FOR CONTRACT NO.: 01-385724

INFORMATIONAL HANDOUT

WATER QUALITY

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
NORTH COAST REGION
Water Quality Certification

PERMITS

UNITED STATES ARMY CORPS OF ENGINEERS
404 PERMIT

AGREEMENTS

CALIFORNIA DEPARTMENT OF FISH AND GAME
STREAMBED ALTERATION AGREEMENT
NOTIFICATION NO.1600-2011-0252-R1

NATIONAL MARINE FISHERIES SERVICES(Biological Opinion)

UNITED STATES FISH AND WILDLIFE SERVICE (Informal Consultation)

MATERIALS INFORMATION
(*NOT A PART OF THE CONTRACT*)

FOUNDATION REPORT FOR DUNN CREEK BRIDGE

FINAL HYDRAULIC REPORT, DUNN CREEK BRIDGE

UNDEGROUND CLASSIFICATION C011-045-12T

AS BUILTS MEN-1-92,8

ROUTE: 01-MEN-1-92.8

March 21, 2012

In the Matter of

Water Quality Certification

for the

California Department of Transportation
Highway 1, Dunn Creek Bridge and Fish Passage Project
WDID No. 1B11176WNME

APPLICANT:	California Department of Transportation
RECEIVING WATER:	Dunn Creek
HYDROLOGIC AREA:	Mendocino Coast Hydrologic Unit, No.113.00
COUNTY:	Mendocino
FILE NAME:	CDOT – HWY 1, Dunn Creek Bridge and Fish Passage Project

BY THE EXECUTIVE OFFICER:

1. On September 22, 2011, the North Coast Regional Water Quality Control Board (Regional Water Board) received an application from the California Department of Transportation (Caltrans), requesting Federal Clean Water Act (CWA), section 401, Water Quality Certification for activities related to the proposed Highway 1, Dunn Creek Bridge and Fish Passage Project (Project). The proposed project will cause disturbances to waters of the United States (U.S.) and waters of the State associated with Dunn Creek, a tributary to Cottaneva Creek located within the Mendocino Coast Hydrologic Unit No.113.00 (Rockport Hydrologic Area No.113.10) The Regional Water Board provided public notice of the application pursuant to title 23, California Code of Regulations, section 3858 on November 1, 2011, and posted information describing the project on the Regional Water Board's website. No comments were received. On November 28, 2011, the Regional Water Board received additional information from Caltrans on revised project designs and impacts. The additional impacts are derived from design changes to the rock weirs and rock slope protection that were determined to be necessary.

2. As part of the compensatory mitigation requirements from the California Department of Fish and Game (CDFG) for the Caltrans Highway 1 - Ten Mile River

Bridge Project, Caltrans proposes to remove the existing culvert within Dunn Creek, which is a fish passage barrier, and construct a new bridge and in-stream weirs to accommodate upstream salmonid migration. Caltrans is proposing to remove the existing 9-foot diameter, 87-foot long culvert, construct a 134-foot long 3-span concrete slab bridge, and construct rock weirs to provide grade control to improve fish passage. Proposed actions also include the establishment of staging areas in upland areas, installation of temporary culverts to divert flow during construction, reconstructing embankments, restoration and enhancement of the stream channel, and other activities.

3. Caltrans has determined that the total project permanent impacts to streams identified as waters of the U.S. and State will be approximately 0.087 acres (533 linear feet) for the fish weirs and rock slope protection (RSP) and 0.17 acres (517 linear feet) for culvert removal and roadway excavation. The temporary project impacts to streams identified as waters of the U.S. and waters of the state will be approximately 0.201 acres (350 linear feet). Temporary impacts to riparian areas designated as waters of the state were determined to be 0.57 acres (24, 766 feet^2 linear feet, 405 linear feet). The project will result in 262 linear feet of stream channel restoration with 100 feet of stream daylight from culvert removal. The impacts associated with the project activities will reduce sedimentation and erosion, and extend available habitat to threatened and endangered salmonids.

4. The project is anticipated to take 215 days to construct; however, work within waters of the US will only be conducted between June 15 and October 31. Caltrans' contractor will be required to implement Best Management Practices (BMPs) for construction and post-construction phases of the project to provide erosion and sediment control and pollution prevention throughout the project area. All graded areas within the project affected by the construction activities will be appropriately stabilized and BMPs will be implemented to ensure erosion and potential pollution is minimized and controlled.

5. Caltrans has applied for authorization from the Unites States Army Corps of Engineers to perform the project under their Nationwide Permits No. 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities) and No. 33 (Temporary Construction, Access, and Dewatering) pursuant to Clean Water Act, section 404. In addition, Caltrans has applied for a 1602 Lake and Streambed Alteration Agreement from the California Department of Fish and Game. On April 4, 2011, Caltrans, acting as lead agency, certified an Initial Study with Negative Declaration for the proposed project in order to comply with the California Environmental Quality Act (CEQA) (State Clearing House No. 2010032029). The Regional Water Board has considered the environmental document including any proposed changes, and incorporates any avoidance, minimization, and mitigation measures into the project as a condition of approval to avoid significant affects to the environment

6. To ensure compliance with Water Quality Objectives within the Basin Plan, adequate wetland and riparian protection and stringent requirements to avoid, minimize, and mitigate the sediment and temperature impacts associated with the proposed project will be incorporated as enforceable conditions in this Water Quality Certification. In addition, Caltrans will be required to conduct surface water monitoring, sampling, and analysis in accordance with the conditions of the Water Quality Certification. Additionally, storm water runoff monitoring, sampling, and analysis will be conducted as required by the State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water Discharges from the State of California, Department of Transportation (Caltrans) Properties, Facilities and Activities Order No. 99 – 06 - DWQ. The surface water data collected will be utilized to assess the adequacy of BMPs during construction as well as site specific mitigation measures proposed to minimize impacts to the environment, including sediment and temperature impacts.

7. Pursuant to Regional Water Board Resolution R1-2012-0013, *Implementation of the Water Quality Objective for Temperature in the North Coast Region* (Temperature Implementation Policy), Regional Water Board staff are directed to address factors that contribute to elevated water temperatures when issuing 401 certifications or WDRs (permits) for individual projects. Any permit should be consistent with the assumptions and requirements of temperature shade load allocations in areas subject to existing temperature TMDLs, including EPA-established temperature TMDLs, as appropriate. If applicable, any permit or order should implement similar shade controls in areas listed as impaired for temperature but lacking a TMDL and region-wide as appropriate and necessary to prevent future impairments and to comply with the intrastate temperature objective.

8. The federal antidegradation policy requires that state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. This Order is consistent with applicable federal and State antidegradation policies, as it does not authorize the discharge of increased concentrations of pollutants or increased volumes of treated wastewater, and does not otherwise authorize degradation of the waters affected by this project.

9. This discharge is also regulated under State Water Resources Control Board Order No. 2003-0017-DWQ, "General Waste Discharge Requirements for Dredge and Fill Discharges That Have Received State Water Quality Certification," which requires compliance with all conditions of this certification.

Receiving Waters: Dunn Creek Ephemeral Streams

	Mendocino Coast Hydrologic Unit, No.113.00. Rockport Hydrologic Area No.113.10
Filled and/or Excavated Areas:	Permanent - streams (Waters of the U.S.), culvert/road prism excavation: 0.17 acres (7,340 feet^2) Permanent - streams (Waters of U.S.), fish weirs/RSP: 0.087 acres (3,777 feet^2) Temporary - stream (Waters of U.S.), stream diversion: 0.201 acres (8,750 feet^2) Temporary - riparian (Waters of the State): 0.57 acres (24,766 feet^2)
Total Linear Impacts:	Permanent - streams (Waters of U.S.), fish weirs/RSP: 533 linear feet Permanent - streams (Waters of the U.S.), culvert/road prism excavation: 517 linear feet Temporary - streams (Waters of U.S.): 350 linear feet Temporary - riparian (Waters of the State): 405 linear feet
Stream Restoration:	Permanent - streams (waters of the U.S.) 100 linear feet of stream will be daylight
Dredge Volume:	None
Latitude/Longitude:	39.605 N / 123.3822 W

Accordingly, based on its independent review of the record, the Regional Water Board certifies that the Caltrans Highway – 1, Dunn Creek Bridge and Fish Passage Project (WDID No. 1B1176WNME), as described in the application will comply with sections 301, 302, 303, 306 and 307 of the Clean Water Act, and with applicable provisions of state law, provided that the Caltrans complies with the following terms and conditions:

All conditions of this order apply to Caltrans (and all its employees) and all contractors (and their employees), sub-contractors (and their employees), and any other entity or agency that performs activities or work on the project (including the off-site mitigation lands) as related to this Water Quality Certification.

1. This certification action is subject to modification or revocation upon administrative or judicial review; including review and amendment pursuant to Water Code section 13330 and title 23, California Code of Regulations, section 3867.

2. This certification action is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to title 23, California Code of Regulations, section 3855, subdivision (b) and the application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

3. The validity this certification is conditioned upon total payment of any fee required under title 23, California Code of Regulations, section 3833, and owed by the applicant.

4. All conditions required by this Order shall be included in the Plans and Specifications prepared by Caltrans for the Contractor. In addition, Caltrans shall require compliance with all conditions included in this Order in the bid contract for this project.

5. Caltrans shall provide a copy of this order and State Water Resources Control Board (SWRCB) Order No. 2003-0017-DWQ (web link referenced below) to the contractor and all subcontractors conducting the work, and require that copies remain in their possession at the work site. Caltrans shall be responsible for work conducted by its contractor or subcontractors.

6. The Regional Water Board shall be notified in writing each year at least five working days (working days are Monday – Friday) prior to the commencement of ground disturbing activities, water diversion activities or construction activities with details regarding the construction schedule, in order to allow Regional Water Board staff to be present on-site during installation and removal activities, and to answer any public inquiries that may arise regarding the project. Caltrans shall provide Regional Water Board staff access to the project site to document compliance with this order.

7. The Resident Engineer (or appropriately authorized agent) shall hold on-site water quality permit compliance meetings (similar to tailgate safety meetings) to discuss permit compliance, including instructions on how to avoid violations and procedures for reporting violations. The meetings shall be held at least every other week, before forecasted storm events, and when a new contractor or subcontractor arrives to begin work at the site. The contractors, subcontractors and their employees, as well as any inspectors or monitors assigned to the project, shall be present at the meetings. Caltrans shall maintain dated sign-in sheets for attendees at these meetings, and shall make them available to the Regional Water Board on request.

8. All activities and best management practices (BMPs) shall be implemented according to the submitted application and the conditions in this certification. BMPs for erosion, sediment, turbidity and pollutant control shall be implemented and in

place at commencement of, during, and after any ground clearing activities, construction activities, or any other project activities that could result in erosion, sediment, or other pollutant discharges to waters of the State. The BMPs shall be implemented in accordance with the Caltrans Construction Site Best Management Practice Manual (CCSBMPM) and all contractors and subcontractors shall comply with the CCSBMPM. In addition, BMPs for erosion and sediment control shall be utilized year round, regardless of season or time of year. Caltrans shall stage erosion and sediment control materials at the work site. All BMPs shall be installed properly and in accordance with the manufacturer's specifications. If the project Resident Engineer elects to install alternative BMPs for use on the project, Caltrans shall submit a proposal to Regional Water Board staff for review and concurrence.

9. Caltrans shall prioritize the use of wildlife-friendly biodegradable (not photo-degradable) erosion control products wherever feasible. Caltrans shall not use or allow the use of erosion control products that contain synthetic netting for permanent erosion control (i.e. erosion control materials to be left in place for two years or after the completion date of the project). If Caltrans finds that erosion control netting or products have entrapped or harmed wildlife, personnel shall remove the netting or product and replace it with wildlife-friendly biodegradable products. Caltrans shall not use or allow the use of erosion control products that contain synthetic materials within waters of the United States or waters of the State at any time. Caltrans shall request approval from the Regional Water Board if an exception from this requirement is needed for a specific location.

10. Work in flowing or standing surface waters, unless otherwise proposed in the project description and approved by the Regional Water Board, is prohibited. If construction dewatering of groundwater is found to be necessary, Caltrans shall use a method of water disposal other than disposal to surface waters (such as land disposal) or Caltrans shall apply for coverage under the Low Threat Discharge Permit or an individual National Pollutant Discharge Elimination System (NPDES) Permit and receive notification of coverage to discharge to surface waters, prior to the discharge.

