the surfaces 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 tree frogs, three-spined stickleback and to a limited extent, California mice, 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 of 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; Fahrig and Merriam 1985; Gotelli 1991; Holt 1993). 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 (Petit *et al.* 1995; Buza *et al.* 2000; Hilty and Merenlender 2004).

Most metapopulation or metapopulation-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 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 red-legged frog throughout its range. Several researchers in central California have noted the decline and eventual local disappearance of California and northern California red-legged frogs (*Rana aurora*) in systems supporting bullfrogs (Jennings and Hayes 1990; Twedt 1993), red swamp crayfish, signal crayfish, and several species of warm water fish including sunfish, goldfish, common carp, and mosquitofish (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 California red-legged frogs, and suggested that bullfrogs could prey on subadult northern 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 red-legged frog reproduction. Thus bullfrogs are able to prey upon and out-compete California red-legged frogs, especially in sub-optimal habitat. Both California and northern California red-legged frogs have also been observed in

amplexus (mounted on) with both male and female bullfrogs (Jennings and Hayes 1990; Jennings 1993; Twedt 1993).

The urbanization of land within and adjacent to red-legged frog habitat has also adversely affected California red-legged frogs. These declines are attributed to channelization of riparian areas, enclosure of the channels by urban development that blocks red-legged frog dispersal, and the introduction of predatory fishes and bullfrogs.

Diseases may also pose a significant threat though the specific effects of diseases 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 to the red-legged frog because these diseases have been found to adversely affect other amphibians, including the listed species (Davidson *et al.* 2003; Lips *et al.* 2003). 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.* 2005). 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 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. Disease will likely become a growing threat because of the relatively small and fragmented remaining California red-legged frog breeding sites, the many stresses on these sites due to habitat losses and alterations, and the many other potential disease-enhancing anthropogenic changes that have occurred both inside and outside the species' range.

Negative effects to wildlife populations from roads and pavement may extend some distance from the actual road. The phenomenon can result from any of the effects already described in this BO, such as vehicle-related mortality, habitat degradation, and invasive exotic species. Forman and Deblinger (1998, 2000) described the area affected as the "road effect" zone. Along a 4-lane road in Massachusetts, they determined that this zone extend for an average of approximately 980 feet to either side of the road for an average total zone width of approximately 1,970 feet. They describe the boundaries of this zone as asymmetric and in some areas diminished wildlife use attributed to road effects was detected greater than 0.6 mile from Massachusetts Route 2. The "road-zone" effect can also be subtle. Van der Zande *et al.* (1980) reported that lapwings and black-tailed godwits feeding at 1,575-6,560 feet from roads were disturbed by passing vehicles. The heart rate, metabolic rate and energy expenditure of female bighorn sheep increase 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, but elevated levels of metals in both soil and plants were detected at 660 feet of roads. The "road-zone" apparently varies with habitat type and traffic volume. Based on responses by birds, Forman (2000) estimated the effect 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" effect 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. Large, 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, incidents of very large numbers of road-killed frogs are well documented (*e.g.*, Ashley 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 kills 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 it certainly is not true 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 slow-moving and small, and thus cannot easily be avoided by drivers (Carr and Fahrig 2001).

Environmental Baseline

The action area is located within the range of the California red-legged frog. A map depicting the species' range is included in the Service's online profile for the species at http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=D02D.

The general vicinity is primarily characterized by a low density rural community surrounded by pine and redwood forest, riparian corridors, open fields, and vineyards. The action area is located within the Russian River riparian corridor and is synonymous with habitat typically used by the California red-legged frog for forage, movement, dispersal, and refuge along the central coast of California.

The project footprint includes a 2-lane highway positioned on a steep slope leading down to the Russian River. The highway sits at a point where the riparian community associated with the Russian River transitions to a pine and redwood forest that extends up the slope into mountainous terrain. The Russian River is a wide perennial water way that empties into the Pacific Ocean, approximately 13.4 miles downstream. Within the action area and vicinity there are numerous ephemeral drainages coursing down the steep hillside into the Russian River. The considerable canopy cover keeps the area cool and moist. Due to dense canopy cover and limited foot access, the Service was unable to determine from aerial photography and field observations where suitable California red-legged frog breeding habitat is located relative to the action area. There is a potential for suitable breeding habitat in the plunge pools within the nearby drainages leading to the Russian River. Adult California red-legged frogs are highly mobile and have been documented to move more than 2 miles over upland habitat. The frog habitat within the action area has direct connectivity with suitable habitat adjacent to the project site and is well within the feasible movement distance to potential breeding locations. These baseline conditions favor frog occupation.

SR 116 is the major east-west transportation corridor in the area. The steep hillside on the north side of the highway may limit the California red-legged frog's movement, as does the existing viaduct structures. Traffic presents a risk to frogs that would attempt to move across the road but is not considered an absolute barrier between habitat or frog populations on either side of the road.

The Service believes that the California red-legged frog is reasonably certain to occur within the action area due to: (1) the project being located within the species' range and current distribution; (2) suitable aquatic and upland habitat for forage and cover are located within the action area; (3) the ability of the California red-legged frog to move a considerable distance; and (4) the biology and ecology of the animal.

Effects of the Action

The direct effects of the proposed project are those effects occurring within the action area during construction of the proposed project. Direct effects may be temporary (lasting less than 1 year) or permanent (lasting more than 1 year). Indirect effects are the effects of the proposed project generally occurring later in time after construction has been completed (*e.g.*, degradation of habitat due to the spread of invasive plant species; barriers to dispersal due to the installation of retaining walls). An interrelated activity is an activity that is part of the proposed project and depends on the proposed project for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation.

Adult and juvenile frogs could be found in the project work area which will be subject to staging, access, and ground disturbance. Frogs in these areas may be in above or underground refugia or moving through the landscape. Dispersing adult or juvenile frogs could be found throughout the project footprint.

The proposed ground disturbing activities beyond the existing hardscape include establishment of an access trail as well as excavations, equipment use and storage, and foot activity below the viaduct. The access trail will approximately follow an existing non-designated path created by the public. Project activities will result in clearing of adjacent vegetation for greater clearance and further soil compaction. Vegetation removal will be minor and post-construction revegetation is expected to provide long-term compensation for the loss of riparian cover. The area under the viaduct has compact soils with little vegetation and signs of frequent human visitation and possible encampment. The proposed project includes excavation and other ground work under the viaduct that will be restored to baseline condition following construction. The path establishment and use, as well as the activities under the viaduct are not expected to result in habitat loss or modification of habitat function for the California red-legged frog.

The ground disturbance associated with vegetation removal, path establishment, and construction activity may result in exposure, stranding, crushing, entombing, maiming, or otherwise harassing or harming of California red-legged frogs. The noise, vibration, and increased human activity will be disruptive and may result in California red-legged frogs avoiding the action area, therefore modifying their behavior and creating a barrier to resource areas. This disruption may also result in California red-legged frogs taking cover in conspicuous areas rather than fleeing potential harm. This will make them more difficult to find, avoid, and rescue from harm's way.

Caltrans proposes to minimize adverse effects related to the proposed project by implementing the *Conservation Measures* included in the *Description of the Action* section of this BO. Effective implementation of the *Conservation Measures* will likely minimize but not prevent adverse effects to the California red-legged frog.

Educating project personnel will encourage compliance with the conservation measures and increase the possibility that California red-legged frogs in the work area will be identified and addressed appropriately for avoidance. Worker education is limited by the effectiveness of the presentation and the willingness of the construction personnel to participate in compliance.

Pre-construction surveys by a Service-approved biologist will assist in clearing California red-legged frogs from the work areas prior to initial vegetation clearing and ground disturbance. Biological clearance of work areas prior to the start of each day's work by the Service-approved biologist or their designee during construction will increase the chances of identifying frogs in the work area that

would be susceptible to injury. Biological clearance of work areas is limited by the experience of the biologist, the complexity and abundance of potential cover sites, the small size and inconspicuous nature of the species, and the challenges of completing a thorough clearance given the construction schedule. Clearance and overall implementation of the conservation measures may be the responsibility of a non-Service approved designee in times when activities other than vegetation clearing or ground disturbance are taking place. In addition to the discussed factors limiting personal abilities to identify frogs in harms' way, the effectiveness of the designee will depend upon their commitment to ensuring compliance.

Despite being "cleared" prior to construction, California red-legged frogs can continue to move into the work site undetected. The project is located adjacent to upland habitat that likely supports California red-legged frogs. Frogs may be actively moving around, through, or within the work area during the evening as well as during the day. This places greater emphasis on thorough biological clearance of work areas and under staged equipment and materials prior to the start of each day's activities.

Frogs occupying excavations may be unable to escape and be killed due to predation, desiccation, entombment, or starvation. This risk will be minimized with monitoring and the installation of escape ramps. Proper trash disposal is often difficult to enforce and is a common non-compliance issue. Improperly disposed edible trash could attract predators, such as raccoons, crows, and ravens, to the site, which could subsequently prey on the listed herpetofauna.

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, 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).

Discovery, capture, and relocation of individual California red-legged frogs may avoid injury or mortality due to construction activities; however, capturing and handling animals may result in stress and/or inadvertent injury during handling, containment, and transport. Nearby release of captured frogs within the Russian River riparian corridor should avoid significant adverse effects often associated with displacement.

California red-legged frogs and their prey could also be affected by contamination due to chemical or sediment discharge. 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 reduce these risks by implementing BMPs that consist of refueling, oiling, or cleaning of vehicles and equipment a minimum of 50 feet from drainages; installing coir rolls, straw wattles and/or silt fencing to capture sediment and prevent runoff or other harmful chemicals from entering the aquatic habitat; and locating staging, storage and parking areas away from drainages.

Caltrans' commitment to use erosion control devices other than mono-filament should be effective in avoiding the associated risk of entrapment that can result in death by predation, starvation, or desiccation (Stuart *et al.* 2001).

The completed project will not enable increased vehicle speeds or traffic capacity and will not result in the addition of barriers to frog movement. Therefore completion of the project is not expected to result in an increased risk of animal-vehicle collision risk or movement barrier for the California red-legged frog.

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 BO. Future Federal actions that are unrelated to the SR 116 Bridge Seismic Restoration Russian River Viaducts Project are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Service is not aware of specific projects that might affect listed species in the action area that are currently under review by State, county, or local authorities.

Conclusion

After reviewing the current status of the California red-legged frog, the environmental baseline for the action area, and the effects of the proposed action, and the cumulative effects on the species, it is the Service's biological opinion that the SR 116 Bridge Seismic Restoration Russian River Viaducts Project, as described herein, is not likely to jeopardize the continued existence of the California red-legged frog. We base this conclusion on the following: (1) successful implementation of the described *Conservation Measures* is likely to reduce the potential for proposed construction activities to result in the disruption of normal California red-legged frog behavior or risk of injury; (2) the project is small in scope and size, and short in duration; (3) there will be no permanent habitat loss for the California red-legged frog; and (4) the project is not expected to result in the addition of movement barriers or increased risk of road mortality.

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 significantly 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 assume and implement the *Terms and Conditions* or (2) fails to adhere to the *Terms and Conditions* of the *Incidental Take Statement* through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Caltrans must report the

progress of the action and its impact on the species to the Service as specified in the *Incidental Take Statement* [50 CFR §402.14(i)(3)].

Amount or Extent of Take

The Service anticipates that incidental take of the California red-legged frog will be difficult to detect due to their small size, wariness, and cryptic nature. Finding an injured or dead California red-legged frog is unlikely due to their relatively small body size, rapid carcass deterioration, and likelihood that the remains will be removed by a scavenger or indistinguishable amongst the disturbed soil and debris. 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, ground disturbance of upland habitat, and capture and relocation efforts; therefore, the Service is authorizing take incidental to the proposed action as: (1) the harassment and capture of all California red-legged frogs within the action area; and (2) the injury or mortality of no more than one adult or juvenile California red-legged frog, observed by biological monitors.

Upon implementation of the following *Reasonable and Prudent Measures*, the incidental take of California red-legged frogs within the action area in proportion to the amount and type of take outlined above 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 for the California red-legged frog is not likely to jeopardize the continued existence of the species.

Reasonable and Prudent Measure

The Service has determined that the following reasonable and prudent measure is necessary and appropriate to minimize the effect of the action on the California red-legged frog. Caltrans will be responsible for the implementation and compliance with this measure:

1. Minimize the adverse effects to the California red-legged frog and its habitat in the action area by implementing their proposed project, including the conservation measures as described, with the following terms and conditions.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, Caltrans must comply with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

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

    a. 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 BO, including staging and access.

b. If requested, before, during, or upon completion of groundbreaking and construction activities, Caltrans shall allow access by Service personnel into the project footprint to inspect the project and its activities.

c. Each California red-legged frog encounter shall be treated on a case-by-case basis in coordination with the Service but general guidance is as follows: (1) leave the non-injured animal if it is not in danger or (2) move the frog to a nearby location if it is in danger.

These two options are further described as follows:

1) When a California red-legged frog is encountered in the action area the first priority is to stop all activities in the surrounding area that have the potential to result in the harm, harassment, injury, or death of the individual. Then the monitor needs to assess the situation in order to select a course of action that will minimize adverse effects to the individual. Contact the Service once the site is secure. The contacts for this situation are Ryan Olah (*ryan_olah@fws.gov*) or John Cleckler (*john_cleckler@fws.gov*). They can also be reached at (916) 414-6600. If you get voicemail messages for these contacts then contact John Cleckler on his cell phone at (916) 712-6784. Contact the Service prior to the start of construction to confirm the status of this contact information.