11. Caltrans is prohibited from discharging waste to waters of the State, unless explicitly authorized by this Order. For example, no debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete or concrete washings, welding slag, oil or petroleum products, or other organic or earthen material from any construction or associated activity of whatever nature, other than that authorized by this Order, shall be allowed to enter into waters of the State. In addition, none of the materials listed above shall be placed within 150 linear feet of waters of the State or where the materials may be washed by rainfall into waters of the State.

12. Caltrans shall submit, subject to review and concurrence by the Regional Water Board staff, a dewatering and/or diversion plan that appropriately describe the dewatered or diverted areas and how those areas will be handled during construction. The diversion/dewatering plans shall be submitted no later than 30

days prior to conducting the proposed activity. Information submitted shall include the area or work to be diverted or dewatered and method of the proposed activity. All diversion or dewatering activities shall be designed to minimize the impact to waters of the State and maintain natural flows upstream and downstream. All dewatering or diversion structures shall be installed in a manner that does not cause sedimentation, siltation or erosion upstream or downstream. All dewatering or diversion structures shall be removed immediately upon completion of project activities. The in-channel work will only be conducted between June 15 and October 15. This Order does not authorize Caltrans to draft surface waters.

13. Fueling, lubrication, maintenance, storage and staging of vehicles and equipment shall be outside of waters of the U.S. and the State. Fueling, lubrication, maintenance, storage and staging of vehicles and equipment shall not result in a discharge or a threatened discharge to any waters of the State or the U.S. At no time shall Caltrans use any vehicle or equipment which leaks any substance that may impact water quality.

14. Caltrans shall implement appropriate BMPs to prevent the discharge of equipment fluids to the stream channel. The minimum requirements will include: storing hazardous materials at least 150 linear feet outside of the stream banks; checking equipment for leaks and preventing the use of equipment with leaks; pressure washing or steam cleaning equipment to remove fluid residue on any of its surfaces prior to its entering any stream channel in a manner that does not result in a discharge to waters of the State.

15. If, at any time, an unauthorized discharge to surface water (including wetlands, rivers or streams) occurs, or any water quality problem arises, the associated project activities shall cease immediately until adequate BMPs are implemented. The Regional Water Board shall be notified promptly and in no case more than 24 hours after the unauthorized discharge or water quality problem arises.

16. Caltrans and their contractor are not authorized to discharge wastewater (e.g., water that has contacted uncured concrete or cement, or asphalt) to surface waters, ground waters, or land. Wastewater may only be disposed of to a sanitary waste water collection system/facility (with authorization from the facility's owner or operator) or a properly-licensed disposal or reuse facility. If Caltrans or their contractor proposes an alternate disposal method, Caltrans or their contractor shall request authorization from the Regional Water Board. Plans to reuse or recycle wastewater require written approval from Regional Water Board staff.

17. Caltrans shall provide analysis and verification that placing non-hazardous waste or inert materials (which may include discarded product or recycled materials) will not result in degradation of water quality, human health, or the environment. All project-generated waste shall be handled, transported, and disposed in strict compliance with all applicable State and Federal laws and regulations. When operations are complete, any excess material or debris shall be removed from the

work area and disposed of properly and in accordance with the Special Provisions for the project and/or Standard Specification 7-1.13, Disposal of Material Outside the Highway Right of Way. Within 30 days of disposing of materials off-site Caltrans shall submit to the Regional Water Board the satisfactory evidence provided to the Caltrans Engineer by the Contractor referenced in Standard Specification 7-1.13. In accordance with State and Federal laws and regulations, Caltrans is liable and responsible for the proper disposal of waste generated by their project.

18. All imported fill material shall be clean and free of pollutants. All fill material shall be imported from a source that has the appropriate environmental clearances and permits. The reuse of low-level contaminated solids as fill on-site shall be performed in accordance with all State and Federal policies and established guidelines and must be submitted to the Regional Water Board for review and concurrence.

19. Only clean washed spawning gravel (0.25" – 6") with a cleanliness value of at least 85, using the Cleanness Value Test Method for California Test No. 227 will be placed in the streams. Gravel bag fabric shall be nonwoven polypropylene geotextile (or comparable polymer) and shall conform to the following requirements:
    - Mass per unit area, grams per square meter, min ASTM Designation: D 5261 – 270
    - Grab tensile strength (25-mm grip), kilonewtons, min. ASTM Designation: D4632* 0.89
    - Ultraviolet stability, percent tensile strength retained after 500 hours, ASTM Designation: D4355, xenon arc lamp method 70 or appropriate test method for specific polymer
    - Gravel bags shall be between 600 mm and 800 mm in length, and between 400 mm and 500 mm in width.
    - Yarn used in construction of the gravel bags shall be as recommended by the manufacturer or bag supplier and shall be of a contrasting color. Gravel shall be between 0.5" – 4" in diameter, and shall be clean and free from clay balls, organic matter, and other deleterious materials. The opening of gravel-filled bags shall be secured to prevent gravel from escaping. Gravel-filled bags shall be between 13 kg and 22 kg in mass.
    - Caltrans shall request approval from the Regional Water Board if an exception from this requirement is needed for a specific location.

20. In order to demonstrate compliance with receiving water limitations and water quality objectives surface water monitoring shall be conducted. When conducting surface water monitoring Caltrans shall establish discharge, upstream (background) and downstream monitoring locations to demonstrate compliance with applicable water quality objectives. The downstream location shall be no more than 100 feet from the discharge location.

A. Surface water monitoring shall be conducted whenever a project activity is conducted within waters of the State (including but not limited to stream diversions, pile installation, and cofferdam installation or removal). Measurements and observations shall be collected from each sampling location four times daily.

B. Surface water monitoring shall be conducted immediately when any project activity has mobilized sediment or other pollutants resulting in a discharge and/or has the potential to alter background conditions within waters of the State (including but not limited to storm water runoff, concrete discharges, leaks, and spills.). The continuing frequency is contingent upon results of field measurements and applicable water quality objectives.

Surface water monitoring field measurements shall be taken for pH, turbidity and temperature. In addition, visual observations of each location shall be documented daily for each established monitoring location and monitoring event and include the estimate of flow, appearance of the discharge including color, floating or suspended matter or debris, appearance of the receiving water at the point of discharge (occurrence of erosion and scouring, turbidity, solids deposition, unusual aquatic growth, etc), and observations about the receiving water, such as the presence of aquatic life. If a project activity has reached a steady state and is stable then Caltrans may request a temporary reprieve from this condition from the Regional Water Board until an activity or discharge triggers the monitoring again.

21. Whenever, as a result of project activities (in-stream work or a discharge to receiving waters), downstream measurements exceed any water quality objective 100 feet downstream of the source(s) all necessary steps shall be taken to install, repair, and/or modify BMPs to control the source(s). The frequency of surface water monitoring shall increase to hourly and shall continue until measurements demonstrate compliance with water quality objectives for each parameter listed below and measured levels are no longer increasing as a result of project activities. In addition, the overall distance from the source(s) to the downstream extent of the exceedence of water quality objectives shall be measured.

Monitoring results shall be reported to appropriate Regional Water Board staff person by telephone within 24 hours of taking any measurements that exceed the limits detailed below (only report turbidity if it is higher than 20 NTU).

pH	<6.5 or >8.5 (any changes >0.5 units)
turbidity	20% above natural background
temperature	>0.5°F above background

Monitoring results and upstream and downstream pictures within the working and/or disturbed area and discharge location shall be taken and submitted to the appropriate Regional Water Board staff within 24 hours of the incident. All other monitoring data documenting compliance with water quality objectives shall be

reported on a monthly basis and is due to the Regional Water Board by the 15th of the following month.

22. Post Storm Event Reports:

    - Once the project has begun ground-disturbing activities, and subsequent to a qualifying rain event that exceeds 0.5-inches of precipitation, Caltrans shall inspect the project within 24 hours and take photos of all discharge locations, and disturbed areas, including all excess materials disposal areas, in order to demonstrate that erosion control and revegetation measures are present and have been installed appropriately and are functioning effectively. A brief report containing these photos, corrective actions (if necessary), and any surface water monitoring results collected pursuant to this Order or the Construction General Permit (SWRCB Order 2009-009 DWQ) shall be submitted to the Regional Water Board within 10 days after the end of the qualifying rain event. Inspections are required daily during extended rain events. Once the project site is stable, in a steady state (channel- ground- or vegetation-disturbing activities have ceased), and has demonstrated sufficient and effective erosion and sediment control, Caltrans may request a reprieve from this condition from the Regional Water Board. At least one post-construction inspection is required to demonstrate sufficient and effective erosion and sediment control and compliance with the Basin Plan.

    - Rain events are periods of precipitation that that are separated by more than 48-hours of dry weather. Rainfall amounts may be taken from on-site rain gauges, from the nearest California Data Exchange Center station (http://cdec.water.ca.gov), or by a custom method or station approved by Regional Water Board staff.

23. Subsequent to the completion of the project Caltrans shall implement revetation actions. At least 60 days prior to conducting any channel- ground- or vegetation-disturbing activities Caltrans shall provide a riparian revegatation plan to the Executive Officer of the Regional Water Board for review, consideration, and concurrence. The plan shall include the revegetation of all disturbed soil area (DSA) with the appropriate native vegetation to achieve the maximum site potential shade and replacement or improvement of the existing biotic structure. The plan shall include a time frame for implementation, success criteria, and monitoring period. The revegetation actions shall be implemented the first fall immediately after project completion and no later than December 31, 2013.

24. In the event of any violation or threatened violation of the conditions of this Order, the violation or threatened violation shall be subject to any remedies, penalties, process or sanctions as provided for under applicable state or federal law. For the purposes of section 401(d) of the Clean Water Act, the applicability of any state law authorizing remedies, penalties, process or sanctions for the violation or threatened violation constitutes a limitation necessary to assure compliance with the water

quality standards and other pertinent requirements incorporated into this Order. In response to a suspected violation of any condition of this certification, the State Water Board may require the holder of any federal permit or license subject to this Order to furnish, under penalty of perjury, any technical or monitoring reports the State Water Board deems appropriate, provided that the burden, including costs, of the reports shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. In response to any violation of the conditions of this Order, the Regional Water Board may add to or modify the conditions of this Order as appropriate to ensure compliance.

25. The Regional Water Board may add to or modify the conditions of this Order, as appropriate, to implement any new or revised water quality standards and implementation plans adopted or approved pursuant to the Porter-Cologne Water Quality Control Act or section 303 of the Clean Water Act.

26. This Order is not transferable. In the event of any change in control of ownership of land presently owned or controlled by the Applicant, the Applicant shall notify the successor-in-interest of the existence of this Order by letter and shall forward a copy of the letter to the Regional Water Board. The successor-in-interest must send to the Regional Water Board Executive Officer a written request for transfer of this Order to discharge dredged or fill material under this Order. The request must contain the following:

    a. requesting entity's full legal name
    b. the state of incorporation, if a corporation
    c. address and phone number of contact person
    d. description of any changes to the project or confirmation that the successor-in-interest intends to implement the project as described in this Order.

27. Except as may be modified by any preceding conditions, all certification actions are contingent on: a) the discharge being limited, and all proposed revegetation, avoidance, minimization, and mitigation measures being completed, in strict compliance with Caltrans' project description and CEQA documentation, as approved herein, b) Caltrans shall construct the project in accordance with the project described in the application and the findings above, and c) compliance with all applicable water quality requirements and water quality control plans including the requirements of the Water Quality Control Plan for the North Coast Region (Basin Plan), and amendments thereto. Any change in the design or implementation of the project that would have a significant or material effect on the findings, conclusions, or conditions of this Order must be submitted to the Executive Officer of the Regional Water Board for prior review, consideration, and written concurrence. If the Regional Water Board is not notified of a significant alteration to the project, it will be considered a violation of this Order, and Caltrans may be subject to Regional Water Board enforcement actions.

28. The authorization of this certification for any dredge and fill activities expires on March 21, 2017. Conditions and monitoring requirements outlined in this Order are not subject to the expiration date outlined above, and remain in full effect and are enforceable.

29. Please contact our staff Environmental Specialist / Caltrans Liaison Jeremiah Puget of at (707) 576-2835 or jpuget@waterboards.ca.gov if you have any questions.