The first priority is to avoid contact with the animal and allow it to move out of the project footprint and hazardous situation on its own to a safe location. The animal should not be picked up and moved because it is not moving fast enough or it is inconvenient for the construction schedule. This guidance only applies to situations where a California red-legged frog is encountered on the move during conditions that make their upland travel feasible. This does not apply to animals that are uncovered or otherwise exposed or in areas where there is not sufficient adjacent habitat to support the life history of the California red-legged frog should they move outside the construction footprint.

Avoidance is the preferred option if the animal is not moving and is using aquatic habitat or is within some sort of burrow or other refugia. The area should be well marked for avoidance by construction and a Service-approved biological monitor should be assigned to the area when work is taking place nearby.

2) The animal should be captured and moved when it is the only option to prevent its death or injury.

If appropriate habitat is located immediately adjacent to the capture location then the preferred option is short distance relocation to that habitat. This must be coordinated with the Service but the general guidance is the frog should not be moved outside of the area it would have traveled on its own. Under no circumstances should a frog be relocated to another property without the owner's written permission. It is Caltrans' responsibility to arrange for that permission.

The release must be coordinated with the Service and will depend on where the individual was found and the opportunities for nearby release. In most situations the release location is likely to be into the mouth of a small burrow or other

suitable refugia and in certain circumstances pools without non-native predators may be suitable. The preferred release location will be within the Russian River riparian corridor.

Only Service-approved biologists for the project can capture California red-legged frogs. Nets or bare hands may be used to capture California red-legged frogs. Soaps, oils, creams, lotions, repellents, or solvents of any sort cannot be used on hands within 2 hours before and during periods when they are capturing and relocating California red-legged frogs. To avoid transferring disease or pathogens between sites during the course of surveys or handling of amphibians, Service-approved biologists must use the following guidance for disinfecting equipment and clothing. These recommendations are adapted from the *Declining Amphibian Population Task Force's Code* (http://www.open.ac.uk/daptf/).

i. All dirt and debris, including mud, snails, plant material (including fruits and seeds), and algae, must be removed from nets, traps, boots, vehicle tires and all other surfaces that have come into contact with water and/or an amphibian. Cleaned items should be rinsed with fresh water before leaving each site.

ii. Boots, nets, traps, etc., must then be scrubbed with either a 70 percent ethanol solution, a bleach solution (0.5 to 1.0 cup of bleach to 1.0 gallon of water), QUAT 128 (quaternary ammonium, use 1:60 dilution), or a 6 percent sodium hypochlorite 3 solution and rinsed clean with water between sites. Avoid cleaning equipment in the immediate vicinity of a pond or wetland. All traces of the disinfectant must be removed before entering the next aquatic habitat.

iii. Used cleaning materials (liquids, etc.) must be disposed of safely, and if necessary, taken back to the lab for proper disposal.

iv. Service-approved biologists must limit the duration of handling and captivity. While in captivity, California red-legged frogs shall be kept in a cool, dark, moist, aerated environment, such as a clean and disinfected bucket or plastic container with a damp sponge. Containers used for holding or transporting should not contain any standing water.

Reporting Requirements

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, Caltrans shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, Caltrans must reinitiate formal consultation as per 50 CFR 402.16.

1. Notification of injured or dead listed species will be made to the Coast-Bay Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at (916) 414-6600. When an injured or dead individual of the listed species is found, Caltrans shall follow the steps outlined in the following *Disposition of Individuals Taken* section.

2. Sightings of any listed or sensitive animal species should be reported to the CNDDB (http://www.dfg.ca.gov/biogeodata/cnddb/).

3. Construction compliance reports will be addressed to the Coast-Bay Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office.

4. Caltrans shall submit post-construction compliance reports prepared by the Service-approved biologist to the Service within 60 calendar days following completion of each construction season or within 60 calendar days of any break in construction activity lasting more than 60 calendar days. This report shall detail (1) dates that relevant project activities occurred; (2) pertinent information concerning the success of the project in implementing avoidance and minimization measures; (3) an explanation of failure to meet such measures, if any; (4) known project effects on the California red-legged frog; (5) occurrences of incidental take of any listed species; (6) documentation of employee environmental education; and (7) other pertinent information.

Disposition of Individuals Taken
Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen. The Service contact persons are the Coast-Bay Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at (916) 414-6600.

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 endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. Caltrans District 4 should work with the Service to develop a conservation strategy that would identify the current safe passage potential along Bay Area highways and the areas where safe passage for wildlife could be enhanced or established.

2. Caltrans should assist the Service in implementing recovery actions identified in the *Recovery Plan for the California Red-legged Frog* (Service 2002).

3. Caltrans should consider participating in the planning for a regional habitat conservation plan for the California red-legged frog, other listed species, and sensitive species.

4. Caltrans should consider establishing functioning preservation and creation conservation banking systems to further the conservation of the California red-legged frog. Such banking systems also could be utilized for other required mitigation (i.e., seasonal wetlands, riparian habitats, etc.) where appropriate. Efforts should be made to preserve habitat along roadways in association with wildlife crossings.

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

REINITIATION-CLOSING STATEMENT

This concludes formal consultation on the SR 116 Bridge Seismic Restoration Russian River Viaducts Project. 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 BO, including work outside of the project footprint analyzed in this BO 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 BO including use of rodenticides or herbicides; relocation of utilities; and use of vehicle parking, staging, lay down areas, 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 additional take will not be exempt from the prohibitions of section 9 of the Act, pending reinitiation.

If you have questions concerning this BO, please contact John Cleckler, Caltrans Liaison (*john_cleckler@fws.gov*) or Ryan Olah, Coast-Bay Division Chief (*ryan_olah@fws.gov*), at the letterhead address, (916) 414-6600, or by e-mail.

Sincerely,

Jennifer M. Norris
Field Supervisor

cc:
Melissa Escaron, California Department of Fish and Wildlife, Napa, California
Frances Malamud-Roam and Chris Pincetich, Caltrans District 4, Oakland, California

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BACWA
BAY AREA
CLEAN WATER
AGENCIES

BAY AREA RECYCLED WATER

Commercial Truck Fill Facilities Location Guide

JUNE 2015

WHITLEY BURCHETT & *Associates*

Background

This Guide was prepared by Whitley Burchett & Associates under contract with the Bay Area Clean Water Agencies and under the direction of the BACWA Recycled Water Committee. The Guide was prepared in response to inquiries of commercial recycled water truck fill facilities in the Bay Area. It is the Recycled Water Committee's intention to update this Guide annually. If you see any information that should be updated, have a facility to add to this Guide, or have any questions please email Info@bacwa.org.

Disclaimer

The intent of this Guide is to provide prospective water haulers with general information regarding the location of Bay Area recycled water commercial truck fill facilities, permit requirements, and associated fees for recycled water. Information in this Guide represents data collected in the fall of 2014 and updated in June 2015. Please contact agencies directly for current information.

Cover Photos

Top row: East Bay Municipal Utility District

Bottom row from left to right: City of Palo Alto, City of Santa Rosa

Acknowledgements

This Guide was prepared in conjunction with the BACWA agencies. The time spent by agencies providing program information and review of this document is greatly appreciated.

Electronic Version

The BACWA Truck Fill Guide is available on the BACWA website at http://bacwa.org.

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Bay Area Commercial Recycled Water Truck Fill Facilities Location Map

* Indicates the general location of a truck fill facility.

List of Agencies with Recycled Water Commercial Truck Fill Facilities Sorted by County/City

COUNTY/CITY	AGENCY	PAGE NO.
ALAMEDA COUNTY		
Dublin	Dublin San Ramon Services District	3
Livermore	City of Livermore	5
Oakland	East Bay Municipal Utility District	4
Pleasanton	Dublin San Ramon Services District	3
San Lorenzo	Oro Loma Sanitary District/East Bay Dischargers Authority	10
CONTRA COSTA COUNTY		
Concord	Central Contra Costa Sanitary District	2
Martinez	Central Contra Costa Sanitary District	2
Richmond	East Bay Municipal Utility District	4
San Ramon	Dublin San Ramon Services District	3
MARIN COUNTY		
Novato	North Marin Water District	9
San Rafael	Marin Municipal Water District	6
NAPA COUNTY		
Calistoga	City of Calistoga	1
Napa	Napa Sanitation District	8
Yountville	Town of Yountville	20
SAN FRANCISCO		
San Francisco	City and County of San Francisco/SFPUC	14
SAN MATEO COUNTY		
San Francisco	San Francisco International Airport	15
Redwood City	City of Redwood City	13
SANTA CLARA COUNTY		
Milpitas	City of Milpitas/South Bay Water Recycling	7
Palo Alto	City of Palo Alto	11
San Jose	City of San Jose/South Bay Water Recycling	16
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SONOMA COUNTY		
Petaluma	City of Petaluma	12
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SECTION 1

Recycled Water Commercial Truck Fill Facilities Information

CITY OF CALISTOGA

707.942.2782

www.ci.calistoga.ca.us

Recycled Water Fill Facilities:			
Treatment Plant	Yes	Distribution System	No
Can water be used outside of this agency's service area?			Yes

Hydrant Fill Facilities

Location:	None		
Number of Fill Facilities:		Connection Device:	
Quality:		Truck Size Limits:	
Quantity Limitations per Trip:		Truck Weight Limits:	
Other Restrictions:			
Additional Access Information:			

Fill Facilities at Treatment Plant

Location:	Dunaweal Wastewater Treatment Plant (call for address)		
Quality:	Disinfected Tertiary	Type of Connection:	Side
Quantity Limitations per Trip:	No Minimum	Hours:	Mon-Fri 7 a.m. - 3:30 p.m.
	Maximum up to truck limit	Appointment Required:	No
Quantity Limitations per Day:	No Minimum	Truck Size Limits:	None
	Maximum 50,000 gal	Truck Weight Limits:	None
Additional Access Information:			

Training

Required:	No	Duration:	
Who:		Frequency:	
Schedule:		Location:	
Length of time to become authorized truck hauler:			1 business day

Signage

Area Use Signage Required:	No	Vehicle Signage Required:	Yes
Signs Provided by Water Agency:	N/A	Signs Provided by Water Agency:	Yes

Vehicle Inspection

Required:	No	Inspection Location:	
Duration:		Re-inspection Required:	
How to schedule:			

Fees

Water:	No Charge	Training:	No Charge
Connection Device:	No Charge	Permit:	No Charge
Vehicle Signage:	No Charge	Use Area Signage:	N/A
Other:			

CENTRAL CONTRA COSTA SANITARY DISTRICT

925.228.9500

www.centralsan.org

Recycled Water Fill Facilities:

Treatment Plant: No

Distribution System: Yes

Can water be used outside of this agency's service area? Yes

Hydrant Fill Facilities

Location: Locations in Concord (Willow Way) and Martinez (Marsh Drive)

Number of Fill Facilities: 3

Connection Device: Hydrant key and Construction meter

Quality: Disinfected Tertiary

Truck Size Limits: Max. truck length 18 ft.

Quantity Limitations per Trip: No Minimum
Maximum 6,000 gal

Truck Weight Limits: No limit

Other Restrictions:

Additional Access Information: Fill times: Mon.-Fri. 7 a.m. - 5 p.m. (can be negotiated)

Fill Facilities at Treatment Plant

Location: None

Quality:

Type of Connection:

Quantity Limitations per Trip:

Hours:

Appointment Required:

Quantity Limitations per Day:

Truck Size Limits:

Truck Weight Limits:

Additional Access Information:

Training

Required: Yes

Duration: 15 minutes

Who: Either Truck Owner, Truck Driver, or Customer using water

Frequency: Only Once

Schedule: By Appointment

Location: Recycled Water Treatment Plant

Length of time to become authorized truck hauler: 1 business day

Signage

Area Use Signage Required: No

Vehicle Signage Required: Yes

Signs Provided by Water Agency: N/A

Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: No

Inspection Location:

Duration:

Re-inspection Required:

How to schedule:

Fees

Water: $3.28 per 1,000 gal

Training: No Charge

Connection Device: $750 (refundable deposit)

Permit: No Charge

Vehicle Signage: No Charge

Use Area Signage: N/A

Other:

DUBLIN SAN RAMON SERVICES DISTRICT

925.875.2334
www.dsrsd.com

Recycled Water Fill Facilities:
Treatment Plant: Yes
Distribution System: Yes
Can water be used outside of this agency's service area? Yes

Hydrant Fill Facilities

Location: Dublin and San Ramon, CA - see website for locations
Number of Fill Facilities: 18
Connection Device: Construction Meter
Quality: Disinfected Tertiary
Truck Size Limits: None
Quantity Limitations per Trip: No Minimum
Maximum up to truck limit
Truck Weight Limits: None
Other Restrictions: Permit plus $1,000 refundable deposit for meter required.
Additional Access Information: Obtain permit and meter at 7051 Dublin Blvd, Dublin.

Fill Facilities at Treatment Plant

Location: DSRSD Wastewater Treatment Plant
7399 Johnson Drive, Pleasanton
Quality: Disinfected Tertiary
Type of Connection: Overhead and Large Hose Bib
Quantity Limitations per Trip: No Minimum
Maximum up to truck limit
Hours: 24 hrs/day, 7 days/wk*
Appointment Required: No
Quantity Limitations per Day: No Minimum
No Maximum
Truck Size Limits: None
Truck Weight Limits: None
Additional Access Information: *After business hours truck drivers must use special gate access code to enter the plant. The access code is valid only during hours specified in the permit.

Training

Required: Yes
Duration: 15 min
Who: Truck Owner and Driver
Frequency: Once
Schedule: By Appointment
Location: Recycled Water Plant
Length of time to become authorized truck hauler: 1 business day

Signage

Area Use Signage Required: No
Vehicle Signage Required: Yes
Signs Provided by Water Agency: N/A
Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: No
Inspection Location:
Duration:
Re-inspection Required:
How to schedule:

Fees

Water: Hydrant- check with DSRSD for current fee; Plant- $10/truck load
Training: No Charge
Permit: Hydrant- No permit fee; Treatment Plant- $73/year
Connection Device: Hydrant access- $1,000 deposit for construction meter; Treatment Plant- No connection device charge
Use Area Signage: N/A
Vehicle Signage: No Charge
Other:

EAST BAY MUNICIPAL UTILITY DISTRICT
510.287.1346
www.ebmud.com

Recycled Water Fill Facilities:
Treatment Plant: Yes
Distribution System: No
Can water be used outside of this agency's service area? Check with EBMUD

Hydrant Fill Facilities

Location: None
Number of Fill Facilities:
Connection Device:
Quality:
Truck Size Limits:
Quantity Limitations per Trip:
Truck Weight Limits:
Other Restrictions:
Additional Access Information:

Fill Facilities at Treatment Plant

Locations: 1) EBMUD Wastewater Treatment Plant, Oakland
2) North Richmond Water Recycling Plant, Richmond (*No recycled water available in 2015. All recycled water from this location has been allocated for 2015.)
Quality: Disinfected Tertiary
Type of Connection: Hydrant
Quantity Limitations per Trip: No Minimum
Maximum up to truck limit
Hours: 24 hrs/day, 7 days/wk
Appointment Required: Only for first visit
Quantity Limitations per Day: No Minimum
No Maximum
Truck Size Limits: None
Truck Weight Limits: None
Additional Access Information: 1) EBMUD Wastewater Treatment Plant - enter through the main security gate at the plant to obtain access to the fill hydrant. 2) North Richmond Plant - hydrant is located outside of the plant gate and is accessible with a hydrant key. For more information, visit www.ebmud.com, search "Recycled Water Truck

Training

Required: Yes
Duration: 15 minutes
Who: Truck Driver
Frequency: Once
Schedule: By Appointment
Location: Recycled Water Plant
Length of time to become authorized truck hauler: 5 business days

Signage

Area Use Signage Required: No
Vehicle Signage Required: Yes
Signs Provided by Water Agency: N/A
Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: Yes
Inspection Location: Recycled Water Plant
Duration: Less than 1 hour
Re-inspection Required: No
How to schedule: To be conducted at time of training

Fees

Water: No Charge
Training: No Charge
Connection Device: No Charge
Permit: No Charge
Vehicle Signage: No Charge
Use Area Signage: N/A
Other:

CITY OF LIVERMORE

925.960.8138

Recycled Water Fill Facilities:

Treatment Plant: No

Distribution System: Yes

Can water be used outside of this agency's service area? No

Hydrant Fill Facilities

Location: Call for address

Number of Fill Facilities: 10+

Connection Device: Construction meter and Hydrant Key

Quality: Disinfected Tertiary

Truck Size Limits: No limit

Quantity Limitations per Trip: No Minimum
Maximum up to truck limit

Truck Weight Limits: No limit

Other Restrictions:

Additional Access Information:

Fill Facilities at Treatment Plant

Location: None

Quality:

Type of Connection:

Quantity Limitations per Trip:

Hours:

Appointment Required:

Quantity Limitations per Day:

Truck Size Limits:

Truck Weight Limits:

Additional Access Information:

Training

Required: Yes

Duration: 2 hours or less

Who: Truck Driver

Frequency: Once

Schedule: At time of hydrant meter deposit

Location: Administration Building

Length of time to become authorized truck hauler: 1 business day

Signage

Area Use Signage Required: Yes

Vehicle Signage Required: Yes

Signs Provided by Water Agency: Yes

Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: No

Inspection Location:

Duration:

Re-inspection Required:

How to schedule:

Fees

Water: $2.50 per CCF

Training: No Charge

Connection Device: $1,000

Permit: No Charge

Vehicle Signage: Varies

Use Area Signage: No Charge

Other: Monthly service charge of $195.30

MARIN MUNICIPAL WATER DISTRICT

415.945.1557

Recycled Water Fill Facilities:
Treatment Plant: No
Distribution System: Yes
Can water be used outside of this agency's service area? No

Hydrant Fill Facilities

Location: Call for location
Number of Fill Facilities: 1
Connection Device: Hydrant meter
Quality: Tertiary
Truck Size Limits: No limit
Quantity Limitations per Trip: No Minimum
Maximum up to truck limit
Truck Weight Limits: No limit
Other Restrictions:
Additional Access Information:

Fill Facilities at Treatment Plant

Location: None
Quality:
Type of Connection:
Quantity Limitations per Trip:
Hours:
Appointment Required:
Quantity Limitations per Day:
Truck Size Limits:
Truck Weight Limits:
Additional Access Information:

Training

Required: Yes
Duration: 2 hours or less
Who: Truck Driver
Frequency: Once
Schedule: By Appointment
Location: Administration Building or Hydrant Fill Facility
Length of time to become authorized truck hauler: 1-6 business days

Signage

Area Use Signage Required: Yes
Vehicle Signage Required: Yes
Signs Provided by Water Agency: Yes
Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: Yes
Inspection Location: Administration Building
Duration: 1 hour or less
Re-inspection Required: Annually
How to schedule: Appointment

Fees

Water: Tier 1: 0-100 CCF @ $2.57 per CCF
Tier 2: 101-150 CCF @ $7.48 per CCF
Tier 3: over 150 CCF @ $14.97 per CCF
Training: No Charge
Connection Device: No Charge
Permit: No Charge
Vehicle Signage: No Charge
Use Area Signage: No Charge
Other:

CITY OF MILPITAS/SOUTH BAY WATER RECYCLING

408.586.3355

www.ci.milpitas.ca.gov

Recycled Water Fill Facilities:

Treatment Plant: No

Distribution System: Yes

Can water be used outside of this agency's service area? Check with City

Hydrant Fill Facilities

Location: Call for locations

Number of Fill Facilities: 5

Connection Device: Hydrant key and Construction meter

Quality: Disinfected Tertiary

Truck Size Limits: check with City

Quantity Limitations per Trip: No Minimum
Maximum up to truck limit

Truck Weight Limits: check with City

Other Restrictions: M-F: 7 a.m. to 7 p.m.

Additional Access Information: Secure access. Gate key to be provided at training.

Fill Facilities at Treatment Plant

Location: None

Quality:

Type of Connection:

Quantity Limitations per Trip:

Hours:

Appointment Required:

Quantity Limitations per Day:

Truck Size Limits:

Truck Weight Limits:

Additional Access Information:

Training

Required: Yes

Duration: 1 hour

Who: Truck Owner, Truck Driver, and Customer

Frequency: Once

Schedule: By Appointment and Semi-Annually

Location: Administration Building or Hydrant fill facility

Length of time to become authorized truck hauler: 2 business days

Signage

Area Use Signage Required: Yes

Vehicle Signage Required: Yes

Signs Provided by Water Agency: No

Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: Yes

Inspection Location: Administration Building or Hydrant fill facility

Duration: 1 hour or less

How to schedule: Appointment

Re-inspection Required: Annually

Fees

Water: $2.65 per CCF

Training: No Charge

Connection Device: $2,000

Permit: No Charge

Vehicle Signage: No charge

Use Area Signage: No charge

Other: Monthly fee of $75

NAPA SANITATION DISTRICT

707.258.6029

www.napasan.com

Recycled Water Fill Facilities:

Treatment Plant: Yes

Distribution System: No

Can water be used outside of this agency's service area? Yes

Hydrant Fill Facilities

Location: None

Number of Fill Facilities:

Connection Device:

Quality:

Truck Size Limits:

Quantity Limitations per Trip:

Truck Weight Limits:

Other Restrictions:

Additional Access Information:

Fill Facilities at Treatment Plant

Location: Soscol Water Recycling Facility, Napa CA (call for address)

Quality: Disinfected Tertiary

Type of Connection: Side

Quantity Limitations per Trip: No Minimum
Maximum up to truck limit

Hours: 7:30 a.m. - 4:30 p.m. Daily

Appointment Required: No

Quantity Limitations per Day: No Minimum
No Maximum

Truck Size Limits: None

Truck Weight Limits: None

Additional Access Information:

Training

Required: Yes

Duration: 2 hours or less

Who: Truck Owner, Truck Driver, and Customer

Frequency: Once, plus Annual Refresher

Schedule: By Appointment

Location: Recycled Water Plant

Length of time to become authorized truck hauler: 2 business days

Signage

Area Use Signage Required: Yes

Vehicle Signage Required: Yes

Signs Provided by Water Agency: Yes

Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: Yes

Inspection Location: Recycled Water Plant

Duration: 15 min

Re-inspection Required:

How to schedule: By Appointment

Fees

Water: $1.01 per 1,000 gal

Training: No Charge

Connection Device: No Charge

Permit: $50

Vehicle Signage: $6 per sticker and $10.50 per plastic sign

Use Area Signage: $6 per sticker and $10.50 per plastic sign

Other:

NORTH MARIN WATER DISTRICT

415.761.8912

www.nmwd.com

Recycled Water Fill Facilities:

Treatment Plant: No

Distribution System: Yes

Can water be used outside of this agency's service area? No

Hydrant Fill Facilities

Location: Novato, CA (Call for address)

Number of Fill Facilities: 10+

Connection Device: Hydrant key

Quality: Disinfected Tertiary

Truck Size Limits: No limit

Quantity Limitations per Trip: No Minimum
Maximum up to truck limit

Truck Weight Limits: No limit

Other Restrictions:

Additional Access Information: Obtain permit at District Office (999 Rush Creek Place, Novato)

Fill Facilities at Treatment Plant

Location: None

Quality:

Type of Connection:

Quantity Limitations per Trip:

Hours:

Appointment Required:

Quantity Limitations per Day:

Truck Size Limits:

Truck Weight Limits:

Additional Access Information:

Training

Required: Yes

Duration: 15 Min

Who: Truck Driver

Frequency: Once

Schedule: By appointment

Location: District Office

Length of time to become authorized truck hauler: 1 business day

Signage

Area Use Signage Required: No

Vehicle Signage Required: Yes

Signs Provided by Water Agency: N/A

Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: No

Inspection Location:

Duration:

Re-inspection Required:

How to schedule:

Fees

Water: $5.00 per load; no max.

Training: N/A

Connection Device: No Charge

Permit: No Charge

Vehicle Signage: No Charge

Use Area Signage: N/A

Other:

ORO LOMA SANITARY DISTRICT/EAST BAY DISCHARGERS AUTHORITY

510.276.4700

Recycled Water Fill Facilities:
Treatment Plant: Yes
Distribution System: No
Can water be used outside of this agency's service area? Yes

Hydrant Fill Facilities

Location: None
Number of Fill Facilities:
Connection Device:
Quality:
Truck Size Limits:
Quantity Limitations per Trip:
Truck Weight Limits:
Other Restrictions:
Additional Access Information:

Fill Facilities at Treatment Plant

Location: Oro Loma Treatment Facility, San Lorenzo CA (call for address)
Quality: Disinfected Secondary-2.2
Type of Connection: Overhead
Quantity Limitations per Trip: No Minimum
Maximum up to truck limit
Hours: M-F: 6 a.m. - 5 p.m.
Appointment Required: No
Quantity Limitations per Day: No Minimum
No Maximum
Truck Size Limits: None
Truck Weight Limits: None
Additional Access Information:

Training

Required: Yes
Duration: 15 min
Who: Truck Driver
Frequency: Once
Schedule: By Appointment
Location: Recycled Water Plant
Length of time to become authorized truck hauler: 1 business day

Signage

Area Use Signage Required: No
Vehicle Signage Required: No
Signs Provided by Water Agency: N/A
Signs Provided by Water Agency: N/A

Vehicle Inspection

Required: No
Inspection Location:
Duration:
Re-inspection Required:
How to schedule:

Fees

Water: No Charge
Training: No Charge
Connection Device: No Charge
Permit: No Charge
Vehicle Signage: N/A
Use Area Signage: N/A
Other:

CITY OF PALO ALTO

650.329.2598

Recycled Water Fill Facilities:

Treatment Plant: Yes

Distribution System: Yes

Can water be used outside of this agency's service area? Yes

Hydrant Fill Facilities

Location: Greer Park (on Colorado Ave at the intersection of West Bayshore Road)

Number of Fill Facilities: 1

Connection Device: Hose

Quality: Disinfected Tertiary

Truck Size Limits: None

Quantity Limitations per Trip: None

Truck Weight Limits: None

Other Restrictions: Permit required to access

Additional Access Information: Accessible 24 hours a day, seven days a week.

Fill Facilities at Treatment Plant

Location: Palo Alto Regional Water Quality Control Plant
2501 Embarcadero Way, Palo Alto, CA 94303

Quality: Disinfected Tertiary

Type of Connection: Overhead and Side

Quantity Limitations per Trip: No Minimum
Maximum up to truck limit

Hours: Mon-Fri 5:30 a.m. - 5:30 p.m.*

Appointment Required: No

Quantity Limitations per Day: No Minimum
No Maximum

Truck Size Limits: None

Truck Weight Limits: None

Additional Access Information: * Extended hours during drought emergency. Normal hours are Monday to Friday 6:30 a.m. to 5:00 p.m.