Catherine Kuhlman
Executive Officer

120321_JJP_CDOT_Hwy1_DunnCree_Bridge_FishPassage_Project_401Cert

Web link: State Water Resources Control Board Order No. 2003-0017 -DWQ, General Waste Discharge Requirements for Dredge and Fill Discharges That Have Received State Water Quality Certification can be found at: http://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2003/wqo/wqo2003-0017.pdf

Original to: Ms. Lisa Embree Caltrans, North Region Environmental, P. O. Box 3700, Eureka, CA 95502

Copies to: Mr. Dana York, Caltrans, North Region Environmental, P. O. Box 3700, Eureka, CA 95502

Electronic Copies to: U.S. Army Corps of Engineers, Regulatory Functions - San Francisco District

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET STREET, 16TH FLOOR
SAN FRANCISCO, CALIFORNIA 94103-1398

APR 17 2012

REPLY TO
ATTENTION OF

Regulatory Division

Subject: File Number 1998-234020N

Ms. Grace Kim Tell
California Department of Transportation, District 1
1656 Union Street
Eureka, California 95501

Dear Ms. Tell:

This correspondence is in reference to your submittal of September 23, 2011, revised on November 28, 2011, concerning Department of the Army (DA) authorization to replace an existing culvert with a bridge and complete downstream fish barrier removal work located where Dunn Creek flows under State Route 1 (Post Mile 92.83) 13 miles west of the town of Leggett in Mendocino County, California (39.79871, -123.82068).

Work within U.S. Army Corps of Engineers' (Corps) jurisdiction would include construction of a bridge and associated wing walls, removal of an existing culvert and associated rock slope protection, installation of ten to eleven rock weirs spanning the channel with rock on the slopes between the weirs, installation of rock slope protection to protect the bridge abutment and a wingwall, and removal of a portion of highway. All work shall be completed in accordance with the plans and drawings titled "*USACE File #1998-234020N, Dunn Creek Fish Weir Replacement, April 16, 2012, Figure 1 to 6*", provided as enclosure 1. Work will require placement of approximately 572 cubic yards of fill within 4,245 square feet of Dunn Creek.

Section 404 of the Clean Water Act (CWA) generally regulates the discharge of dredged or fill material below the plane of ordinary high water in non-tidal waters of the United States, below the high tide line in tidal waters of the United States, and within the lateral extent of wetlands adjacent to these waters. Section 10 of the Rivers and Harbors Act generally regulates construction of structures and work, including excavation, dredging, and discharges of dredged or fill material, occurring below the plane of mean high water in tidal waters of the United States; in former diked baylands currently below mean high water; outside the limits of mean high water but affecting the navigable capacity of tidal waters; or below the plane of ordinary high water in non-tidal waters designated as navigable waters of the United States. Navigable waters of the United States generally include all waters subject to the ebb and flow of the tide; and/or all waters presently used, or have been used in the past, or may be susceptible for future use to transport interstate or foreign commerce. A Preliminary JD has been completed for your site. Preliminary JDs are written indications that there may be waters of the U.S. on a parcel or indications of the approximate location(s) of waters of the U.S. on a parcel. Preliminary JDs are

advisory in nature and may not be appealed. The basis for this preliminary jurisdictional determination is fully explained in the *Preliminary Jurisdictional Determination Form* (enclosure 2). You are requested to sign and date this form and return it to this office within two (2) weeks of receipt.

Based on a review of the information in your submittal, the project qualifies for authorization under Department of the Army Nationwide Permits (NWPs) 27 and 33 for *Aquatic Habitat Restoration, Establishment, and Enhancement Activities* and for *Temporary Construction, Access, and Dewatering*, 77 Fed. Reg. 10, February 21, 2012, pursuant to Section 404 of the CWA of 1972, as amended, 33 U.S.C. § 1344 *et seq*. The project must be in compliance with the terms of the NWP, the general conditions of the Nationwide Permit Program, and the San Francisco District regional conditions cited in enclosure 3. You must also be in compliance with any special conditions specified in this letter for the NWP authorization to remain valid. Non-compliance with any term or condition could result in the revocation of the NWP authorization for your project, thereby requiring you to obtain an Individual Permit from the Corps. This NWP authorization does not obviate the need to obtain other State or local approvals required by law.

This verification will remain valid for two years from the date of this letter. Activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon an NWP will remain authorized provided the activity is completed within 12 months of the date of an NWP's expiration, modification, or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 CFR 330.4(e) and 33 CFR 330.5 (c) or (d). The Chief of Engineers will periodically review NWPs and their conditions and will decide to either modify, reissue, or revoke the permits. If an NWP is not modified or reissued within five years of its effective date, it automatically expires and becomes null and void. It is incumbent upon you to remain informed of any changes to the NWPs. Changes to the NWPs would be announced by Public Notice posted on our website (http://www.spn.usace.army.mil/regulatory/index.html). Upon completion of the project and all associated mitigation requirements, you shall sign and return the Certification of Compliance, enclosure 4, verifying that you have complied with the terms and conditions of the permit.

You shall comply with all terms and conditions set forth by the "*California Department of Transportation, Highway 1, Dunn Creek Bridge and Fish Passage Project WDID No. 1B11176WNME*" issued by the North Coast Regional Water Quality Control Board on March 21, 2012 (enclosure 5). You shall consider such conditions to be an integral part of the NWP authorization for your project.

General Condition 18 stipulates that project authorization under a NWP does not allow for the incidental take of any federally-listed species in the absences of a biological opinion (BO) with incidental take provisions. As the principal federal lead agency for this project, Caltrans initiated consultation with the National Marine Fisheries Service (NMFS) to address project related impacts to list species, pursuant to Section 7(a) of the Endangered Species Act of 1973, as amended, 16 U.S.C. Section 1531 *et seq*. By letter of February 28, 2011, NMFS issued a BO (2012/01856) cited in enclosure 6, with an incidental take statement for Central California Coast Coho Salmon and Northern California steelhead. Caltrans also initiated consultation with the United States Fish and Wildlife Service (USFWS) to address project related impacts to list species, pursuant to Section 7(a) of the Endangered Species Act of 1973, as amended, 16 U.S.C. Section 1531 *et seq*. By letter of March 14, 2011, the USFWS concurred with the determination that the project was not likely to adversely affect northern spotted owl and designated critical habitat for this species (enclosure 7).

In order to ensure compliance with this NWP authorization, the following special conditions shall be implemented:

1. Appropriate measures must be taken to maintain near normal downstream flows and to minimize flooding.

2. Fill must consist of materials, and be placed in a manner, that will not be eroded by expected high flows.

3. Following completion of construction, temporary fill must be entirely removed to an area that has no waters of the United States, dredged material must be returned to its original location, and the affected areas must be restored to pre-construction elevations. The affected areas must also be revegetated, as appropriate.

4. Only native plant species should be planted at the site.

5. To remain exempt from the prohibitions of Section 9 of the Endangered Species Act, the non-discretionary Terms and Conditions for incidental take of federally-listed CCC Coho salmon and NC steelhead shall be fully implemented as stipulated in the Biological Opinion entitled, "*Replacement of a Culvert on Dunn Creek with a Bridge and In -stream Fish Passage Enhancement Work on State Route 1, Post Mile 92.83, in Mendocino County, California*" (pages 1- 40) dated February 28, 2011. Project authorization under the NWP is conditional upon compliance with the mandatory terms and conditions associated with incidental take. Failure to comply with the terms and conditions for incidental take, where a take of a federally-listed species occurs, would constitute an

unauthorized take and non-compliance with the NWP authorization for your project. The NMFS is, however, the authoritative federal agency for determining compliance with the incidental take statement and for initiating appropriate enforcement actions or penalties under the Endangered Species Act.

6. The USFWS concurred with the determination that the project was not likely to adversely affect northern spotted owl. This concurrence was premised, in part, on project work restrictions outlined in the USFWS letter dated March 14, 2011. These work restrictions are incorporated as special conditions to the NWP authorization for your project to ensure unauthorized incidental take of species and loss of critical habitat does not occur.

7. Immediately post construction, a topographic survey of the channel cross-sections at points downstream and upstream of the project reach will be completed. A topographic survey of the river thalwag profile for 500 feet upstream and downstream, with survey points at less than 100 foot intervals, will also be completed. Annual geomorphic monitoring at these locations shall be preformed five times post construction. For each report current geomorphic conditions shall be reported through survey of channel cross-sections, thalwag profile, and field observations. Reports should be submitted to the Corps and the RWQCB upon completion. Should monitoring indicate vertical degradation, bank in-stability, channel incision, or changes in creek conditions up or down stream of the project reach then the applicant shall propose recommendations to alleviate concerns. After receiving approval from the Corps, the changes will be implemented. Photographs will also be taken periodically from establish points for evaluation.

You may refer any questions on this matter to Paula Gill of my Regulatory staff by telephone at 415-503-6776 or by e-mail at Paula.C.Gill@usace.army.mil. All correspondence should be addressed to the Regulatory Division, referencing the file number at the head of this letter.

The San Francisco District is committed to improving service to our customers. My Regulatory staff seeks to achieve the goals of the Regulatory Program in an efficient and cooperative manner, while preserving and protecting our nation's aquatic resources. If you would like to provide comments on our Regulatory Program, please complete the Customer Service Survey Form available on our website: http://www.spn.usace.army.mil/regulatory/.

Sincerely,

for Jane M. Hicks
Chief, Regulatory Division

Enclosures

Copy Furnished (w/ encl 1 only):
CA RWQCB, Redding, CA

Copy Furnished (w/o encls):
U.S. EPA, San Francisco, CA
CA SWRCB, Sacramento, CA

CALIFORNIA DEPARTMENT OF FISH AND GAME
NORTHERN REGION
601 LOCUST STREET
REDDING, CA 96001

STREAMBED ALTERATION AGREEMENT
NOTIFICATION NO. 1600-2011-0252-R1
Dunn Creek

CALIFORNIA DEPARTMENT OF TRANSPORTATION
DUNN CREEK BRIDGE AND FISH PASSAGE PROJECT

This Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Game (DFG) and the California Department of Transportation (Permittee) as represented by Mr. Frank Demling.

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, Permittee notified DFG on September 23, 2011 that Permittee intends to complete the project described herein.

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

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

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

PROJECT LOCATION

The project is located at the State Route (SR) 1 crossing of Dunn Creek, tributary to North Fork Cottaneva Creek, at Post Mile (PM) 92.83 in the County of Mendocino, State of California; Latitude 39.798746° North, Longitude 123.820405° West.

PROJECT DESCRIPTION

The project is limited to the construction of a new bridge to replace the existing culvert under SR 1 and the reconstruction of approximately 250 linear feet of stream channel, including the installation of 11 boulder weirs and bank protection to provide passage for juvenile and adult anadromous salmonids. The new bridge will be constructed on a new alignment approximately 100 feet downstream of the existing crossing and will be 134

feet long and 47 feet wide. The structure will be a three-span, cast in place concrete bridge with two abutments and two piers located above the ordinary high water mark of the stream. The bridge will provide two 12-foot lanes and 10-foot shoulders. An existing logging road will be realigned and elevated to intersect the highway at a 90-degree angle at the west end of the structure.

Specific construction activities include:

- Establishing equipment and material staging areas,
- Removing vegetation from the work area beneath and adjacent to the new bridge and roadway alignment,
- Constructing an approximately 350-foot long, clear water diversion to route stream flows around the work area,
- Capturing and relocating fish and other aquatic organisms from the dewatered stream reach,
- Constructing two bridge piers founded on sixteen (eight per pier) 24-inch diameter Cast in Drilled Hole (CIDH) piles located slightly above the 100-year flood elevation,
- Placing two bridge abutments, wing walls and a retaining wall on spread footings to support both ends of the bridge,
- Constructing temporary falsework and forms to support the cast in place concrete bridge deck,
- Realigning and reconstructing approximately 250 feet of stream channel and installation of 11 boulder weirs to control the stream profile and facilitate fish passage,
- Placing approximately 13 cubic yards of bank protection rock between the weirs to prevent flanking by stream flows,
- Placing Rock Slope Protection (RSP) to protect the bank at abutment 4,
- Constructing four new drainage systems, including grated drop inlets, 24-inch-diameter culverts, elbows, downdrains, and rock-lined ditches or rock energy dissipators to maintain existing flow paths,
- Removing the existing structural steel plate pipe culvert, redwood timber box culvert, wing walls, sacked concrete, gabions and associated roadway fill at the existing crossing, and
- Restoring and revegetating areas of temporary disturbance with a regionally appropriate California native seed mix as well as installing seedlings of species native to the area.