Training

Required: Yes

Duration: 30 minutes or less

Who: Truck Driver

Frequency: Once

Schedule: By Appointment

Location: Recycled Water Plant

Length of time to become authorized truck hauler: 1 business day, typically

Signage

Area Use Signage Required: Yes

Vehicle Signage Required: Yes

Signs Provided by Water Agency: No

Signs Provided by Water Agency: Yes for vehicles

Vehicle Inspection

Required: No

Inspection Location:

Duration:

Re-inspection Required:

How to schedule:

Fees

Water: No Charge

Training: No Charge

Connection Device: No Charge

Permit: $50 per 3 years

Vehicle Signage: User provides

Use Area Signage: User provides

Other:

CITY OF PETALUMA

707.776.3726

Recycled Water Fill Facilities:

Treatment Plant: Yes

Distribution System: Yes

Can water be used outside of this agency's service area? Yes

Hydrant Fill Facilities

Location: Petaluma, CA (call for information)

Number of Fill Facilities: 3

Connection Device: Hydrant Meter

Quality: Disinfected Tertiary

Truck Size Limits: None

Quantity Limitations per Trip: None

Truck Weight Limits: None

Other Restrictions: Hydrant meter fees noted below

Additional Access Information: Contact Pat Dirrane, 707-778-4561

Fill Facilities at Treatment Plant

Location: Ellis Creek Water Recycling Facility (call for address)

Quality: Disinfected Tertiary

Type of Connection: Overhead

Quantity Limitations per Trip: No Minimum
Maximum up to truck limit

Hours: Mon-Fri 7 a.m. - 4:30 p.m.

Appointment Required: No

Quantity Limitations per Day: No Minimum
No Maximum

Truck Size Limits: None

Truck Weight Limits: None

Additional Access Information: Check in at office each trip, keep "purple card" in truck at all times

Training

Required: Yes

Duration: 2 hours or less

Who: Truck Driver and
Customer using water

Frequency: Once

Location: Recycled Water Plant

Schedule: By Appointment

Additional Permit Requirement: City inspects all recycled water use sites, and performs cross connection checks. City issues permit to recycled water user. Recycled water user must contact City to initiate water hauling. Time to issue permit varies.

Length of time to become authorized truck hauler: Varies. Contact City.

Signage

Area Use Signage Required: Yes

Vehicle Signage Required: Yes

Signs Provided by Water Agency: Yes

Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: No

Inspection Location:

Duration:

Re-inspection Required:

How to schedule:

Fees

Water: $1.88 per CCF

Training: No Charge

Connection Device: Hydrant- $1000 deposit for meter plus $45 meter setting fee.
Treatment Plant - No connection device charge

Permit: No Charge

Vehicle Signage: No Charge

Use Area Signage: No Charge

Other:

CITY OF REDWOOD CITY

650.780.7470

Recycled Water Fill Facilities:

Treatment Plant: No

Distribution System: Yes

Can water be used outside of this agency's service area? Yes

Hydrant Fill Facilities

Location: Redwood City, CA (call for location)

Number of Fill Facilities: 5

Connection Device: Construction Meter

Quality: Disinfected Tertiary

Truck Size Limits: No limit

Quantity Limitations per Trip: No Minimum
Maximum up to truck limit

Truck Weight Limits: No limit

Other Restrictions:

Additional Access Information:

Fill Facilities at Treatment Plant

Location:

Quality:

Type of Connection:

Quantity Limitations per Trip:

Hours:

Appointment Required:

Quantity Limitations per Day:

Truck Size Limits:

Truck Weight Limits:

Additional Access Information:

Training

Required: Yes

Duration: 2 hours or less

Who: Truck Owner, Truck Driver, and Customer using water

Frequency: Once

Location: Administration Building

Schedule: By Appointment

Length of time to become authorized truck hauler: 5 business days

Signage

Area Use Signage Required: Yes

Vehicle Signage Required: Yes

Signs Provided by Water Agency: Yes

Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: No

Inspection Location:

Duration:

Re-inspection Required:

How to schedule:

Fees

Water: 0-15 CCF @ $4.42 per CCF; 16+CCF @ $7.22 per CCF

Training: No Charge

Connection Device: $ 392.04 per month

Permit: No Charge

Vehicle Signage: No Charge

Use Area Signage: No Charge

Other:

CITY AND COUNTY OF SAN FRANCISCO/SAN FRANCISCO PUBLIC UTILITIES COMMISSION

415.695.7378

Recycled Water Fill Facilities:

Treatment Plant: Yes
Distribution System: No
Can water be used outside of this agency's service area? No

Hydrant Fill Facilities

Location: None
Number of Fill Facilities:
Connection Device:
Quality:
Truck Size Limits:
Quantity Limitations per Trip:
Truck Weight Limits:
Other Restrictions:
Additional Access Information:

Fill Facilities at Treatment Plant

Location: South East Treatment Plant
750 Phelps Street, San Francisco
Quality: Disinfected Secondary-23
Type of Connection: Overhead and Side
Quantity Limitations per Trip: No Minimum
Maximum up to truck limit
Hours: 24 hrs/day, 7 days/week
Appointment Required:
Quantity Limitations per Day: No Minimum
No Maximum
Truck Size Limits: None
Truck Weight Limits: None
Additional Access Information: Access code and PIN provided at permit issuance

Training

Required: Yes
Duration: 2 hours or less
Who: Truck Driver
Frequency: Once
Schedule: By Appointment
Location: Treatment Plant
Length of time to become authorized truck hauler: 3 business days

Signage

Area Use Signage Required: Yes
Vehicle Signage Required: Yes
Signs Provided by Water: No
Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: Yes
Inspection Location: Truck Fill Facility
Duration: 1 hour or less
Re-inspection Required: Not required
How to schedule: Appointment

Fees

Water: No Charge
Training: No Charge
Connection Device: No Charge
Permit: No Charge
Vehicle Signage: No Charge
Use Area Signage: N/A
Other:

SAN FRANCISCO INTERNATIONAL AIRPORT

650.821.8380

Recycled Water Fill Facilities:

Treatment Plant: Yes

Distribution System: No

Can water be used outside of this agency's service area? No

Hydrant Fill Facilities

Location: None

Number of Fill Facilities:

Connection Device:

Quality:

Truck Size Limits:

Quantity Limitations per Trip:

Truck Weight Limits:

Other Restrictions:

Additional Access Information:

Fill Facilities at Treatment Plant

Location: Mel Leong Treatment Plant, San Francisco International Airport

Quality: Disinfected Secondary-23

Type of Connection: Hydrant

Quantity Limitations per Trip: No Minimum
Maximum up to truck limit

Hours: 24 hrs/day, 7 days/wk

Appointment Required: No

Quantity Limitations per Day: No Minimum
No Maximum

Truck Size Limits: None

Truck Weight Limits: None

Additional Access Information:

Training

Required: Yes

Duration: 2 hours or less

Who: Truck Driver

Frequency: Once

Schedule: By Appointment

Location: Treatment Plant

Length of time to become authorized truck hauler: 5 business days

Signage

Area Use Signage Required: No

Vehicle Signage Required: Yes

Signs Provided by Water Agency: N/A

Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: Yes

Inspection Location: Recycled Water Plant

Duration: 1 hour or less

Re-inspection Required: One random audit per year

How to schedule: Appointment

Fees

Water: No Charge

Training: No Charge

Connection Device: No Charge

Permit: No Charge

Vehicle Signage: No Charge

Use Area Signage: N/A

Other:

CITY OF SAN JOSE/SOUTH BAY WATER RECYCLING

408.277.3671

Recycled Water Fill Facilities:

Treatment Plant: Yes
Distribution System: Yes
Can water be used outside of this agency's service area? No

Hydrant Fill Facilities

Location: Maps provided at driver and truck certification
Number of Fill Facilities: 7
Connection Device: Hydrant Key and Construction Meter
Quality: Disinfected Tertiary
Truck Size Limits: TBD during inspection
Quantity Limitations per Trip: No Minimum
Maximum up to truck limit
Truck Weight Limits: TBD during inspection
Other Restrictions: Commercial users only - must show proof of commercial liability insurance
Additional Access Information: Locked hydrants. Hydrant keys provided by City at time of meter pick up.

Fill Facility - Hydrant at Treatment Plant

Location: San Jose/Santa Clara Regional Wastewater Facility (RWF)
700 Los Esteros Rd., San Jose
Quality: Disinfected Tertiary
Type of Connection: Hydrant
Quantity Limitations per Trip: No Minimum
Maximum up to truck limit
Hours: Mon-Fri 7 a.m. - 4 p.m.
Appointment Required: No
Quantity Limitations per Day: No Minimum
No Maximum
Truck Size Limits: None
Truck Weight Limits: None
Additional Access Information: Secured access. Gates open during operating hours. Hydrant keys provided by City.

Training

Required: Yes
Duration: 2 hours or less
Who: Truck Owner, Truck Driver, and Customer using water
Frequency: Once
Location: Access point at RWF 700 Los Esteros Rd., San Jose
Schedule: Wednesday mornings at 9am
Length of time to become authorized truck hauler: 1 business day

Signage

Area Use Signage Required: Yes
Vehicle Signage Required: Yes
Signs Provided by Water Agency: Yes
Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: Yes
Inspection Location: RWF
Duration: 1 hour or less
Re-inspection Required: Annually
How to schedule: Wednesday mornings at 9am

Fees

Water: Check with City
Training: No charge
Connection Device: Check with City
Permit: No charge
Vehicle Signage: No charge
Use Area Signage: No charge
Other: Check with City

CITY OF SANTA ROSA

707.543.3938

Recycled Water Fill Facilities:

Treatment Plant: Yes
Distribution System: No
Can water be used outside of this agency's service area? Yes

Hydrant Fill Facilities

Location: Utilities Field Operations-35 Stony Point Road, Santa Rosa
Number of Fill Facilities: 1
Connection Device: Hydrant
Quality: Disinfected Tertiary
Truck Size Limits: None
Quantity Limitations per Trip: Maximum up to truck limit
Truck Weight Limits: None
Other Restrictions: Due to limited available recycled water supply, truck fill use is restricted to dust control only.
Additional Access Information: Must get an access key from Santa Rosa Water

Fill Facilities at Treatment Plant

Location: Santa Rosa Subregional Water Reuse Plant
Quality: Disinfected Tertiary
Type of Connection: Hydrant
Quantity Limitations per Trip: No Minimum
Maximum up to truck limit
Hours: Mon-Fri 8 a.m. - 5:30 p.m.
Appointment Required: No
Quantity Limitations per Day: No Minimum
No Maximum
Truck Size Limits: None
Truck Weight Limits: None
Additional Access Information: Must get an access key from Santa Rosa Water
Other Restrictions: Due to limited available recycled water supply, truck fill use is restricted to dust control only.

Training

Required: No
Duration:
Who:
Frequency:
Schedule:
Location:
Length of time to become authorized truck hauler: 1 business day

Signage

Area Use Signage Required: No
Vehicle Signage Required: Yes
Signs Provided by Water Agency: N/A
Signs Provided by Water Agency: No

Vehicle Inspection

Required: No
Inspection Location:
Duration:
Re-inspection Required:
How to schedule:

Fees

Water: $5.09 per 1,000 gal
Training: No Charge
Connection Device: No Charge
Permit: $15.00 per year
Vehicle Signage: N/A
Use Area Signage: No Charge
Other:

SONOMA COUNTY WATER AGENCY

707.521.1865

www.scwa.ca.gov

Recycled Water Fill Facilities:

Treatment Plant: Yes

Distribution System: No

Can water be used outside of this agency's service area? Yes

Hydrant Fill Facilities

Location: None

Number of Fill Facilities:

Connection Device:

Quality:

Truck Size Limits:

Quantity Limitations per Trip:

Truck Weight Limits:

Other Restrictions:

Additional Access Information:

Fill Facilities at Treatment Plant

Locations: Sonoma Valley County Sanitation District, Sonoma CA (call for address)

Quality: Disinfected Tertiary

Type of Connection: Side

Quantity Limitations per Trip: No Minimum
Maximum up to truck limit

Hours: Mon-Fri 8 a.m. - 4 p.m.; with permission could be 24/7

Quantity Limitations per Day: No Minimum
No Maximum

Appointment Required: No

Truck Size Limits: None

Truck Weight Limits: None

Additional Access Information: Contact treatment plant for site access outside of business hours

Training

Required: Yes

Duration: 2 hours or less

Who: Truck Driver

Frequency: With each new application

Schedule: By Appointment

Location: Recycled Water Plant

Length of time to become authorized truck hauler: 5 business days

Signage

Area Use Signage Required: No

Vehicle Signage Required: Yes

Signs Provided by Water Agency: N/A

Signs Provided by Water Agency: Yes

Vehicle Inspection

Required: Yes

Inspection Location: Recycled Water Plant

Duration: 1 hour or less

Re-inspection Required: With each new application

How to schedule: Appointment

Fees

Water: $5.00 per 1,000 gal

Training: No Charge

Connection Device: $100 deposit

Permit: $300

Vehicle Signage: First set free

Use Area Signage: N/A

Other:

CITY OF SUNNYVALE

408.760.7560

Recycled Water Fill Facilities:

Treatment Plant: Yes

Distribution System: No

Can water be used outside of this agency's service area? No

Hydrant Fill Facilities

Location: None

Number of Fill Facilities:

Connection Device:

Quality:

Truck Size Limits:

Quantity Limitations per Trip:

Truck Weight Limits:

Other Restrictions:

Additional Access Information:

Fill Facilities at Treatment Plant

Location: Sunnyvale Water Pollution Control Plant (call for address)

Quality: Disinfected Tertiary

Type of Connection: Hydrant

Quantity Limitations per Trip: No Minimum
Maximum up to truck limit

Hours: Mon-Fri 7 a.m. - 4 p.m.