PROJECT IMPACTS

Existing fish or wildlife resources the project could substantially adversely affect include: Northern California steelhead (*Oncorhynchus mykiss*), Central California Coast coho salmon (*Oncorhynchus kisutch*), nesting resident and migratory birds, as well other aquatic and riparian species.

The adverse effects the project could have on the fish or wildlife resources identified above include: direct mortality of fish and other aquatic organisms during capture and relocation efforts, potential mortality of nesting birds, eggs or young through vegetation removal and construction disturbance, as well as injury to downstream fish and benthic invertebrates through sediment transport and deposition and/or spills of deleterious materials.

MEASURES TO PROTECT FISH AND WILDLIFE RESOURCES

1 Administrative Measures

Permittee shall meet each administrative requirement described below.

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

1.2 Providing Agreement to Persons at Project Site. Permittee shall provide copies of the Agreement and any extensions and amendments to the Agreement to all persons in responsible positions who will be working on the project at the project site on behalf of Permittee, including but not limited to contractors, subcontractors, inspectors, and monitors.

1.3 Notification of Conflicting Provisions. Permittee shall notify DFG if Permittee determines or learns that a provision in the Agreement might conflict with a provision imposed on the project by another local, state, or federal agency. In that event, DFG shall contact Permittee to resolve any conflict.

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

2 Avoidance and Minimization Measures

To avoid or minimize adverse impacts to fish and wildlife resources identified above, Permittee shall implement each measure listed below.

PROJECT TIMING

2.1 All work within the stream channel or on the stream banks shall be confined to the period commencing June 15 and ending October 15, of any year in which this Agreement is valid. If weather conditions permit and stream flows remain low, Permittee may perform work in the channel or on the stream banks after October 15 provided a written request is made to the Department at least 5 days before the

proposed work period variance. Written approval from the Department for the work period variance must be received by the Permittee prior to the start or continuation of work after October 15.

2.2 If work is performed in the channel or on the stream banks after October 15, the Permittee shall do all of the following:

a. Stage erosion and sediment control materials at the work site.

b. Monitor the seventy-two (72) hour forecast from the National Weather Service.

c. When the 72-hour forecast indicates a probability of precipitation of 60% or greater, or at the onset of any precipitation, ground disturbing activities shall cease and erosion control measures shall be implemented to stabilize exposed soils and prevent the mobilization of sediment into the stream channel or adjacent wetland or riparian areas.

HABITAT AND SPECIES PROTECTION

2.3 Prior to initiating vegetation- or ground-disturbing Project activities, Permittee shall clearly delineate the limits of the work area. Permittee shall restrict all Project activities to the designated work area and shall maintain all fencing, stakes and flags until the completion of Project activities.

2.4 Removal of existing vegetation shall not exceed the minimum necessary to complete operations.

2.5 All vegetated areas beyond the construction limits shall be protected as Environmentally Sensitive Areas (ESAs) and shall be off limits to construction equipment and personnel.

2.6 ESA fencing shall be installed as the first order of work. The placement of ESA fencing shall be inspected and approved by DFG prior to the initiation of work. Permittee shall provide written notification for inspection a minimum of 5 working days prior to beginning work. If DFG is unable to conduct a site inspection during this period, the inspection may be conducted by the Environmental Construction Liaison and the results forwarded to DFG for approval.

2.7 ESA fencing shall consist of temporary orange construction fence or other highly visible material that clearly delineates the limits of the work area. Environmentally Sensitive Areas shall be clearly shown on the Project plans and drawings. The Permittee shall ensure that the contractor, subcontractors, and all personnel working on the Project are instructed on the purpose of the ESA fencing and understand the limits of the work area.

2.8 Removal of tree limbs and shrubs from the work area shall take place between September 1 and February 28 to avoid impacts to nesting birds.

2.9 Redwood and Douglas-fir trees with a diameter-at-breast-height (dbh) greater than 12 inches that must be cleared from the work area shall be made available to the California Conservation Corps (CCC) or other State funded entity for instream restoration and habitat improvement projects in the Dunn Creek/Cottaneva Creek watershed. Whenever possible, and safe, trees shall be removed with the root wads intact and attached to at least 20 feet of trunk. It is estimated that 5 redwoods and 1 Douglas-fir will be removed with the root wads attached. An additional 25 redwoods and 6 Douglas-firs will be made available as logs without root wads attached. Focus shall be placed on trees that must be removed for installation of weirs, piers and abutments, as well as excavation for the roadway prism.

2.10 Permittee shall remove restoration trees to a secure storage/staging area to prevent theft or cutting for fire wood pending transport by the CCC or other State funded entity. If, due to scheduling and storage availability, the material cannot be used in the Dunn Creek/Cottaneva Creek watershed, the material will become available for other in-stream restoration projects. The material will remain available to the CCC or other State funded entity for up to one year.

CONSTRUCTION DEWATERING AND FISH RELOCATION

2.11 All work within the channel or on the banks shall be performed when the stream is at low flow. If water is present during construction, all work shall be performed in isolation from surface or subsurface flow.

2.12 If stream flow is present, a temporary stream diversion shall be constructed to isolate the work area from flow. Diversion methods and materials will be based on Construction Site Best Management Practices (BMPs) and site conditions, and will be selected by the environmental construction liaison and/or the fisheries biologist in consultation with the contractor. Flows will then be diverted into a temporary culvert, pipe, or conduit and released downstream from the work area.

2.13 The clear water diversion shall be adequately sized to accommodate the full range of flows that may occur during the diversion period without overtopping into the work area and shall be adequately screened to prevent fish from re-entering the work area.

2.14 Dewatering shall be done in a manner that prevents the discharge of material that could be deleterious to fish, plants or other aquatic life and maintains adequate flows to downstream reaches during all times natural flow would have supported aquatic life.

2.15 If a pump is necessary to accelerate the dewatering, the pump intake must be double-screened to prevent fish from being pumped out with the water. The pump screens shall meet NMFS/DFG screening criteria.

2.16 If subsurface flow is present, any turbid water pumped from the work area shall be used for construction purposes (compaction, dust abatement, etc.) or properly disposed of in an upland area where it will not drain to surface waters or wetlands.

2.17 Permittee shall provide NMFS and DFG with a "Fish Relocation Plan" for review and approval 30 days prior to the start of dewatering and fish relocation activities. The plan shall outline all confirmed fish relocation methods, including the location of the habitat where coho salmon and steelhead are to be relocated.

2.18 Permittee shall notify NMFS and DFG at least one week prior to fish relocation activities to provide an opportunity for NMFS and DFG staff to be present during these activities.

2.19 Fish relocation activities shall be conducted by a qualified fisheries biologist with demonstrated experience handling listed salmonids. Captured fish shall be segregated by size to minimize predation, and maintained in cool, well-oxygenated water until released to suitable habitat outside the construction impact area.

2.20 Water drafting is not authorized by this agreement.

FISH PASSAGE AND CHANNEL RECONSTRUCTION

2.21 All in-channel work, including stream realignment, profile control, boulder weir construction, and installation of bank protection rock shall comply with the fish passage design recommended by the National Marine Fisheries Service (NMFS) and further described in the Biological Assessment dated March 2010, and the Biological Opinion dated February 28, 2011. Weir designs shall be submitted to DFG for review and approval prior to beginning weir construction. DFG shall provide written comments and/or concurrence on the weir designs within 14 days of receipt or the plans shall be considered approved. Final weir designs shall allow for site specific adjustments as determined by a qualified fisheries engineer during weir construction.

2.22 Permittee shall notify NMFS and DFG at least one month prior to the beginning of boulder weir construction in order to provide NMFS and DFG staff with an opportunity to be present during weir construction activities.

2.23 Installation of boulder weirs shall be conducted by a qualified contractor as directed by the engineer. Construction methods shall comply with the California Salmonid Stream Habitat Restoration Manual, Part XII (April 2009) and shall be inspected by a qualified fisheries engineer. Daily QA/QC inspection reports shall be submitted electronically to DFG for review during weir construction.

2.24 The final configuration of the reconstructed stream channel, including but not limited to weir crest elevations, placement of rocks to fill voids within the boulder weirs, and streambed material used to seal the structures and streambed shall be inspected and approved by DFG prior to removing heavy equipment from the work site. If DFG is unavailable for an onsite inspection, Permittee shall provide photos and written documentation for concurrence. DFG shall respond within 5 working days.

BRIDGE CONSTRUCTION AND TEMPORARY STRUCTURES

2.25 Piles for bridge piers shall be installed using the cast-in-drilled-hole (CIDH) method to avoid the use of an impact hammer adjacent to the stream.

2.26 Temporary sheet piles may be installed with a vibratory hammer to facilitate construction of the bridge abutments.

2.27 All falsework, forms, supports or other temporary structures and construction materials shall be removed from the stream channel prior to October 15 unless written approval for a work period variance has been obtained from DFG.

2.28 RSP and energy dissipation materials shall consist of clean rock, competent for the application, sized and properly installed to resist washout. RSP slopes shall be supported with competent boulders keyed into a footing trench with a depth sufficient to properly seat the footing course boulders and prevent instability (typically at least 1/3 diameter of footing course boulders). Excavation spoils shall not be side-cast into the channel nor is any manipulation of the substrate of the channel authorized except as herein expressly provided.

PETROLEUM, CHEMICAL AND OTHER POLLUTANTS

2.29 All construction-related materials and equipment shall be stored in designated staging areas outside of the floodplain.

2.30 Refueling and vehicle maintenance shall be performed at least 100 feet from streams or other water bodies unless approved in writing by DFG.

2.31 No equipment or machinery shall be operated within any flowing stream.

2.32 Any equipment or vehicles driven and/or operated within or adjacent to the stream channel shall be checked and maintained daily to prevent leaks of materials that could be deleterious to aquatic and terrestrial life or riparian habitat.

2.33 Stationary equipment such as motors, pumps, generators, and welders that contain deleterious materials, located adjacent to the stream channel shall be positioned over drip pans.

2.34 Water that has been in contact with uncured concrete shall be contained in a concrete washout facility, Baker tank, or other impervious container and shall not be discharged to surface or ground waters.

2.35 All construction activities performed in or near the stream shall have absorbent materials designated for spill containment and clean up activities on-site for use in an accidental spill. In the event of a discharge, the Permittee shall immediately notify the California Emergency Management Agency at 1-800-852-7550 and immediately initiate clean up activities. DFG shall be notified by the Permittee and consulted regarding clean-up procedures

2.36 No debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete or washings thereof, asphalt, paint or other coating material, oil or petroleum products or other organic or earthen material from any construction, or associated activity of whatever nature shall be allowed to enter into, or placed where it may be washed by rainfall or runoff into, waters of the State. When operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the high water mark of any stream or lake.

EROSION AND SEDIMENT CONTROL

2.37 The project shall at all times feature adequate erosion and sediment control devices to prevent the degradation of water quality.

2.38 Soils exposed by project operations shall be treated to prevent sediment runoff and transport. Erosion control measures shall include the proper installation and maintenance of approved Best Management Practices (BMPs) and may include applications of seed, weed-free straw, compost, fiber, commercial fertilizer, stabilizing emulsion and mulch, or combinations thereof.

2.39 Permittee shall use only weed-free erosion control materials to prevent the spread of invasive plant species.

2.40 Soils adjacent to the stream channel that are exposed by project operations shall be adequately stabilized when rainfall is reasonably expected during construction, and immediately upon completion of construction, to prevent the mobilization of such sediment into the stream channel or adjacent riparian areas. National Weather Service forecasts shall be monitored by the Permittee to determine the chance of precipitation.

2.41 Following construction, all disturbed upland areas shall be stabilized and reseeded with a regionally appropriate California native seed mix.

2.42 Permittee shall prepare a revegetation plan including but not limited to the following: a planting plan containing a list of the plant species that will be used and

the type and number of plants to be installed; a discussion of measures to be used during the plant establishment period; an annual monitoring plan; and a description of the criteria that will be used to determine whether the revegetation is successful. The revegetation plan shall be approved by DFG prior to the start of project construction.

REPORTING

2.43 Permittee shall provide NMFS and DFG with a summary report by January 15 of the year following completion of fish relocation and monitoring activities. The report shall include the methods used during the fish relocation and monitoring efforts, location, number and species captured, number of mortalities by species, and other pertinent information related to the monitoring and fish relocation activities.