Appointment Required: No

Quantity Limitations per Day: No Minimum
No Maximum

Truck Size Limits: None

Truck Weight Limits: None

Additional Access Information: Required to check in and check out.

Training

Required: Yes

Duration: 2 hours or less

Who: Truck Owner, Truck Driver, and Customer using water

Frequency: Annually

Schedule: By Appointment

Location: Agency Corp Yard

Length of time to become authorized truck hauler: 30 business days

Signage

Area Use Signage Required: Yes

Vehicle Signage Required: Yes

Signs Provided by Water Agency: No

Signs Provided by Water Agency: No

Vehicle Inspection

Required: Yes

Inspection Location: Corp Yard

Duration: 1 hour or less

Re-inspection Required: Annually

How to schedule: Appointment

Fees

Water: $5.23 per CCF

Training: No Charge

Connection Device: No Charge

Permit: $125 annually

Vehicle Signage: User provides

Use Area Signage: User provides

Other:

TOWN OF YOUNTVILLE

707.944.2988

townofyounvtille.com

Recycled Water Fill Facilities:

Treatment Plant: Yes

Distribution System: No

Can water be used outside of this agency's service area? No, not without authorization

Hydrant Fill Facilities

Location: None

Number of Fill Facilities:

Connection Device:

Quality:

Truck Size Limits:

Quantity Limitations per Trip:

Truck Weight Limits:

Other Restrictions:

Additional Access Information:

Fill Facilities at Treatment Plant

Location: Town of Yountville Wastewater Reclamation Facility
7501 Solano Avenue, Yountville, CA 94599

Quality: Disinfected Tertiary and Disinfected Secondary-2.2

Type of Connection: Hydrant and Side

Quantity Limitations per Trip: No Minimum
Maximum 5,000 gal

Hours: Mon-Fri 8 a.m. - 3:30 p.m.

Appointment Required: Yes, for initial fill-up and training

Quantity Limitations per Day: No Minimum
Maximum 25,000 gal per day

Truck Size Limits: None

Truck Weight Limits: None

Additional Access Information:

Training

Required: Yes

Duration: 2 hours or less

Who: Truck Owner, Truck Driver, and Customer using water

Frequency: Annually

Location: Wastewater Reclamation Facility

Schedule: By Appointment

Length of time to become authorized truck hauler: 3 business days

Signage

Area Use Signage Required: Yes

Vehicle Signage Required: No

Signs Provided by Water Agency: No

Signs Provided by Water Agency: N/A

Vehicle Inspection

Required: No

Inspection Location:

Duration:

Re-inspection Required:

How to schedule:

Fees

Water: $1,041.60 for first 100,000 gal

Training: No Charge

Connection Device: No Charge

Permit: $350

Vehicle Signage: N/A

Use Area Signage: User provides

Other:

SECTION 2

Additional Commercial Truck Fill Facilities Anticipated in 2015

Commercial Fill Facilities Planned to be Operational in 2015

COUNTY/CITY	AGENCY
SAN MATEO COUNTY	
Pacifica	North Coast County Water District (contact for availability) Contact: www.nccwd.com
MARIN COUNTY	
San Rafael	Marin Municipal Water District (anticipated Jul/Aug 2015) Contact: (415) 945-1557
SONOMA COUNTY	
Windsor	Town of Windsor (anticipated late 2015) Contact: (707) 838-5343

SECTION 3

Potential Future Commercial Truck Fill Facilities

Agencies That May Consider Commerical Fill Facilities in the Future

At the time this Guide was prepared, the agencies below indicated they may consider development of commercial fill facilities, in particular if the drought continues.

COUNTY/CITY	AGENCY
ALAMEDA COUNTY	
Piedmont	City of Piedmont
Union City	Union Sanitary District
CONTRA COSTA COUNTY	
Antioch	Delta Diablo Sanitation District (in planning phase)
Brentwood	City of Brentwood
MARIN COUNTY	
San Rafael	Ross Valley Sanitary District
SAN FRANCISCO	
South San Francisco	South San Francisco
SAN MATEO COUNTY	
Menlo Park	West Bay Sanitary District (in planning phase)
San Mateo	City of San Mateo
SOLANO COUNTY	
Benicia	City of Benicia
SONOMA COUNTY	
Guerneville	Sonoma County Water Agency

SECTION 4

Existing and Planned Residential Fill Facilities

Existing Residential Fill Facilities

COUNTY/CITY	AGENCY
ALAMEDA COUNTY	
Dublin	Dublin San Ramon Services District
Livermore	City of Livermore
CONTRA COSTA COUNTY	
Concord	Central Contra Costa Sanitary District
SAN MATEO COUNTY	
Palo Alto	City of Palo Alto (Residents may obtain a residential use permit from the City and contract with a City-authorized commercial water hauler to deliver recycled water. The City does not have a residential truck fill station.)
Redwood City	City of Redwood City

Planned Residential Fill Facilities

COUNTY/CITY	AGENCY
ALAMEDA COUNTY	
Oakland	East Bay Municipal Utility District (anticipated July 2015)
MARIN COUNTY	
Novato	North Marin Water District (anticipated July 2015)
San Rafael	Marin Municipal Water District (anticipated Fall 2015)

SECTION 5

Recycled Water Uses Allowed in California

Recycled Water Uses Allowed[1] in California

Use of Recycled Water	Treatment Level			
	Disinfected Tertiary Recycled Water	Disinfected Secondary – 2.2 Recycled Water	Disinfected Secondary – 23 Recycled Water	Undisinfected Secondary Recycled Water
Irrigation of:				
Food crops where recycled water contacts the edible portion of the crop, including all root crops	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Parks and playgrounds	**Allowed**	Not Allowed	Not Allowed	Not Allowed
School yards	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Residential landscaping	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Unrestricted-access golf courses	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Any other irrigation uses not prohibited by other provisions of the California Code of Regulations	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Food crops, surface-irrigated, above-ground edible portion, and not contacted by recycled water	**Allowed**	**Allowed**	Not Allowed	Not Allowed
Cemeteries	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Freeway landscaping	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Restricted-access golf courses	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Ornamental nursery stock and sod farms with unrestricted public access	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Pasture for milk animals for human consumption	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Non-edible vegetation with access control to prevent use as a park, playground or school yard	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Orchards with no contact between edible portion and recycled water	**Allowed**	**Allowed**	Not Allowed[2]	Not Allowed[2]
Vineyards with no contact between edible portion and recycled water	**Allowed**	**Allowed**	Not Allowed[2]	Not Allowed[2]
Non food-bearing trees, including Christmas trees not irrigated less than 14 days before harvest	**Allowed**	**Allowed**	**Allowed**	**Allowed**
Fodder and fiber crops and pasture for animals not producing milk for human consumption	**Allowed**	**Allowed**	**Allowed**	**Allowed**
Seed crops not eaten by humans	**Allowed**	**Allowed**	**Allowed**	**Allowed**
Food crops undergoing commercial pathogen-destroying processing before consumption by humans	**Allowed**	**Allowed**	**Allowed**	**Allowed**
Ornamental nursery stock, sod farms not irrigated less than 14 day before harvest	**Allowed**	**Allowed**	**Allowed**	**Allowed**
Supply for impoundment:				
Non-restricted recreational impoundments, with supplemental monitoring for pathogenic organisms	**Allowed[3]**	Not Allowed	Not Allowed	Not Allowed
Restricted recreational impoundments and publicly-accessible fish hatcheries	**Allowed**	**Allowed**	Not Allowed	Not Allowed
Landscape impoundments without decorative fountains	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Supply for cooling or air conditioning:				
Industrial or commercial cooling or air conditioning involving cooling tower, evaporative condenser, or spraying that creates a mist	**Allowed[4]**	Not Allowed	Not Allowed	Not Allowed
Industrial or commercial cooling or air conditioning not involving cooling tower, evaporative condenser, or spraying that creates a mist	**Allowed**	**Allowed**	**Allowed**	Not Allowed

Recycled Water Uses Allowed[1] in California
(continued)

Use of Recycled Water	Treatment Level			
	Disinfected Tertiary Recycled Water	Disinfected Secondary – 2.2 Recycled Water	Disinfected Secondary – 23 Recycled Water	Undisinfected Secondary Recycled Water
Other uses:				
Groundwater recharge	**Allowed** under special case-by-case permits by RWQCBs[5]			
Flushing toilets and urinals	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Priming drain traps	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Industrial process water that may contact workers	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Structural fire fighting	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Decorative fountains	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Commercial laundries	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Consolidation of backfill material around potable water pipelines	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Artificial snow making for commercial outdoor uses	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Commercial car washes, not heating the water, excluding the general public from washing process	**Allowed**	Not Allowed	Not Allowed	Not Allowed
Industrial process water that will not come into contact with workers	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Industrial boiler feedwater	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Non-structural fire fighting	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Backfill consolidation around non-potable piping	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Soil compaction	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Mixing concrete	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Dust control on roads and streets	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Cleaning roads, sidewalks, and outdoor work areas	**Allowed**	**Allowed**	**Allowed**	Not Allowed
Flushing sanitary sewers	**Allowed**	**Allowed**	**Allowed**	**Allowed**

This summary is prepared from the December 2, 2000-adopted Title 22 Water Recycling Criteria and supersedes all earlier versions. Prepared by Bahman Sheikh and edited by EBMUD Office of Water Recycling, who acknowledge this is a summary and not the formal version of the regulations referenced above.

[1] Refer to the full text of the December 2, 2000 version of Title 22: California Code of Regulations, Chapter 3 Water Recycling Criteria. This chart is only an informal summary of the uses allowed in this version, with the exception of orchards and vineyards noted as "Not Allowed[2]" on page 1 and explained below.

[2] Per California Department of Public Health letter of January 8, 2003 to California Regional Water Quality Control Boards.

[3] Allowed with "conventional tertiary treatment." Additional monitoring for two years or more is necessary with direct filtration.

[4] Drift eliminators and/or biocides are required if public or employees can be exposed to mist.

[5] Refer to Groundwater Recharge Guidelines, available from the California Department of Public Health.

2013

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Serious drought
Help Save Water!

To: MR. DOUGLAS DUNRUD
Branch Chief
Bridge Design Branch 14
Office of Bridge Design South

Date: June 19, 2015

Attention: John Lane

File: 04-SON-116 (PM 10.4/10.5)
EA 04-0G6410
E-FIS 0413000340
Russian River Viaducts

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

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

CHRIS RISDEN
Chief, Branch B
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

Subject: **FOUNDATION REPORT FOR RUSSIAN RIVER VIADUCTS SEISMIC RESTORATION**

This Foundation Report (FR) is in response to your recent request for final foundation recommendations for seismic restoration of the existing Russian River Viaducts (Bridge Numbers 20-0071 and 20-0072). These viaducts are located on Route 116, one mile southwest of City of Guerneville in Sonoma County (see vicinity map, Figure 1).

1. PROJECT DESCRIPTION

The existing Russian River Viaducts were built in 1940 and widened in 1941. Viaduct 20-0071 is a 253-foot-long, 14-span reinforced concrete structure, and Viaduct 20-0072 is a 252-foot-long, 13-span reinforced concrete structure. The distance between the two viaducts is approximately 150 feet.

The original project scope based on Advanced Planning Study was to retrofit the viaducts by constructing a grade beam on top of a series of 4-foot diameter CIDH piles on the westbound edge of the existing structure; the grade beam would then be tied to the existing structures to seismically strengthen them. However, in the PA&ED phase, Structures Design reanalyzed and determined that the structures had adequate strength, but did not have enough displacement capability at the expansion joint / hinge seats. The proposed new scope of work is to add 3 seat

extensions on each viaduct at the expansion joint / hinge to prevent this failure. The CIDH piles and grade beam were all eliminated. Thus, the new scope significantly reduces retrofit work and associated cost.

In addition, a bridge rehab project under EA 04-0J610K proposed to do minor repair work on one column at Bent 9 of Viaduct 20-0071. It was decided by Project Management to transfer that repair work into the current project scope.

2. EXCEPTION TO POLICY

There is no known exception to Department policy relating to the investigation of the structure.

3. SITE GEOLOGY AND SUBSURFACE CONDITIONS

3.1 Climate

The climate in the Guerneville area is characterized as Mediterranean, with warm, dry summers and cool, moist winters. The warmest month of the year is July with an average maximum temperature of 83 degrees Fahrenheit, while the coldest month of the year is January with an average minimum temperature of 36 degrees Fahrenheit. Temperature variations between the highs and lows tend to be relatively big during summer with a difference that can reach 25 degrees Fahrenheit, and moderate during winter with an average difference of 12 degrees Fahrenheit.

The annual average precipitation in Guerneville is 55 inches. Winter months tend to be wetter than summer months. The number of days with measureable precipitation is 70.

3.2 Topography and Drainage

The project is located on the west bank of the Russian River, within the Russian River Valley Watershed. According to the USGS topographic map for the area, the elevation within the project limits ranges from approximately 85 feet above mean sea level. Drainage at the site is generally characterized as uncontrolled sheet flow to the east into the Russian River.

3.3 Regional Geologic Overview

The project is located in the Coast Range Geomorphic Province of Central California, a series of northwest-trending mountain ranges (2,000 to 4,000, occasionally 6,000 feet elevation above sea level), and intermountain valleys, bounded in the east by the Great Valley and to the west by the Pacific Ocean. The Coast Ranges are composed of thick Mesozoic and Cenozoic sedimentary

strata. The northern and southern ranges are separated by a depression containing the San Francisco Bay. The Coast Ranges are subparallel to the active San Andreas Fault, which is more than 600 miles long, extending from Pt. Arena to the Gulf of California.