2.44 Permittee shall document the finished condition of the reconstructed stream channel and fish passage structures by providing copies of As-Built plans to NMFS and DFG. The plans shall include the alignment and profile of the finished stream channel as well as the final boulder weir crest elevations.

2.45 An annual monitoring report shall be provided to NMFS and DFG for a minimum of three years following planting to document revegetation performance.

CONTACT INFORMATION

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

To Permittee:

Mr. Frank Demling
Department of Transportation
2656 Union Street
Eureka, CA 95501
Fax: (707) 441-5733
Email: frank_demling@dot.ca.gov

To DFG:

Department of Fish and Game
Northern Region
601 Locust Street
Redding, CA 96001
Attn: Lake and Streambed Alteration Program – Craig Martz
Notification #1600-2011-0252-R1
Fax: (530) 225-2267
Email: cmartz@dfg.ca.gov

LIABILITY

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

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

SUSPENSION AND REVOCATION

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

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

ENFORCEMENT

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

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

OTHER LEGAL OBLIGATIONS

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

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

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

AMENDMENT

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

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

TRANSFER AND ASSIGNMENT

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

The transfer or assignment of the Agreement to another entity shall constitute a minor amendment, and therefore to request a transfer or assignment, Permittee shall submit to DFG a completed DFG "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the minor amendment fee identified in DFG's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

EXTENSIONS

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

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

EFFECTIVE DATE

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

TERM

This Agreement shall expire on December 31, 2014, unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as FGC section 1605(a) (2) requires.

EXHIBITS

The documents listed below are included as exhibits to the Agreement and incorporated herein by reference.

A. Exhibit 1. *Dunn Creek Fish Passage Initial Study with Negative Declaration.* California Department of Transportation. April 4, 2011.

B. Exhibit 2. *Biological Opinion and Incidental Take Statement No. 2010/01856.* National Marine Fisheries Service, Southwest Region. February 28, 2011.

C. Exhibit 3. *California Salmonid Stream Habitat Restoration Manual, Part XII Fish Passage Design and Implementation.* Department of Fish and Game. April 2009.

AUTHORITY

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

AUTHORIZATION

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

CONCURRENCE

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

FOR DEPARTMENT OF TRANSPORTATION

Frank Demling
Project Manager

24 MAY 2012
Date

FOR DEPARTMENT OF FISH AND GAME

Curt Babcock
Habitat Conservation Program Manager

5/25/12
Date

Prepared by: Craig Martz, Staff Environmental Scientist

BIOLOGICAL OPINION

ACTION AGENCY: California Department of Transportation (Caltrans)

ACTION: Replacement of a Culvert on Dunn Creek with a Bridge and Instream Fish Passage Enhancement Work On State Route 1, Post Mile 92.83, in Mendocino County, California

CONSULTATION CONDUCTED BY: National Marine Fisheries Service, Southwest Region

TRACKING NUMBER: 2010/01856

DATE ISSUED: **February 28, 2011**

I. CONSULTATION HISTORY

Caltrans will be acting as the lead agency as per the agreement with the Federal Highways Administration (FHWA) in accordance with Section 6005 (a) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (PL-109-59) to assume the FHWA Secretary's responsibilities under the National Environment Policy Act of 1969 (42 USC § 4351, *et seq.*) and all or part of the FHWA Secretary's responsibilities for environmental review, consultation, or other action required under any environmental law with respect to one or more highway projects within the state.

Caltrans has proposed to replace a culvert with a bridge and improve fish passage at Dunn Creek along State Route (SR) 1 Post Mile (PM) 92.83 in Mendocino County, California. FHWA funding will be used for the project. Approximately 50 feet below the culvert outlet is a 4.5-foot drop that forms a barrier to migrating fish. Caltrans has previously attempted fish passage enhancement projects at this location. On August 26, 1998, NOAA's National Marine Fisheries Service (NMFS) issued a biological opinion permitting the construction of weirs downstream of the culvert outlet and baffles within the culvert designed to enhance fish passage. The weirs have since failed and the drop downstream of the culvert outlet continues to be a barrier to fish passage. Following recent site visits, Caltrans staff has determined that the culvert is reaching the end of its service lifespan. In addition, the bridge is too narrow for large trucks to maneuver through the turn without crossing the highway center line.

This project is proposed by Caltrans in order to fulfill mitigation obligations outlined in the California Department of Fish and Game's (CDFG) Incidental Take Permit (No. 2081-2006-023-03) issued for the Ten Mile River Bridge Replacement Project.

On September 15, 2008, NMFS staff attended a site visit along with staff from Caltrans and CDFG to discuss site access, potential water diversion methods, and the project timeline.

On March 29, 2010, NMFS received Caltrans' March 22, 2010, letter requesting initiation of formal consultation pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 *et seq.*), and the Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Fisheries Conservation and Management Act, as amended, for the replacement of a culvert with a bridge and the installation of rock weirs for fish passage enhancement on Dunn Creek. Caltrans determined that the project, as proposed, is likely to adversely affect listed Central California Coast (CCC) coho salmon (*Oncorhynchus kisutch*) Evolutionary Significant Unit (ESU) and Northern California (NC) steelhead (*Oncorhynchus mykiss*) Distinct Population Segment (DPS), and may affect but will not adversely affect designated critical habitat for CCC coho salmon and NC steelhead. Caltrans also has determined the project may adversely affect EFH for CCC coho salmon.

Included with the Caltrans' letter was their March 2010 *Dunn Creek Bridge and Fish Passage Project Biological Assessment* (Caltrans 2010). On April 28, 2010, NMFS received a formal request from Caltrans for variance from NMFS's Guidelines for Salmonid Passage at Stream Crossings, Section 3.3, for Maximum Hydraulic jump for juvenile salmonids. NMFS initiated consultation with Caltrans on June 15, 2010. Caltrans submitted revised weir designs to NMFS for review on August 3, 2010. On August 4, 2010, NMFS participated in a conference call with Caltrans and CDFG staff to discuss the revised weir designs and the general status of the project. Based on the revised weir designs, NMFS required Caltrans to submit a new request for variance from NMFS's Guidelines for Salmonid Passage at Stream Crossings, Section 3.3, for Maximum Hydraulic jump for juvenile salmonids. Staff from NMFS and Caltrans met at the project site on December 1, 2010, to discuss the revised weir design and to assess if the proposed design warranted variance from NMFS's Guidelines for Salmonid Passage at Stream Crossings. A request for variance was submitted by Caltrans and received by NMFS on December 9, 2010. Upon further discussion, Caltrans and NMFS agreed on a general weir design that will incorporate areas with six inch jumps along the lateral margins of the weir that would provide for juvenile passage, and therefore a variance was not needed.

II. ANALYTICAL FRAMEWORK

A. Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the Status of the Species, which evaluates the CCC coho salmon ESU's and NC steelhead DPS's range-wide conditions, the factors responsible for that condition, and the species' likelihood of both survival and recovery; (2) the Environmental Baseline, which evaluates the condition of this listed species in the action area, the factors responsible for that condition, and the relationship of the action area to the likelihood of both survival and recovery of this listed species; (3) the Effects of the Action, which determines the direct and indirect effects of the proposed Federal action and the effects of any interrelated or interdependent

activities on this species in the action area; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on this species.

The jeopardy determination is made by adding the effects of the proposed Federal action and any Cumulative Effects to the Environmental Baseline and then determining if the resulting changes in species status in the action area are likely to cause an appreciable reduction in the likelihood of both the survival and recovery of this listed species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on the range-wide likelihood of both survival and recovery of this listed species and the role of the action area in the survival and recovery of the listed species. The significance of the effects of the proposed Federal action is considered in this context, taken together with cumulative effects, for purposes of making the jeopardy determination. We use a hierarchical approach that focuses first on whether or not the effects on salmonids in the action area will impact their respective population. If the population will be impacted, we assess whether this impact is likely to affect the ability of the population to support the survival and recovery of the DPS or ESU.

B. Adverse Modification Determination

This biological opinion does not rely on the regulatory definition of destruction or adverse modification of critical habitat at 50 CPR 402.02.[1] Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation the adverse modification analysis in this biological opinion relies on four components: (1) the Status of Critical Habitat, which evaluates the range-wide condition of critical habitat for the CCC coho salmon ESU and NC steelhead DPS in terms of primary constituent elements (PCEs), the factors responsible for that condition, and the intended conservation value of the critical habitat overall; (2) the Environmental Baseline, which evaluates the condition of critical habitat in the action area, the factors responsible for that condition, and the conservation value of the critical habitat in the action area; (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 PCEs in the action area and how that will influence the conservation value of affected critical habitat units; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the conservation value of affected critical habitat units.

For purposes of the adverse modification determination, we add the effects of the proposed Federal action on CCC coho salmon and NC steelhead critical habitat in the action area, and any Cumulative Effects, to the Environmental Baseline and then determine if the resulting changes to the conservation value of critical habitat in the action area are likely to cause an appreciable reduction in the conservation value of critical habitat range-wide. Similar to the hierarchical approach used above, if the proposed action will negatively affect PCEs of critical habitat in the action area we then assess whether the conservation value of the stream reach or river, larger watershed areas, and whole watersheds will be reduced. If these larger geographic areas are

[1] This regulatory definition has been invalidated by Federal Courts.

likely to have their critical habitat value reduced, we then assess whether or not this reduction will impact the value of the ESU or DPS critical habitat designation as a whole.

C. Use of Best Available Scientific and Commercial Information

To conduct the assessment, NMFS examined an extensive amount of information from a variety of sources. Detailed background information on the biology and status of the listed species and critical habitat has been published in a number of documents including peer reviewed scientific journals, primary reference materials, and governmental and non-governmental reports. Additional information regarding the effects of the project's actions on the listed species in question, their anticipated response to these actions, and the environmental consequences of the actions as a whole was formulated from the aforementioned resources, the biological assessment for this project, and project meeting notes if applicable. For information that has been taken directly from published, citable documents, those citations have been referenced in the text and listed at the end of this document.

III. DESCRIPTION OF THE PROPOSED ACTION

The California Department of Transportation (Caltrans) proposes to replace a failing 9-foot-diameter culvert with a new bridge at SR 1 over Dunn Creek in Mendocino County, California and install rock weirs to enhance fish passage and provide channel grade control at this location. The proposed work for this project is scheduled to last one year in either 2012 or 2013 and instream work will only occur between June 15 and October 15, unless a work window extension is granted by NMFS. Work outside of the live stream channel on the adjacent slopes, which includes vegetation clearing and abutment construction, will be conducted year round.

A. Description of Project Activities

The existing culvert consists of a 9-foot (ft)-diameter structural steel plate pipe (SSPP) culvert that was installed in 1956 and is located approximately 2,863 feet upstream of the confluence with North Fork Cottaneva Creek. The SSPP culvert is encased within a pre-existing redwood timber box culvert that dates back to the early 20th Century. The culvert carries Dunn Creek under State Route 1, Post Mile (PM) 92.83. Channel head-cutting, apparently caused by the culvert over time, has resulted in a 4-foot drop located approximately 50 feet downstream of the culvert outlet. This drop in the channel is a barrier to anadromous fish passage (CDFG 2008, NMFS 2010). Caltrans has implemented multiple projects in the past in an attempt to enhance fish passage at this culvert. These have included the installation of gabion rock weirs downstream of the crossing and baffles within the culvert. The baffles have improved passage through the culvert, however the gabion weirs have failed and the drop downstream of the culvert remains a barrier. Caltrans proposes to construct 11 rock weirs within the project area to enhance fish passage and eliminate channel head-cutting. The removal of the culvert and enhancement of fish passage will result in long-term beneficial effects for salmonids by increasing both the area and accessibility of suitable habitat for spawning and rearing.

1. Accessing the Project Area

Primary access to the site will occur from State Route 1. Potential staging areas will include the northbound lane and shoulder turnouts at PMs 91.08, 91.76, 92.23, and 92.50. This will require one-way traffic control during work hours for the duration of the project. Construction of the bridge piers will require access to the lower portions of the slopes adjacent to the creek. The steepness of the bank slopes will most likely require placement of temporary fill material in the channel in order to gain better access to the channel.

2. Dewatering the Project Area

The project will include a clear water diversion in order to dewater the work area. Water bladders or other structures such as sandbags will be installed at the upstream end of the existing culvert to create a check dam. The total dewatered work area (length) will be approximately 350 ft of Dunn Creek, which will begin June 15. Stream flow will be bypassed around the entire work area in a pipe. Velocities inside the diversion pipe shall not exceed ambient velocities upstream and/or downstream of the dewatered area. If a pump is necessary to assist with dewatering of the action area, the pump will be double-screened to prevent fish entrainment. The mesh on the screens will meet NMFS and CDFG guidelines for fish screening criteria.

3. Fish Collection and Relocation

Fish collection and relocation within the dewatered section of Dunn Creek will be conducted by a NMFS/CDFG approved biologist. Methods used to capture and relocate fish may include dip net, seine, and electrofishing. Whether fish are relocated upstream or downstream of the work area will be determined by the biologist prior to initial diversion activities. The fisheries biologist will note the number of each species observed in the affected area, the number of fish relocated, and the date and time of collection and relocation. If any dead or critically wounded fish are observed, they will be collected and placed in an appropriately sized whirl-pack or zip-lock bag, labeled with the date and time of collection, fork length, and location of capture, and frozen as soon as possible.

4. Bridge Construction and Culvert Removal

a. *Bridge Construction*

The new bridge will be constructed downstream of the existing road alignment by 100 feet from the centerlines of the two alignments. The new bridge will be a 134-foot-long concrete slab structure with two 12-foot lanes and two 10-foot shoulders. The bridge will require three spans supported by two piers (middle supports) and two abutments (end supports) with all foundation work using the Cast in Drilled Hole (CIDH) method. The bridge spans will be composed of a Cast-In-Place reinforced concrete slab. The piers will consist of sixteen (eight at each pier) 24-inch diameter piles. The use of CIDH piles will eliminate the use of an impact hammer, thereby reducing impacts to ESA-listed salmonids. The support piers will be placed slightly above the 100 year flood level. Two short seat type concrete abutments will be constructed (Abutment 1 at the southwest end of bridge and Abutment 4 at the northeast end). Abutment 1 will be flanked

by a wingwall and retaining wall, while Abutment 4 will be flanked by wingwalls. The retaining and/or wing walls are designed to support back fill placed behind the abutments for elevating the road to the bridge level. The retaining wall will sit on a concrete spread footing. All areas affected during the construction of the bridge will eventually be impacted by the removal of the culvert, construction of the fish passage weirs, and the realignment of the entrance to a private access road owned by the Soper-Wheeler Company (Soper-Wheeler).

b. *Culvert Removal*

The existing culvert will be removed after construction of the new bridge has been completed. All man-made materials associated with the culvert (*i.e.,* the SSPP culvert, redwood timbers for the box culvert, sacked concrete, and the overlying highway materials) will be removed and disposed of in an appropriate manner. The removal of the culvert will necessitate cutting the bank slopes back on both sides of the culvert. Natural materials (*i.e.,* soil and duff) removed from the adjacent bank slopes during the culvert removal process will be placed back on the reconfigured slopes after the fish passage work is completed.

5. Road Re-alignment

The existing road alignment for SR 1 includes a tight curve radius over Dunn Creek. State Route 1 is a two lane road with one lane in both directions. The road alignment for the new bridge will be approximately 100 feet downstream of the existing alignment (measured from centerline to centerline). The new bridge design and alignment will allow for an increased turning radius and allow the existing bridge to remain in use during construction of the new bridge. Constructing the bridge upstream of the existing alignment would require cutting into the banks and substantially altering the private Soper-Wheeler access road. Once the new bridge is constructed, Caltrans will realign the entrance of the Soper-Wheeler access road and will remove a portion of the existing highway.

6. Instream Enhancement Features to Improve Fish Passage and Grade Control

Caltrans proposes to construct eleven V-shaped rock weirs in Dunn Creek designed to enhance fish passage and provide channel grade control by minimizing or preventing channel head cutting. Construction of the weirs will eliminate the 4-foot drop in the channel bed that is currently acting as a barrier to salmonids. Each weir will be constructed with one-half to two-ton rock, will span the width of the channel, and would be keyed into the channel bed and creek banks to prevent undercutting and flanking. The locations of the weirs are based on recommendations provided by CDFG. The weirs will be distributed approximately 20 feet apart along approximately 220 feet of the creek, which will include portions of the channel that are currently upstream and downstream of the culvert. This length of the creek channel is located within Caltrans' easement. Each weir has been designed to adequately pass all anadromous salmonid life stages. The height differential between the top of the weir crest to the surface of the water below is twelve inches. However, through coordination with NMFS, the rocks within each weir crest will be positioned in order to create some areas with smaller (six inch) jumps that will meet the maximum hydraulic jump standard stated in the NMFS' Guidelines for Salmonid Passage at Stream Crossings for juveniles. Existing rocks from previous weirs and the failed

gabions may be incorporated into the construction of the new weirs. All of the gabion wire from previous weirs will be removed from the site.

The overall design for fish passage will include realigning portions of the creek to avoid impacts to several large trees, including two large redwood trees (4 and 6-foot diameter at breast height (DBH)) located higher up on the left stream bank near the culvert inlet. To protect the bank in front of the two large trees by reducing un-natural rates of erosion, Caltrans has proposed to use bio-engineering methods, although a small amount of rock slope protection (RSP) may be necessary. If RSP is used, the creek may extend up to the rocks during ordinary high water flows. Also, due to the lower bank slope at this location, Caltrans anticipates that if RSP is required, riparian trees could be planted within the RSP. The new channel design will be 202 feet long and varies between 25 to 35 feet in width with a change in elevation of approximately 10.5 feet.

An additional small area of RSP will be installed at one of the new bridge abutments to better protect against scour after the creek channel is re-aligned. The area covered by RSP will be approximately 3,500 square feet (assuming an estimated 35 feet along the bank by 10 feet up the bank) and will be in accordance with the California Bank and Shore Rock Slope Protection Design: Practitioner's Guide and Field Evaluations of Riprap Methods (Caltrans 2000). Caltrans estimates the rock sizes to be one-quarter to one-half ton, and the RSP will override a layer of gravel which will help with interstitial plantings. Caltrans anticipates that due to the steepness of this RSP area (1:1), herbaceous species such as ferns will be planted within the RSP, but trees will not be planted.

7. Proposed Measures to Minimize and Avoid Impacts

Caltrans has proposed measures to minimize project induced impacts to salmonids and their habitat related to erosion and sediment delivery, the introduction of toxins and other pollutants (*i.e.,* oils, fuel), and general impacts to the stream and riparian habitat during construction activities (Caltrans 2010). These will include the following:

1. Construction activities within the stream will be confined to the period of June 15-October 15.

2. Work on the bank slopes during or immediately after a rain event will be limited, minimizing the chance of material falling down the slopes and entering the creek bed.

3. Barriers will be placed, where appropriate, below construction activities to capture material and reduce the possibility of material sliding down the bank slopes and entering the creek.

4. Equipment fueling and waste storage and handling on site will be necessary, and will be performed in accordance with current State and Federal regulations, Best Management Practices, and an approved Stormwater Pollution Prevention Plan (SWPPP) or Water Pollution Control Plan (WPCP). Specific fueling and waste handling locations and procedures will be clearly identified in the SWPPP or WPCP.

5. Construction vehicles and equipment will be maintained to prevent contamination of soil or water from external grease and oil or from leaking hydraulic fluid, fuel, oil, and grease.

6. All vegetated areas beyond the construction zone will be marked as Environmentally Sensitive Areas (ESA) with flagging or fencing. The ESA areas will be marked as such on the project plans.

7. After completion of the project, all construction material will be completely removed and hauled from the site.

8. Areas temporarily affected along with newly constructed slopes will be treated for erosion control (mulched and seeded) upon completion of the construction activities and revegetated with a regionally appropriate California native seed mix and seedlings of plant species found on the site. Slash and duff that had previously been removed will be spread over the site as much as possible to facilitate regeneration of natural ground cover.

9. Removal of trees providing shade over the stream has been minimized as much as possible.

10. If a pump is necessary to accelerate the dewatering, the pump intake will be double-screened to prevent fish from being pumped out with the water. The pump screens shall meet the following NMFS/CDFG fish screening criteria:

a. Perforated plate: screen opening shall not exceed 3/32 inches (2.38 millimeter (mm)), measured in diameter.
b. Woven Wire: screen openings shall not exceed 3/32 (2.38 mm), measured diagonally.
c. Screen material shall provide a minimum of 27% open area.
d. Approach velocity shall not exceed 0.33 ft per second.

11. The bridge design includes the use of CIDH piles, eliminating the use of an impact hammer.

B. Description of the Action Area

The action area includes "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR § 402.02). For this consultation the action area includes the bank slopes adjacent to the creek and the creek channel itself from approximately 100 feet upstream of the culvert inlet downstream approximately 3,000 feet, to the confluence with the North Fork Cottaneva Creek. The action area will extend to the confluence with the North Fork Cottaneva Creek because of potential effects associated with temporary increases in turbidity downstream of the project area during the construction process. NMFS assumes that the temporary pulses of turbidity will be diluted to levels that are unlikely to adversely affect salmonids once joining the North Fork Cottaneva Creek.

The construction area and dewatered area consists of 1.5 acres (65,340 square feet), of which 0.56 acre is currently paved highway, 0.08 acre is existing logging road (Soper-Wheeler), 0.15 acre of stream channel, 0.02 acre of stream that is within the existing culvert, and 0.69 acres of

mixed conifer forest. Overall, approximately 350 feet of stream are included, of which 87 feet are within the existing culvert.

IV. STATUS OF THE SPECIES/CRITICAL HABITAT

This biological opinion analyzes the effects of the proposed action on the salmon ESU and steelhead DPS listed below:

- CCC coho salmon ESU, listed as endangered under the ESA (70 FR 37160)
- NC steelhead DPS, listed as threatened under the ESA (71 FR 834).

The action area is within the designated critical habitat listed below:

- CCC coho salmon critical habitat (64 FR 24049)
- NC steelhead critical habitat (70 FR 52488).

A. Species Life History

1. Coho Salmon

The life history of coho salmon in California has been well documented by Shapovalov and Taft (1954) and Hassler (1987). In contrast to the life history patterns of other anadromous salmonids, coho salmon in California generally exhibit a relatively simple three year life cycle (Shapovalov and Taft 1954, Hassler 1987). Adult coho salmon typically begin the freshwater migration from the ocean to their natal streams after heavy late fall or winter rains breach the sandbars at the mouths of coastal streams (Sandercock 1991). Delays in river entry of over a month are not unusual (Salo and Bayliff 1958, Eames *et al.* 1981). Migration continues into March, generally peaking in December and January, with spawning occurring shortly after arrival to the spawning ground (Shapovalov and Taft 1954).

Coho salmon are typically associated with medium to small coastal streams characterized by heavily forested watersheds; perennially-flowing reaches of cool, high-quality water; dense riparian canopy; deep pools with abundant overhead cover; instream cover consisting of large, stable woody debris and undercut banks; and gravel or cobble substrates.

Female coho salmon choose spawning sites usually near the head of a riffle, just below a pool, where water changes from a laminar to a turbulent flow and small to medium gravel substrate are present. The flow characteristics of the location of the redd usually ensure good aeration of eggs and embryos, and flushing of waste products. The water circulation in these areas also facilitates fry emergence from the gravel. Preferred spawning grounds have: nearby overhead and submerged cover for holding adults; water depth of 4 to 21 inches; water velocities of 8 to 30 inches per second; clean, loosely compacted gravel (0.5 to 5 inch diameter) with less than 20 percent fine silt or sand content; cool water ranging from 39 degrees (°) to 50° Fahrenheit (F)

with high dissolved oxygen of 8 milligrams per liter (mg/L); and inter-gravel flow sufficient to aerate the eggs. Lack of suitable gravel often limits successful spawning.

Each female builds a series of redds, moving upstream as she does so, and deposits a few hundred eggs in each. Fecundity of female coho salmon is directly proportional to size; each adult female coho salmon may deposit from 1,000 to 7,600 eggs (Sandercock 1991). Briggs (1953) noted a dominant male accompanies a female during spawning, but one or more subordinate males may also engage in spawning. Coho salmon may spawn in more than one redd and with more than one partner (Sandercock 1991). Coho salmon are semelparous meaning they die after spawning. The female may guard a redd for up to two weeks (Briggs 1953).