3.4 Site Geology

The site is situated on an east-facing cut bank created by the Russian River. Jurassic/Cretaceous Franciscan rocks overlain by Tertiary alluvial strata dominate the geology of the area (Wentworth and others, 1997). Franciscan rocks within the area consist of intensely sheared sandstones, graywacke, and siltstones containing knockers of various metamorphic rocks. Tertiary strata consist of alluvium, landslide, and river terrace deposits. The site of the viaducts consists of graywacke-type sandstones with bedding obscured by shearing and heavy vegetation. Slides are common in the area due to the combination of sheared, unstable rock and heavy annual precipitation. See Figure 2, geology map.

3.5 Soils

According to the Soil Map of Sonoma County, the project is underlain by Hugoe very gravelly loam (HkG). The Hugo Series Soils are described as well-drained very gravelly loams that have a gravelly sandy clay loam subsoil (USDA 1972). At a depth of 30 to 60 inches the soils are underlain by weathered fine-grained sandstone and shale. The soils are on mountainous uplands and are extensive in the northern half of the county. See Figure 3, soil map.

3.6 Subsurface Conditions

There are no existing LOTBs regarding subsurface soil conditions at the viaducts. However, geotechnical investigation was conducted in 1979-1980 for remediation of a slide on the westbound (hill) side between the two viaducts, which included twelve shallow borings drilled in the slide area. Based on these LOTBs, the site has a top layer of soil with thickness varying from 2 to 10 feet. The soil includes primarily silt and sand, with the presence of gravel, boulder, and clay as well. The soil layer is underlain by weathered, fractured sandstone and gray sandy shale.

3.7 Groundwater

Groundwater was not observed on the slope at the time of our visits. During the drilling in February 1980, groundwater level was measured between elevations 38.3 and 34.7 feet. The elevation of the roadway surface is approximately 52 feet. The depth to groundwater will vary across the site as topography, geologic and hydrologic conditions change. The depth to groundwater is generally greatest in summer months and shallowest in winter months. For design purposes, groundwater can be considered at river levels.

4. SEISMICITY AND GEOLOGICAL HAZARDS

4.1 Seismicity

Geologists and seismologists recognize the San Francisco Bay Area as one of the most active seismic regions in the United States. There are three major faults that trend in a northwest direction through the Bay Area, which have generated about 12 earthquakes per century large enough to cause significant structural damage. These earthquakes occur on faults that are part of the San Andreas Fault system that extends for at least 700 miles along the California Coast, and includes the San Andreas, Hayward, and Calaveras Faults. The San Andreas Fault is located approximately 7.8 miles southwest southern portion of the project limits. The Maacama Fault is located approximately 16.9 miles northeast of the project limits. Additionally, the Rodgers Creek Fault is mapped 13.3 miles northeast of the northern portion of the project limits.

Seismologic and geologic experts convened by the U. S. Geological Survey concluded that there is a 62 percent probability for at least one "large" earthquake of magnitude 6.7 or greater in the Bay Area before 2032. They also maintain that there could be more than one earthquake of this magnitude and that numerous "moderate" earthquakes of about magnitude 6 are probable before 2032. The San Andreas Fault is estimated to have a 21 percent probability of producing a magnitude 6.7 or larger earthquake by the Year 2032 (WGCEP, 2003).

4.2 Geologic Hazards

The site may be affected by activity along any of the active faults discussed above. Earthquake induced hazards can be categorized as primary and secondary seismic effects.

Primary seismic effects such as ground rupture or surface deformation resulting from differential movement along a fault trace are not expected to occur on the site since there are no active faults mapped within the project limits.

Secondary seismic effects result from various soil responses to ground acceleration. These effects result from activity of any nearby active faults:

- Ground Shaking - As noted in the Seismicity section above, moderate to large earthquakes are probable along several active faults in the greater Bay Area. Therefore, strong ground shaking should be expected at some time during the design life of the proposed development. The improvements should be designed in accordance with current earthquake resistant standards.

- Liquefaction of Natural Ground – Liquefaction is a process by which soil deposits below the water table temporarily lose strength and behave as a viscous liquid rather than a solid, typically during a moderate to large earthquake. In general, very loose to medium dense, clean fine- to medium-grained sand and very soft to firm, low plasticity silts that are relatively free of clay are most susceptible to liquefaction. Earthquake-induced ground shaking can cause these loose or soft materials to densify, resulting in increased pore water pressures and an upward movement of groundwater that may result in a liquefied condition. Depending on the weight of the structure, the depth to the liquefied stratum, and the nature of the overlying soils, structures situated above such temporarily liquefied soils may sink or tilt, causing significant structural damage.

  According to the Liquefaction Susceptibility Map, liquefaction susceptibility within the project site is very low (see Figure 4, Liquefaction Susceptibility Map).

- Cracking – Lurch cracks may develop in the silty and clayey soil overlying the site. The potential for lurch cracking will be higher in the rainy periods when the soil is saturated. The hazard from cracking is considered minimal.

- Differential Compaction – During moderate and large earthquakes, soft or loose, natural or fill soils can become densified and consolidate, often unevenly across a site. Since the proposed structures will be supported on relatively deep foundations, the potential for differential compaction to affect new structures proposed in this project is considered low.

Other geological hazards considered include:

- Shrink Swell – Soil expansion and/or contraction can cause foundations to shift and roadways to crack. Since the site is locally underlain loam and bedrock, there is a low shrink swell potential.

- Erosion – According to the Soil Survey, Sonoma County (US Department of Agriculture, 1972), the erosion hazard of the soils within the project area is low. Where bedrock is exposed, there is no hazard of erosion.

- Slope Stability - There are multiple landslides mapped in the vicinity of the project area. More details can be found in our Structure Preliminary Geotechnical Report addressed to Mr. Minh Ha and Mr. Peter Soin on September 13, 2010. However, these slides do not seem to have direct impact on the viaduct structures.

5. SCOUR EVALUATION

No scour information is available. Field visits did not reveal any sign of scour at all bridge bents.

6. CORROSION EVALUATION

No site-specific corrosion information is available at this time.

7. SEISMIC RECOMMENDATIONS

Please refer to the Memo from Hossain Salimi of our office to Bridge Design West, dated September 25, 2013, for seismic design recommendations (attached). Note that the Memo was prepared for EA 04-0J610K but is applicable to this project as well.

Structure Design consulted with us on the liquefaction potential of the site, which is an important factor in determining seismic performance and retrofit strategy of the structures. Although there is no subsurface information directly under the viaducts, based on the geology map (Figure 3) and the liquefaction susceptibility map of the surrounding area (Figure 4), we determined that the liquefaction potential of the site is very low, and the effect of liquefaction on the structures (if any) will be very limited.

8. AS-BUILT FOUNDATION DATA

Both Viaducts are situated on hillside with a slope of 1.5H:1V. Both Viaducts are founded on steel 10x42 H piles with maximum design load of 32 tons (nominal bearing 64 tons). The piles were enhanced with reinforced concrete at ground surface level to increase shear/bending capacity. The pile length for Bents 1 to 8 of Viaduct 20-0071 varies from 35 to 60 feet. There is no information regarding pile length for the remainder of Viaduct 20-0071 or for Viaduct 20-0072.

9. FOUNDATION RECOMMENDATIONS

Since the existing structures have adequate strength and the existing pile foundations are in good condition, no foundation work is recommended except that minor repair work needs to be done on one column at Bent 9 of Viaduct 20-0071 (as mentioned in the Project Description above).

10. DISCLAIMER AND CONTACT INFORMATION

The recommendations contained in this report are based on specific project information regarding structure type, location, and design loads that have been provided by the Office of

Structure Design South. 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.

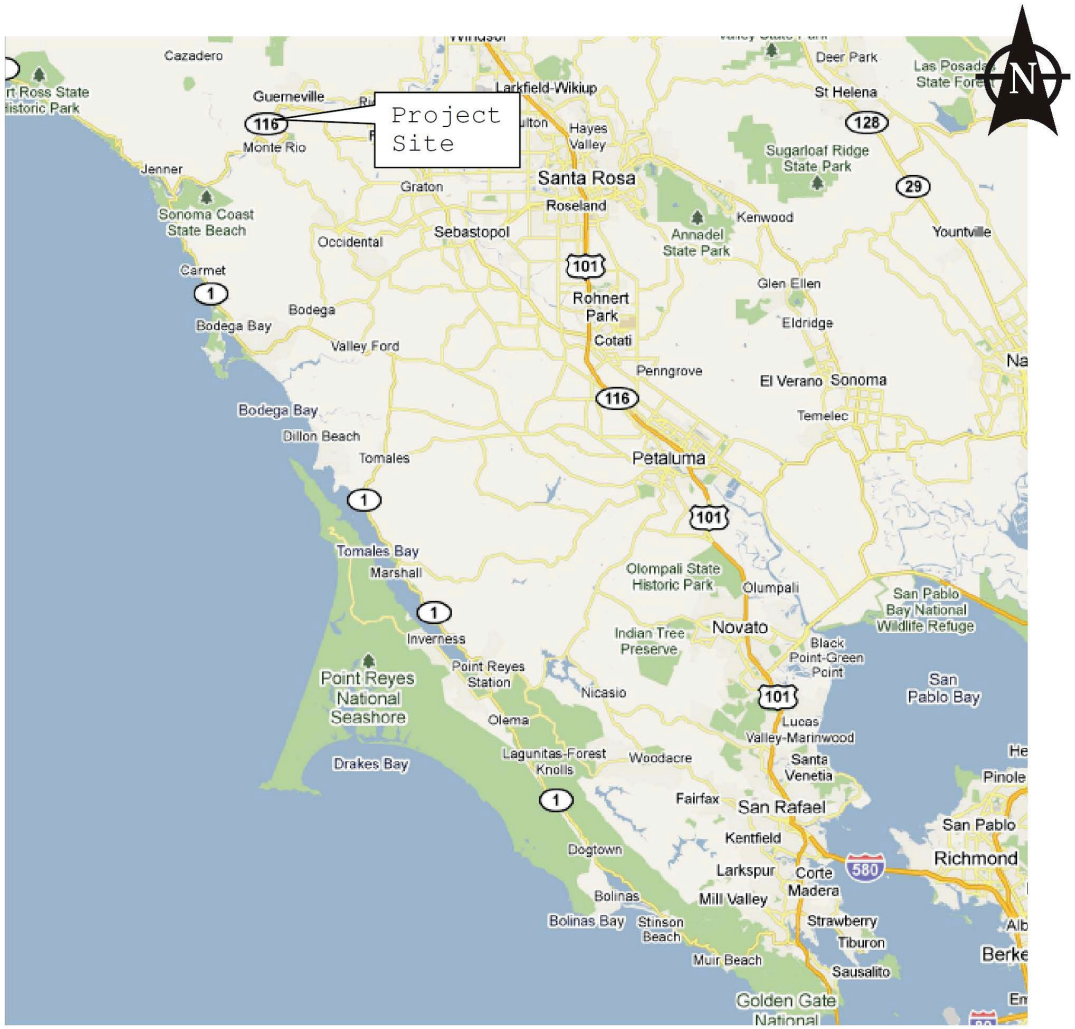
c: TJPokrywka, HNikoui, CRisden, Daily File

SYang/mm

List of Figures:

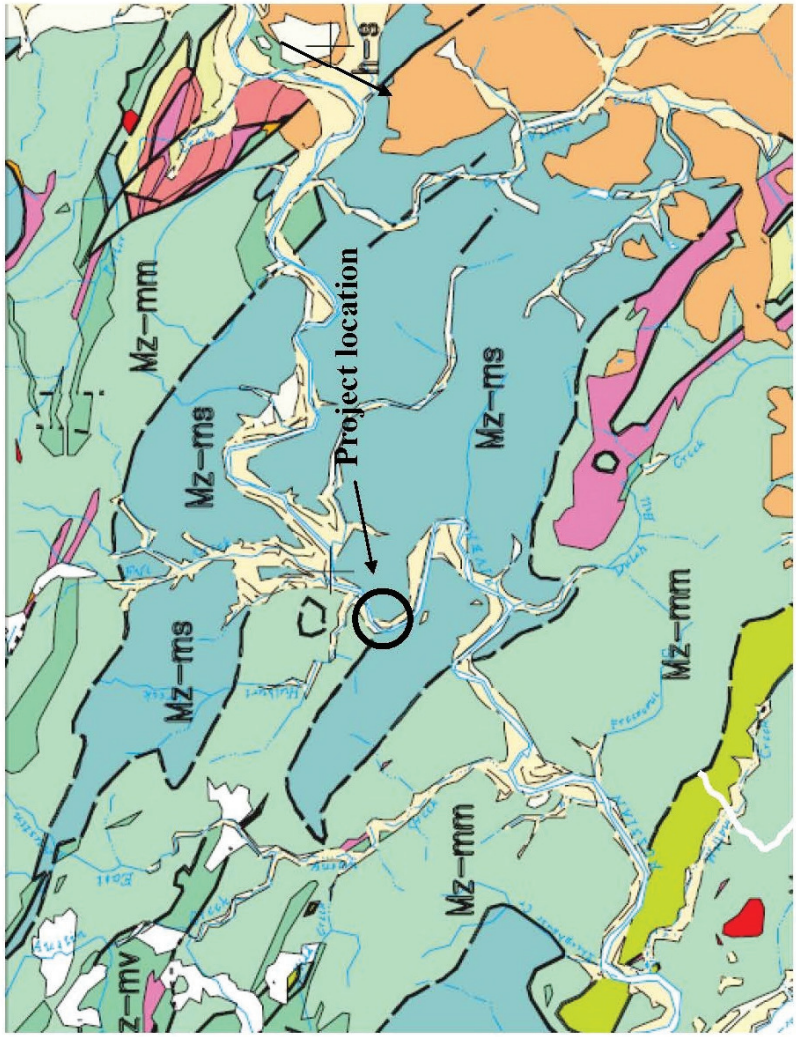
Figure 1 – Vicinity Map
Figure 2 – Vicinity Geology Map
Figure 3 – Soil Map
Figure 4 – Liquefaction Susceptibility Map

Attachment: Preliminary Seismic Design Recommendations



Base: Google Maps
not to scale

Caltrans	RUSSIAN RIVER VIADUCTS HIGHWAY 116, POST MILE 10.38/10.48 SONOMA COUNTY, CALIFORNIA	VICINITY MAP
	JUNE 2015	FIGURE 1



QUATERNARY

- h-wm Water-saturated mud
- h-m Mud and silt
- h-s Sand, gravel, silt and mud
- p-s Sand, gravel, silt and mud
- Q-s Sand, gravel, silt and mud
- Q-cs Clay, silt, sand, and gravel

UPPER TERTIARY

- Tu-md Mudstone, some sandstone
- Tu-sm Sandstone and mudstone
- Tu-ss Sandstone and conglomerate
- Tu-sl Siliceous mudstone, chert

FRANCISCAN COMPLEX

- Mz-mm Melange
- Mz-ms Metasandstone
- Mz-mv Metavolcanics
- Mz-sl Chert
- Mz-ls Limestone
- Mz-sp Serpentinite

Wentworth, C.M., Compiler, 1997, Geologic Materials of the San Francisco Bay Region, USGS Open File Report 97-744, http://pubs.usgs.gov/of/1997/of97-744/of97-744_5b.pdf

Caltrans

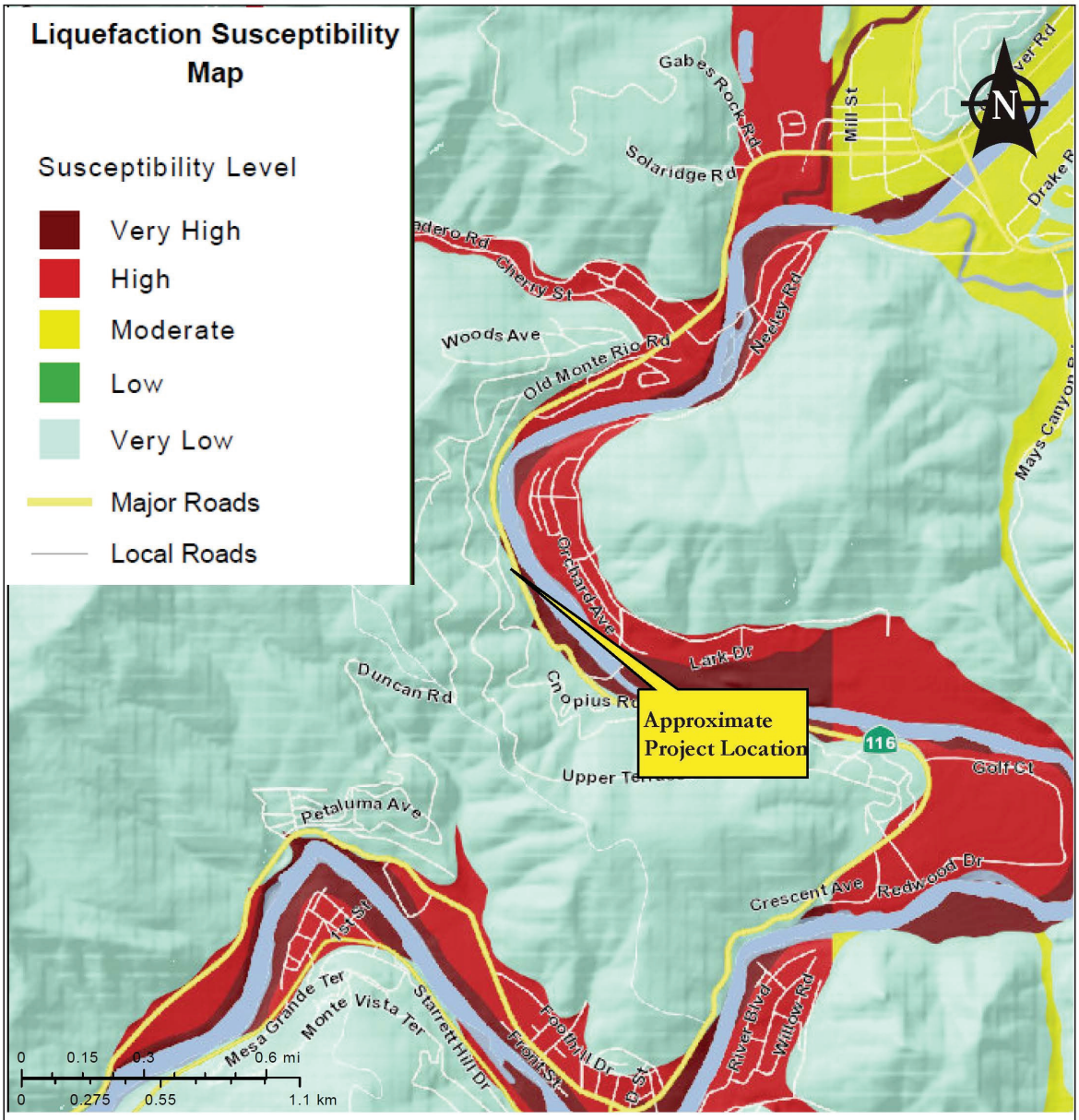
Figure 2 - Geologic Map

04-SON-116 PM 10.38/10.48
04-13000340- JUNE 2015

Map Unit Symbol	Map Unit Name
HkG	Hugo very gravelly loam, 50 to 75 percent slopes
RnA	Riverwash
W	Water

Base: Web Soil Survey (USDA)
not to scale

Caltrans	RUSSIAN RIVER VIADUCTS HIGHWAY 116, POST MILE 10.38/10.48 SONOMA COUNTY, CALIFORNIA	SOIL MAP
	JUNE 2015	FIGURE 3



LEGEND

Base: ABAG Liquefaction Susceptibility Map

Not to scale

Caltrans	RUSSIAN RIVER VIADUCTS HIGHWAY 116, POST MILE 10.38/10.48 SONOMA COUNTY, CALIFORNIA	LIQUEFACTION SUSEPTIBILITY MAP
	JUNE 2015	FIGURE 4

Memorandum

Flex your power!
Be energy efficient!

To: MR. GORDON DANKE
Senior Bridge Engineer
Division of Engineering Services
Office of Bridge Design-West
Bridge Design Branch 4

Date: September 25, 2013

File: 04-SON-116-10.38
04-0J610K
Russian River Viaduct
Bridge No. 20-0071

From: HOSSAIN SALIMI
Senior Materials and Research Engineer
Division of Engineering Services
Geotechnical Services – MS-5
Office of Geotechnical Design-West

Subject: Preliminary Seismic Design Recommendations

This memorandum is in response to your request dated September 12, 2013 to provide Preliminary Seismic Design Recommendations (PSDR) for the proposed rehabilitation and scour mitigation of the existing Russian River Sidehill Viaduct (Bridge No. 20-0071) located on Route 116, approximately 2 miles south/southwest of the City of Guerneville in Sonoma County. The available documents indicate that the structure was built in 1940 and improved in 1941.

According to the latest California Seismic Hazard Map (Version 2.2.06), which is based on the United States Geological Survey (USGS) and California Geological Survey (CGS) maps, the nearest faults are San Andreas (North Coast) 2011 CFM Fault (Strike-Slip) with Maximum Moment Mmax=8, located about 12.6 kilometers southwest of the site, Rodgers Creek Fault (Strike-Slip) with Maximum Moment Mmax=7.3, located over 21 kilometers east of the site, and Maacama Fault Zone (Strike-Slip) with Maximum Moment Mmax=7.4, located over 27 kilometers east of the site. Please note that the distance provided for each fault is the horizontal distance to the fault trace or surface projection of the top of rupture plane.

There are no available Log-of-Test-Borings (LOTB) and/or any geotechnically related data anywhere in the files for this bridge. The only foundation related information is shown on the As-Built General Plan in which steel H-piles are used for the foundation.

It should also be noted that a series of shallow boring were drilled on the westbound (hill) side between the two viaducts (20-0071 and 20-0072) in 1979-1980. Theses borings show the area between the two bridges to have 2 to 10 feet of sand underlain by weathered and fractured Sandstone and Shale. However, these boring are not near the structure foundation.

Due to lack of any subsurface data near the foundation, the site for the time being is being classified as having a Vs30 = 270 meters per second (m/s). Furthermore, liquefaction potential at the site can not be determined at this time. The following table shows the seismic data based on nearby faults, distances, and Maximum Moment.

Fault Name	Fault Type	Distance to Site (km)	Maximum Moment (Mmax)	Peak Ground Acceleration (PGA)
San Andreas (North Coast)	Strike Slip	12.6	8	0.31
Rodgers Creek	Strike Slip	21.4	7.3	0.19
Maacama (South Section)	Strike Slip	27.4	7.4	0.16
Probabilistic Seismic Hazard Analysis (975 year Return Period)	-	-	-	0.56

The Acceleration Response Spectrum (ARS) curves based on both Caltrans ARS On-Line Deterministic Seismic Hazard Analysis (DSHA) and Probabilistic Seismic Hazard Analysis (PSHA) version 2.2.06 using a 975-year return period (5% probability of exceedance in 50 years) were generated for the site, incorporating the latest Attenuation Relationship models. In addition, the PSHA with a 975-year return period using the USGS Interactive Deaggregation procedure was generated, and all five curves were compared. Due to the high seismicity of the site, the PSHA response spectrum (Caltrans ARS On-Line) was higher than the other spectra (please see Figure 1) and chosen as the recommended ARS for the site (please see Figure 2).

Please note that the preliminary ARS curve has been modified to account for the proximity of the site to the fault. The modifications are such that there is no increase in spectral acceleration in periods less than 0.5 seconds and a 20% increase for periods greater than one second. A linear interpolation was used between 0.5 and one second.

It is recommended that a site investigation to include exploratory borings with Standard Penetration Test (SPT), measurement of the ground water table (if applicable), and the collection of samples for subsequent laboratory gradation analysis, plasticity index, shear tests, etc. be conducted.

I will keep you informed on any potential changes as updates and changes become finalized, and re-examine these recommendations once the field investigation is completed. The Final Seismic Design Recommendations will be submitted once the field investigation is completed and the project gets to the final design phase.

If there are any questions, please contact Hossain Salimi at (916) 227-7147.

Attachments

c: TPokrywka (OGD-W)
MMacaranes (OGD-W)
SYang (OGD-West)
MEl-Mously (OBD-West)