The eggs generally hatch after four to eight weeks, depending on water temperature. Survival and development rates depend on temperature and dissolved oxygen levels within the redd. According to Baker and Reynolds (1986), under optimum conditions, mortality during this period can be as low as 10 percent; under adverse conditions of high scouring flows or heavy siltation, mortality may be close to 100 percent. McMahon (1983) found that egg and fry survival drops sharply when fine sediment makes up 15 percent or more of the substrate. The newly-hatched fry remain in the redd from two to seven weeks before emerging from the gravel (Shapovalov and Taft 1954). Upon emergence, fry seek out shallow water, usually along stream margins. As they grow, juvenile coho salmon often occupy habitat at the heads of pools, which generally provide an optimum mix of high food availability and good cover with low swimming cost (Nielsen 1992). Chapman and Bjornn (1969) determined that larger parr tend to occupy the head of pools, with smaller parr found further down the pools. As the fish continue to grow, they move into deeper water and expand their territories until, by July and August; they reside exclusively in deep pool habitat. Juvenile coho salmon prefer: well shaded pools at least 3.3 feet deep with dense overhead cover, abundant submerged cover (undercut banks, logs, roots, and other woody debris); water temperatures of 50 degrees to 59 degrees Fahrenheit (°F) (Brett 1952, Bell 1973, Reiser and Bjornn 1979, McMahon 1983), but not exceeding 73° to 77°F (Brungs and Jones 1977) for extended time periods; dissolved oxygen levels of 4 to 9 mg/L; and water velocities of 3.5 to 9.5 inches per second in pools and 12 to 18 inches per second in riffles. Growth is slowed considerably at 64°F and ceases at 68°F (Stein *et al.* 1972, Bell 1973).

Preferred rearing habitat has little or no turbidity and high sustained invertebrate forage production. Juvenile coho salmon feed primarily on drifting terrestrial insects, much of which are produced in the riparian canopy, and on aquatic invertebrates growing within the interstices of the substrate and in leaf litter in pools. As water temperatures decrease in the fall and winter months, fish stop or reduce feeding due to lack of food or in response to the colder water, and growth rates slow. During December through February, winter rains result in increased stream flows. By March, following peak flows, fish resume feeding on insects and crustaceans, and grow rapidly.

In the spring, as yearlings, juvenile coho salmon undergo a physiological process, or smoltification, which prepares them for living in the marine environment. They begin to migrate downstream to the ocean during late March and early April, and out-migration usually peaks in mid-May, if conditions are favorable. Emigration timing is correlated with peak upwelling currents along the coast. Entry into the ocean at this time facilitates more growth and, therefore,

greater marine survival (Holtby *et al.* 1990). At this point, the smolts are about four to five inches in length. After entering the ocean, the immature salmon initially remain in nearshore waters close to their parent stream. They gradually move northward, staying over the continental shelf (Brown *et al.* 1994). Although they can range widely in the north Pacific, movements of coho salmon from California are poorly understood.

2. Steelhead

Steelhead are anadromous forms of *O. mykiss*, spending some time in both freshwater and saltwater. Steelhead young usually rear in freshwater for one to three years before migrating to the ocean as smolts, but rearing periods of up to seven years have been reported. Migration to the ocean usually occurs in the spring. Steelhead may remain in the ocean for one to five years (two to three years is most common) before returning to their natal streams to spawn (Busby *et al.* 1996). The distribution of steelhead in the ocean is not well known. Coded wire tag recoveries indicate that most steelhead tend to migrate north and south along the continental shelf (Barnhart 1986).

Steelhead can be divided into two reproductive ecotypes, based upon their state of sexual maturity at the time of river entry and the duration of their spawning migration: stream maturing and ocean maturing. Stream maturing steelhead enter fresh water in a sexually immature condition and require several months to mature and spawn, whereas ocean maturing steelhead enter fresh water with well-developed gonads and spawn shortly after river entry. These two reproductive ecotypes are more commonly referred to by their season of freshwater entry (*i.e.*, summer [stream maturing] and winter [ocean maturing] steelhead). The timing of upstream migration of winter steelhead is correlated with higher flow events, such as freshets or sandbar breaches. Adult summer steelhead migrate upstream from March through September. In contrast to other species of *Oncorhynchus*, steelhead may spawn more than one season before dying (iteroparity); although one-time spawners represent the majority.

Because rearing juvenile steelhead reside in freshwater all year, adequate flow and temperature are important to the population at all times (CDFG 1997). Outmigration appears to be more closely associated with size than age. In Waddell Creek, Shapovalov and Taft (1954) found steelhead juveniles migrating downstream at all times of the year, with the largest numbers of young-of-year (YOY) and age 1+ steelhead moving downstream during spring and summer.

Survival to emergence of steelhead embryos is inversely related to the proportion of fine sediment in the spawning gravels. However, steelhead are slightly more tolerant than other salmonids, with significant reductions in survival when fine materials of less than 0.25 inches in diameter comprise 20 to 25 percent of the substrate. Fry typically emerge from the gravel two to three weeks after hatching (Barnhart 1986).

Upon emerging from the gravel, fry rear in edgewater habitats and move gradually into pools and riffles as they grow larger. Older fry establish territories which they defend. Cover is an important habitat component for juvenile steelhead, both as a velocity refuge and as a means of avoiding predation (Meehan and Bjornn 1991). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids.

Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. In winter, juvenile steelhead become less active and hide in available cover, including gravel or woody debris.

Water temperature influences the metabolic rate, population density, and swimming ability of rearing juvenile steelhead (Barnhart 1986, Bjornn and Reiser 1991, Myrick and Cech 2005). Optimal temperatures for steelhead growth range between 50° and 68°F (Hokanson *et al.* 1977, Wurtsbaugh and Davis 1977, Myrick and Cech 2005). Steelhead can survive for brief periods in water up to 80°F with saturated dissolved oxygen and plentiful food available. Fluctuating diurnal water temperatures also aid in survivability of salmonids (Busby *et al.* 1996). Bell (1973) found that suspended sediment loads of less than 25 mg/L were suitable for rearing juvenile steelhead.

B. Status of the Species and Critical Habitat

In this opinion, NMFS assesses four population viability parameters to help us understand the status of listed salmonids and their populations' ability to survive and recover. These population viability parameters are: abundance, population growth rate, spatial structure, and diversity (McElhany *et al.* 2000). While there is insufficient information to evaluate these population viability parameters in a thorough quantitative sense, NMFS has used existing information to determine the general condition of each population and factors responsible for the current status of each DPS or ESU.

We use these population viability parameters as surrogates for numbers, reproduction, and distribution, the criteria found within the regulatory definition of jeopardy (50 CFR 402.20). For example, the first three parameters are used as surrogates for numbers, reproduction, and distribution. We relate the fourth parameter, diversity, to all three regulatory criteria. Numbers, reproduction, and distribution are all affected when genetic or life history variability is lost or constrained resulting in reduced population resilience to environmental variation at local or landscape-level scales.

1. Status of the CCC Coho Salmon ESU

Historically, the CCC coho salmon ESU was comprised of approximately 76 coho salmon populations. Most of these were dependent populations that needed immigration from other nearby populations to ensure their long term survival, as described above. Historically, there were 11 functionally independent populations and one potentially independent population of CCC coho salmon (Spence *et al.* 2008). Most of the populations in the CCC coho salmon ESU are currently doing poorly. Low abundance is common, and some populations have been extirpated, as described below. A comprehensive review of estimates of historic abundance, decline, and present abundance of coho salmon in California is provided by Brown *et al.* (1994). They estimated that annual spawning numbers of coho salmon in California ranged between 200,000 and 500,000 fish in the 1940's, which declined to about 100,000 fish by the 1960's, followed by a further decline to about 31,000 fish by 1991. Brown *et al.* (1994) concluded that the abundance of California coho salmon had declined more than 94 percent since the 1940's, with the greatest decline occurring since the 1960's. More recent abundance estimates vary from

approximately 600 to 5,500 adults (Good *et al.* 2005). Recent NMFS status reviews (NMFS 2001, NMFS 2003, Good *et al.* 2005, Spence *et al.* 2008) indicate that the CCC coho salmon are likely continuing to decline in number.

CCC coho salmon have also experienced acute range restriction and fragmentation (Brown and Moyle 1991). Adams *et al.* (1999) found that in the mid 1990's coho salmon were present in 51 percent (98 of 191) of the streams where they were historically present, and documented an additional 23 streams within the CCC coho salmon ESU in which coho salmon were found for which there were no historical records.

Recent genetic research in progress by both the NMFS Southwest Fisheries Science Center and the Bodega Marine Laboratory has documented a reduction in genetic diversity within subpopulations of the CCC coho salmon ESU (Bjorkstedt *et al.* 2005). The influence of hatchery fish on wild stocks has also contributed to the lack of diversity through outbreeding depression and disease. Available information suggests that CCC coho salmon abundance is very low, and the ESU is not able to produce enough offspring to maintain itself (population growth rates are negative). CCC coho salmon have experienced range constriction, fragmentation, and a loss genetic diversity.

Many dependent populations that supported the species overall numbers and geographic distributions have been extirpated. This suggests that populations that historically provided support to dependent populations via immigration have not been able to provide enough immigrants for many dependent populations for several decades. The near-term (10 - 20 years) viability of many of the extant independent CCC coho salmon populations (Garcia River, Gualala River, Russian River, and San Lorenzo River) is of serious concern. These populations may not have enough fish to survive additional natural and human caused environmental change.

Populations categorized as historically dependent comprise the bulk of coho salmon remaining at the southern portion of the CCC coho salmon range, further compromising long-term survival in this area. While the amount of data supporting these conclusions is not extensive, NMFS is unaware of information that suggests a more positive assessment of the condition of the CCC coho salmon ESU. Recent status reviews for CCC coho salmon conclude that this ESU is presently in danger of extinction (Good *et al.* 2005), and on June 28, 2005, NMFS changed the ESA designation of this ESU to endangered (70 FR 37160). Data from adult return counts in 2007/08 and extremely low densities of juveniles found during sampling in the summer and fall of 2007 and 2008 suggests a recent decline in CCC coho salmon across the ESU (Smith 2007, Smith and Leicester 2008, SPAWN 2009). Ocean conditions are suspected as the principle short term cause because of the wide geographic range of declines (Southwest Fisheries Science Center 2008, Lindley *et al.* 2009).

2. Status of the NC Steelhead DPS

Historically, the NC steelhead DPS was comprised of 41 independent populations (19 functionally and 22 potentially independent) of winter run steelhead and 10 functionally independent populations of summer run steelhead (Bjorkstedt *et al.* 2005). Based on the limited data available (dam counts of portions of stocks in several rivers), NMFS' initial status review of

NC steelhead (Busby *et al.* 1996) determined that population abundance was very low relative to historical estimates (1930s and 1960s dam counts), and recent trends were downward in most stocks. Overall, population numbers are severely reduced from pre-1960s levels, when approximately 198,000 adult steelhead migrated upstream to spawn in the major rivers of this DPS (Busby *et al.* 1996, 65 FR 36074).

Updated status reviews reach the same conclusion, and noted the poor amount of data available, especially for winter run steelhead (NMFS 1997, Adams 2000, Good *et al.* 2005). The information available suggests that the DPS population growth rate is negative. Comprehensive geographic distribution information is not available for this DPS, but steelhead are considered to remain widely distributed (NMFS 1997). It is known that dams on the Mad River and Eel River block large amounts of habitat historically used by NC steelhead (Busby *et al.* 1996, Spence *et al.* 2008). Also, hatchery practices in this DPS have exposed the wild population to genetic introgression and the potential for deleterious interactions between native stock and introduced steelhead. Historical hatchery practices at the Mad River hatchery are of particular concern, and included out-planting of non-native Mad River hatchery fish to other streams in the DPS and the production of non-native summer steelhead (65 FR 36074). The conclusion of the most recent status review (Good *et al.* 2005) echoes that of previous reviews. Abundance and productivity in this DPS are of most concern, relative to NC steelhead spatial structure (distribution on the landscape) and diversity (level of genetic introgression). The lack of data available also remains a risk because of uncertainty regarding the condition of some stream populations. Spence *et al.* (2008) affirms previous determinations by Busby *et al.* (1996) and Good *et al.* (2005), that the NC steelhead DPS is likely to become endangered in the foreseeable future. Recently, NMFS evaluated the listing status of NC steelhead and proposed maintaining the threatened listing determination (71 FR 834). NMFS is unaware of recent population status information specific to steelhead in the Cottaneva Creek watershed, or more specific to the Dunn Creek sub-basin.