REGISTERED PROFESSIONAL ENGINEER
HOSSAIN SALIMI
No. 54567
Exp. 12/2013
CIVIL
STATE OF CALIFORNIA

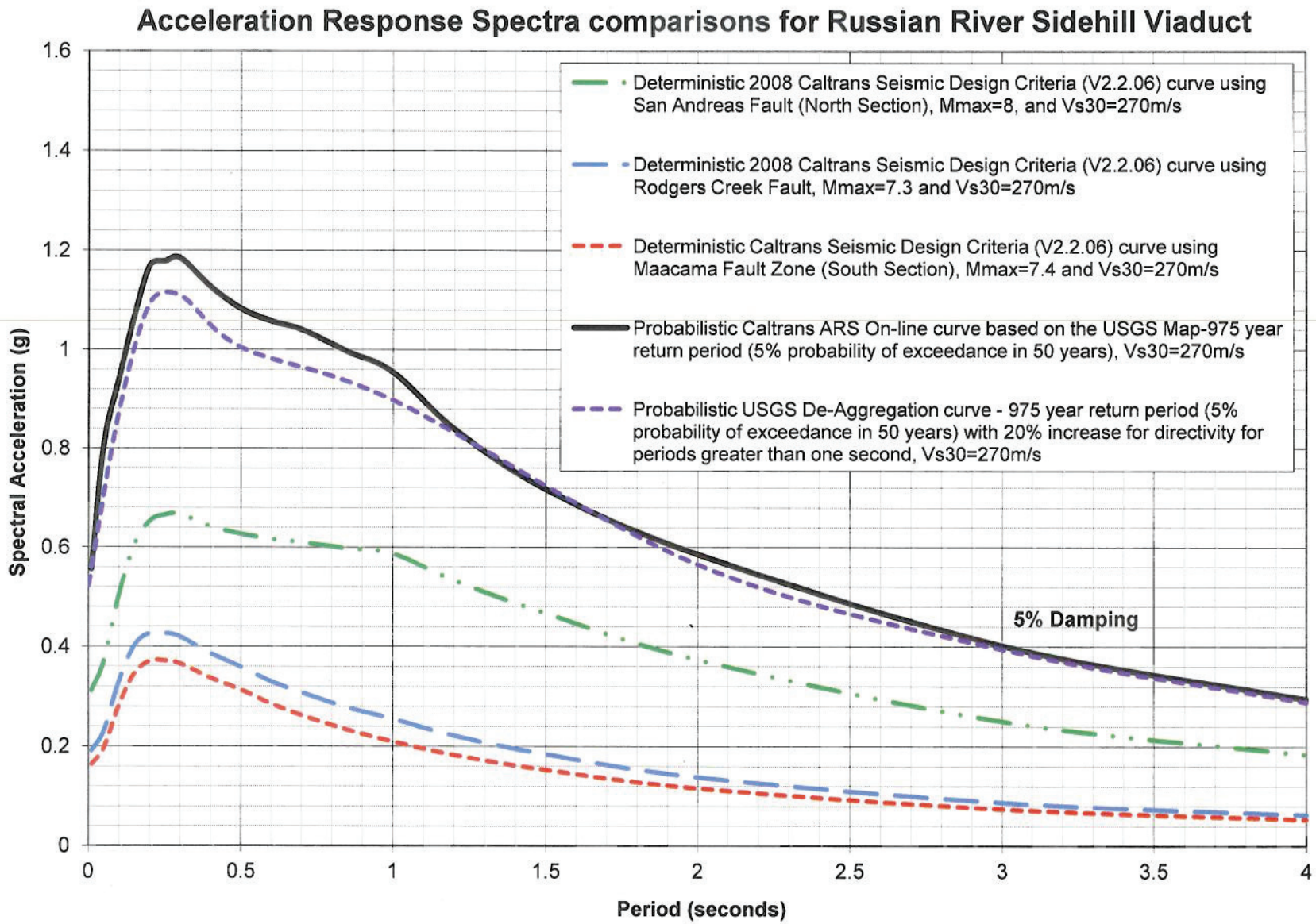

Acceleration Response Spectra comparisons for Russian River Sidehill Viaduct
Deterministic 2008 Caltrans Seismic Design Criteria (V2.2.06) curve using San Andreas Fault (North Section), Mmax=8, and Vs30=270m/s
Deterministic 2008 Caltrans Seismic Design Criteria (V2.2.06) curve using Rodgers Creek Fault, Mmax=7.3 and Vs30=270m/s
Deterministic Caltrans Seismic Design Criteria (V2.2.06) curve using Maacama Fault Zone (South Section), Mmax=7.4 and Vs30=270m/s
Probabilistic Caltrans ARS On-line curve based on the USGS Map-975 year return period (5% probability of exceedance in 50 years), Vs30=270m/s
Probabilistic USGS De-Aggregation curve - 975 year return period (5% probability of exceedance in 50 years) with 20% increase for directivity for periods greater than one second, Vs30=270m/s
5% Damping
Spectral Acceleration (g)
Period (seconds)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
0.5
1.5
2
2.5
3
3.5
4

Figure 1

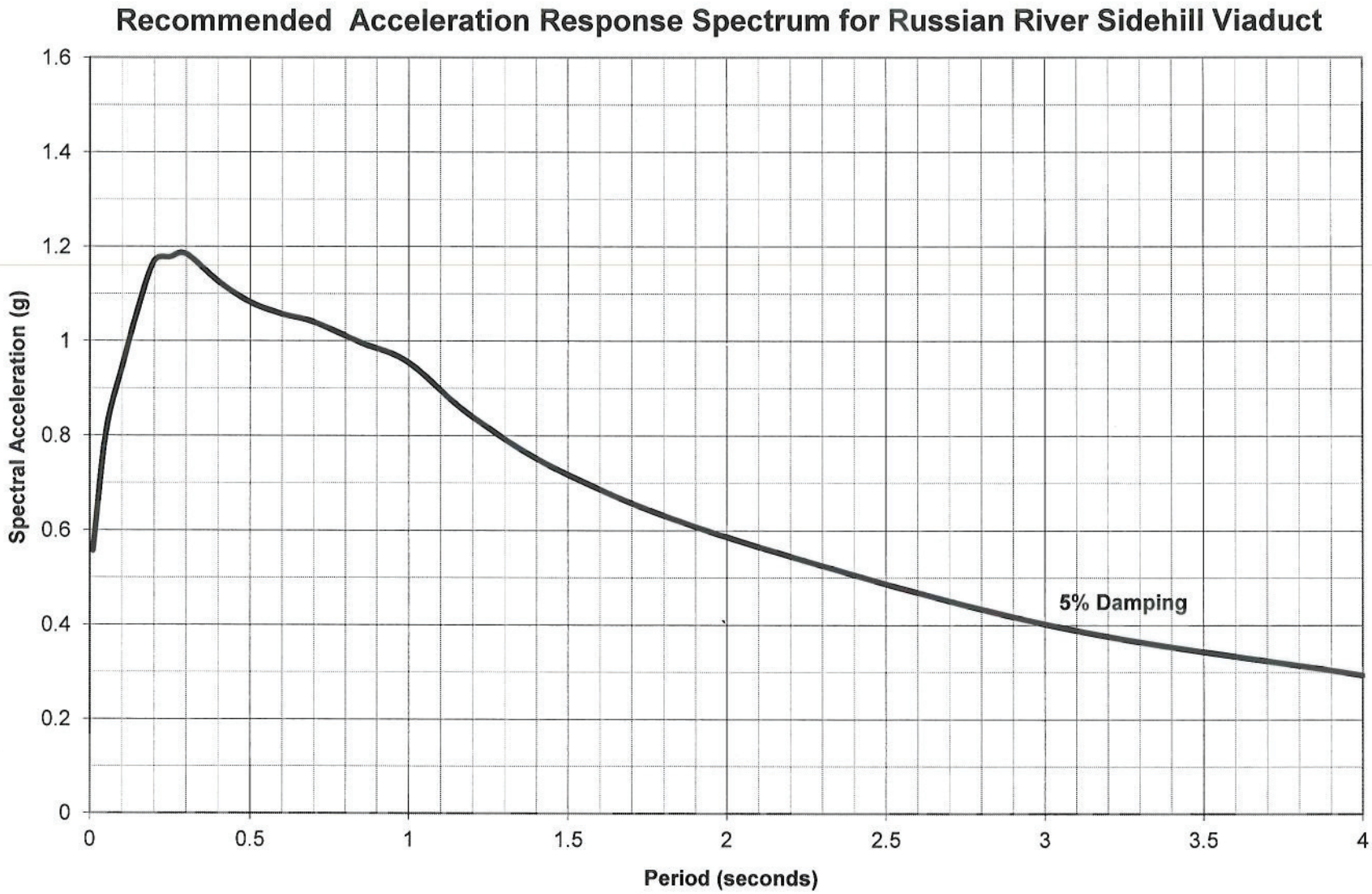

Recommended Acceleration Response Spectrum for Russian River Sidehill Viaduct
Spectral Acceleration (g)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
0.5
1
1.5
2
2.5
3
3.5
4
Period (seconds)
5% Damping

Figure 2

M e m o r a n d u m

Serious Drought
Help Save Water!

To: **JOHN J. LANE**
Project Engineer
Structure Design Branch 14
Office of Bridge Design – South 1

Date: April 13, 2015

File: 04-SON-116-PM 10.38/10.46
Russian River Viaducts
Seismic Retrofit Project
EA: 04-0G641
PID: 04-1300-0340

From: **RICK MACALA**
Structures Hydraulic Engineer
Office of Design and Technical Services
Structure Hydraulics and Hydrology Branch
MS #9-HYD-1/2i

Subject: **Preliminary Hydraulic Report for Seismic Retrofit Work on the Russian River Viaducts (Bridge Numbers 20-0071 and 20-0072)**

Per your request a preliminary hydraulic evaluation was conducted for the seismic retrofit project on the Russian River Viaducts (Bridge Numbers 20-0071 and 20-0072) on State Route 116, Post Miles 10.38 and 10.46 in Sonoma County, California. Due to seismic vulnerabilities including in-span hinges and non-ductile pile extensions, it is proposed to retrofit the existing viaducts with standard hinge seat extenders attached to the existing joints.

The existing Russian River Viaducts were built in 1940 and the Russian River Viaduct #2 (Br. No. 20-0071) was extended in 1941 from 112-feet to 253-feet. The existing viaducts are reinforced concrete continuous slab bridges supported on composite (concrete and steel) 5-pile bents. The Russian River Viaducts are not over the existing waterway; however, flood waters do reach the viaducts during large flood events due to the viaducts and State Route 116 running parallel to the right bank of the Russian River. Therefore, with flood waters reaching the viaducts a hydraulic evaluation must be determined.

The following evaluation is based on an office review of structure maintenance and inspection records; existing structure as-builts; and field reconnaissance including photo documentation collected by Structure Maintenance. Hydraulic analyses were calculated using the BrEASE (v. 3.4) hydraulic program and the latest Federal Emergency Management Agency (FEMA) Flood Insurance Study and Flood Insurance Rate Maps for Sonoma County.

All hydraulic and scour information in this report is <u>preliminary</u> and subject to change pending further analysis that will be completed as part of the Final Hydraulic Report.

GEOGRAPHICAL REFERENCE

All vertical elevations describing the Russian River Viaducts are referenced to the <u>local datum</u> of the 1940 and 1941 as-built plans and all vertical elevations describing the flood water surface elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD-1929).

The as-built plans for the Russian River Viaducts do not provide any information regarding the vertical datum used. Therefore, this report will assume that the vertical datum of the existing viaducts is referenced to the NGVD-1929 datum. For the final hydraulic evaluation it is imperative that field topographical surveys are completed to update all vertical elevations to the same datum.

HYDROLOGY

The Russian River watershed upstream of the existing Russian River Viaducts at State Route 116 drains a very large watershed of approximately 1,370.4 square miles (mi^2). The Russian River watershed originates from springs in the Laughlin Range of the California Coastal Mountains about 5 miles east of the town of Willits in Mendocino County. From its source, the river flows 90 miles southward through Redwood, Ukiah, Hopland, and Alexander Valleys and through the northwestern part of the Santa Rosa Plains. The river then turns abruptly westward and flows 22 miles through a canyon in the mountains before entering the Pacific Ocean at the town of Jenner.

Assessment of the watershed indicates estimated flood frequency discharges for the 50-year and 100-year flood events of 97,600 and 106,600 cubic feet per second (cfs), respectively. Table 1 provides the design flood discharges for this project. These design flood discharges are based on the most recent FEMA Flood Insurance Study for Sonoma County[1].

Table 1: Preliminary Design Flood Discharges at the Russian River Viaducts.

Flood Frequency	Design Flood Discharge (cfs)
50-Year	97,600
100-Year	106,600

HYDRAULIC RESULTS

As mentioned previously the Russian River Viaducts do not cross over the Russian River but flood waters do reach the edge of roadway near and around the viaducts.

Using the flood profile charts of the Russian River, obtained from the latest FEMA flood insurance study, flood water surface elevations were obtained near the beginning of bridge (BB) and end of bridge (EB) for each viaduct. See Tables 2 and 3 for a summary of the BB and EB top edge of deck elevations versus the Russian River flood water surface elevations.

As shown in Table 2, the flood waters from the Russian River are above the top edge of deck for the Russian River Viaduct #2. However with the existing solid concrete barrier (rail height = 2'-11"), flood waters should not inundate the existing viaduct. Downstream of the BB at Station 106+48.00, ends the solid concrete barrier and begins a metal-beam guard rail. Here flood waters will inundate the existing roadway of State Route 116.

From Table 3, it can be seen that the localized flood waters do not get above the top edge of deck for the BB and EB locations. In addition, Russian River Viaduct #1 also has the same solid concrete barrier along the edge of deck paralleling the Russian River; keeping the existing viaduct from having flood waters inundating its roadway.

[1] 2014 FEMA Flood Insurance Study for Sonoma County, California and Incorporated Areas, Volumes 1-3 (Flood Insurance Study Number 06097CV001C). Revised: February 19, 2014.

Table 2: Flood Water Elevations near Russian River Viaduct #2 (Br. No. 20-0071).

Bridge Location	Top Edge of Deck Elevation[1] (ft)	Flood Water Surface Elevation[2] (ft)
BB Station 106+48.00	50.71	52.03
EB Station 109+01.00	51.85	52.20

Notes:
1 – Vertical datum: 1940 as-built datum
2 – Vertical datum: NGVD-1929

Table 3: Flood Water Elevations near Russian River Viaduct #1 (Br. No. 20-0072)

Bridge Location	Top Edge of Deck Elevation[1] (ft)	Flood Water Surface Elevation[2] (ft)
BB Station 110+54.00	52.44	52.30
EB Station 113+06.00	53.54	52.47

Notes:
1 – Vertical datum: 1940 as-built datum
2 – Vertical datum: NGVD-1929

SCOUR ANALYSIS

Currently, the Federal Highway Administration's National Bridge Inventory (NBI) Item 113 code (to identify the current status of the bridge regarding its vulnerability to scour) is rated a 5 for each viaduct. An NBI Item 113 code of 5 states "the bridge foundations determined to be stable for assessed or calculated scour conditions – scour is determined to be within limits of footings or piles by assessment, by calculations, or by installation of properly designed scour countermeasures".

Due to the fact that the viaducts are on the upper right bank of the Russian River, near the fringe of where the flood waters will reach, velocities will be very low and the duration of the peak flood waters will be limited to brief periods. Therefore, the risk of scour issues due to the Russian River is considered to be negligible.

SUMMARY/RECOMMENDATIONS

The purpose of this preliminary hydraulic evaluation is to analyze if the seismic retrofit work would cause any adverse effects to the hydraulic capacity of the channel floodway or scour conditions. Preliminary analysis indicates that the proposed seismic retrofit will not worsen or cause any adverse impacts to the channel floodway or cause increased scour conditions at the viaducts' substructure.

It is recommended that field topographical surveys be conducted around the existing viaducts to update the ground elevations to a vertical datum that can be precisely matched to the flood water elevations of the FEMA flood insurance studies.

If you have any questions or concerns, please contact me at (916) 227-9369 or my supervisor STEVE NG at (916) 227-8018.