3. Status of Critical Habitat for CCC Coho Salmon and NC Steelhead

The condition of critical habitat for CCC coho salmon and NC steelhead, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that present depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat: logging, agriculture, and mining activities, urbanization, stream channelization, dams, wetland loss, and water withdrawals, including unscreened diversions for irrigation.

Numerous studies have demonstrated that land use activities associated with logging, road construction, urban development, mining, agriculture, and recreation have significantly degraded coho salmon critical habitat quantity and quality in the CCC coho salmon ESU. Impacts of concern include alteration of stream bank and channel morphology, alteration of water temperatures, fragmentation of habitat, loss of downstream recruitment of spawning gravels and large woody debris, degradation of water quality, removal of riparian vegetation resulting in increased stream bank erosion, increases in erosion entry to streams from upland areas, loss of shade (higher water temperatures) and loss of nutrient inputs (61 FR 56138, Busby *et al.* 1996, 70 FR 52488).

Depletion and storage of natural river and stream flows have drastically altered natural hydrologic cycles in many of the streams in CCC coho salmon ESU and NC steelhead DPS. Alteration of flows results in migration delays, loss of suitable habitat due to dewatering and blockage; stranding of fish from rapid flow fluctuations; entrainment of juveniles into poorly screened or unscreened diversions, and increased water temperatures harmful to salmonids.

C. Factors Responsible for Salmonid Stock Declines

NMFS cites many reasons (primarily anthropogenic) for the decline of coho salmon (Weitkamp *et al.* 1995) and steelhead (Busby *et al.* 1996). The foremost reason for the decline in these anadromous populations is the degradation and/or destruction of freshwater and estuarine habitat. Additional factors contributing to the decline of these populations include: commercial and recreational harvest, artificial propagation, natural stochastic events, marine mammal predation, and reduced marine-derived nutrient transport.

The following section details the general factors affecting anadromous salmon ESUs and steelhead DPSs in California. The extent to which there are species specific differences in population limiting factors is not clear; however, the freshwater ecosystem characteristics necessary for the maintenance of self-sustaining populations of anadromous salmonids are similar.

1. Habitat Degradation and Destruction

The best scientific information presently available demonstrates that a multitude of factors, past and present, have contributed to the decline of west coast salmonids by reducing and degrading habitat by adversely affecting essential habitat features. Most of this habitat loss and degradation has resulted from anthropogenic watershed disturbances caused by urban development, reduced water quality, water development, dams, gravel mining, agriculture, forestry, and lagoon breaching.

a. Urban Development

Urbanization has degraded anadromous fish habitat through stream channelization, flood plain drainage, riparian damage, and both point- and non-point source pollution (61 FR 56138). When watersheds are urbanized, problems can result simply because structures are placed in the path of natural run-off processes, or because the urbanization itself has induced changes in the hydrologic regime.

b. Water Quality

Many waterways fail to meet the Federal Clean Water Act and Federal Safe Drinking Water Act water quality standards due to the presence of pesticides, suspended sediments, heavy metals, dioxins, and other pollutants. Salmon require clean water and gravel for successful spawning, egg incubation, and fry emergence. Excess fine sediments clog the spaces between gravel and restrict the flow of oxygen-rich water to the incubating eggs. Pollutants, excess nutrients, low

levels of dissolved oxygen, heavy metals, and changes in pH also decrease the water quality for salmon and steelhead.

c. Water Development and Dams

Water withdrawals have reduced summer flows in many streams and have thereby decreased the amount and quality of rearing habitat. Water quantity problems are a significant cause of habitat degradation and reduced fish production. Dams have eliminated spawning and rearing habitat and altered the natural hydrograph of most of the major river systems. Depletion and storage of natural flows have altered natural hydrological cycles in many California rivers and streams.

d. Gravel Mining

Over-harvesting of gravel can lead to river incision, bank erosion, habitat simplification, and tributary down-cutting (SEC 1996). Loss of spawning gravels has a direct impact on salmonids. The lack of suitable gravel often limits successful spawning of anadromous salmonids in many streams. Turbidity as a result of increased erosion and sedimentation caused by gravel mining can also be a limiting factor for anadromous salmonid populations.

e. Agriculture

Agricultural practices have contributed to the degradation of salmonid habitat on the West Coast through irrigation diversions, elimination or conversion of riparian and estuarine habitats, decline in water quality, over-grazing in riparian areas, and compaction of soils in upland areas from livestock (61 FR 56138).

f. Forestry

Habitat degradation by forestry activities has mostly occurred in tributaries, which mostly affects spawning and early-rearing juvenile salmonids. Major impacts associated with forestry activities include the loss of large woody debris, debris barriers, increased temperatures, siltation, loss of riparian cover diversity, and road construction and maintenance causing increased sedimentation of fine silts and the filling of pools.

g. Lagoon Breaching

Studies have confirmed that seasonal bar-built lagoons, or estuaries, can be important rearing areas for juvenile salmonids (Smith 1990, Bjorkstedt *et al.* 2005, Bond 2006). Such lagoons can be highly productive habitats especially if the sand bar forms when freshwater inflows are sufficient to eliminate salinity stratification and produce a well-mixed and more productive water column. Breaching of sand bars, particularly during summer and fall when inflows are reduced or non-existent can result in degraded water quality conditions, productivity, and potential fish mortality.

2. Commercial and Recreational Harvest

Ocean salmon fisheries off California are managed to meet the conservation objectives for certain stocks of salmon listed in the Pacific Coast Salmon Fishery Management Plan, including any stock that is listed as threatened or endangered under the ESA. Early records did not contain quantitative data by species until the early 1950's. In addition, the confounding effects of habitat deterioration, drought, and poor ocean conditions on coho salmon, Chinook salmon, and steelhead make it difficult to assess the degree to which recreational and commercial harvest have contributed to the overall decline of salmonids in West Coast rivers.

3. Artificial Propagation

Releasing large numbers of hatchery fish can pose a threat to wild salmon and steelhead stocks through genetic impacts, competition for food and other resources, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production (Waples 1991).

4. Natural Stochastic Events

Natural events such as droughts, landslides, floods, and other catastrophes have adversely affected salmon and steelhead populations throughout their evolutionary history. The effects of these events are exacerbated by anthropogenic changes to watersheds such as logging, roads, and water diversions. These anthropogenic changes have limited the ability of salmon and steelhead to rebound from natural stochastic events and depressed populations to critically low levels.

5. Marine Mammal Predation

The population of some marine mammal species, such as the Harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*), have increased along the Pacific Coast (NMFS 1999). Although predation by these mammals is not believed to be a major factor in overall population decline, there may be substantial localized impacts on salmonids particularly during the migration season (Hanson 1993).

6. Reduced Marine-Derived Nutrient Transport

Marine-derived nutrients from adult salmon carcasses has been shown to be vital for the growth of juvenile salmonids and the surrounding terrestrial and riverine ecosystems (Bilby *et al.* 1996, Bilby *et al.* 1998, Gresh *et al.* 2000). Declining salmon and steelhead populations have resulted in decreased marine-derived nutrient transport to many watersheds, which has contributed to the further decline of ESA-listed salmonid populations (Gresh *et al.* 2000).

7. Ocean Conditions

Recent evidence suggests that poor ocean conditions played a significant role in the low number of returning adult fall run Chinook salmon to the Sacramento River in 2007 and 2008 (Lindley *et al.* 2009). The decline in ocean conditions likely affected ocean survival of all west coast

salmonid populations including CCC coho salmon which were already in low abundance in most watersheds (Good *et al.* 2005, Spence *et al.* 2008).

D. Additional Factors Affecting the Species

The acceptance of global climate change as a scientifically valid and anthropogenically driven phenomenon has been well established by the United Nations Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change, and others (Davies *et al.* 2001, Oreskes 2004, UNFCCC 2006). The most relevant trend in climate change is the warming of the atmosphere from increased greenhouse gas emissions. This warming is inseparably linked to the oceans, the biosphere, and the world's water cycle. Changes in the distribution and abundance of a wide array of biota confirm a warming trend is in progress, and that it has great potential to affect species' survival (Davies *et al.* 2001). In general, as the magnitude of climate fluctuations increases, the population extinction rate also increases (Good *et al.* 2005). Global warming is likely to manifest itself differently in different regions.

Modeling of climate change impacts in California suggests that average summer air temperatures are expected to increase (Lindley *et al.* 2007). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe *et al.* 2004). Total precipitation in California may decline; critically dry years may increase (Lindley *et al.* 2007, Schneider 2007). The Sierra Nevada snow pack is likely to decrease by as much as 70 to 90 percent by the end of this century under the highest emission scenarios modeled (Luers *et al.* 2006). Wildfires are expected to increase in frequency and magnitude, by as much as 55 percent under the medium emissions scenarios modeled (Luers *et al.* 2006). Vegetative cover may also change, with decreases in evergreen conifer forest and increases in grasslands and mixed evergreen forests. The likely change in amount of rainfall in Northern and Central Coastal streams under various warming scenarios is less certain, although as noted above, total rainfall across the state is expected to decline. For the California North Coast, some models show large increases (75 to 200 percent) while other models show decreases of 15 to 30 percent (Hayhoe *et al.* 2004). Many of these changes are likely to further degrade salmonid habitat by, for example, reducing stream flows during the summer and raising summer water temperatures.

V. ENVIRONMENTAL BASELINE

The environmental baseline is the current status of species and critical habitat in the action area based on analysis of the effects of past and ongoing human and natural factors. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impacts of State or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

Dunn Creek is a second order tributary that flows southeast into the North Fork Cottaneva Creek, a major tributary of Cottaneva Creek, which drains to the Pacific Ocean. The Dunn Creek watershed drains approximately 2.0 square miles and has approximately 1.8 miles of blue line

stream (CDFG 2008). Elevations within the Dunn Creek drainage range from 270 feet at the mouth to 1,100 feet in the headwaters.

The Cottaneva Creek watershed is characterized as having a Mediterranean style climate with cool wet winters and warm dry summers. Precipitation in the watershed ranges from 40 to 60 inches, and average annual air temperature ranges from 43° to 67°F (NRCS 1998). Mixed conifer (coastal redwood and Douglas fir) and hardwood forest comprise over 90 percent of the watershed's land cover (NMFS 2009). The entire Cottaneva Creek watershed was rated an eight for soil erodability potential (where 0 = low slide potential and 10 = high slide potential). Most of the watershed is privately owned and managed for timber production. Based on NMFS' analysis of recent aerial imagery (*i.e.,* Google Earth 2010), unpaved road density is high in the North Fork Cottaneva Creek watershed, including the Dunn Creek sub-watershed.

A. Status of Salmonid Habitat within the Action Area

Information on the status of habitat quality within the action area is limited. In September 2008, CDFG conducted a stream habitat assessment and biological inventory of Dunn Creek that began at its confluence with North Cottaneva Creek and extended upstream 1.5 miles (CDFG 2008). During the survey, water temperatures in Dunn Creek ranged from 52 to 58 ° F which is adequate for salmonid rearing. Dunn Creek is a well shaded stream. Mean percent canopy cover was 92 percent and mean percentage as hardwood and coniferous along the stream were 21 and 79 percent, respectively. Seventy-eight of the 79 pool tail-outs measured (99 percent) had embeddedness ratings of 1 or 2, with one pool tail-out rated as 5 (1 = good quality spawning substrate; 5 indicating unsuitable for spawning) (CDFG 2008). Gravel was the dominant substrate class found in pool tail-outs which is indicative of good substrate size for spawning. However, pools with depths greater than 2 feet were scarce (11 percent of all pools observed) and overall pool shelter ratings were considered low, primarily due to a lack of large woody debris (LWD).

CDFG (2008) recommended increasing the amount of woody cover in pools throughout Dunn Creek to encourage greater pool scour and depth, and where feasible, design and engineer pool enhancement structures to increase the number and complexity of pools. However during recent visits to the action area by NMFS staff (Joel Casagrande, NMFS personal observation, August 25 and December 1, 2010) large woody debris immediately upstream and downstream of the project area was abundant. CDFG (2008) indicated that the 4 foot drop just below the culvert at SR 1 was a barrier to juvenile and adult anadromous salmonids and should be upgraded to provide better fish passage.

Based on the information from a recent habitat survey (CDFG 2008) and recent site visits, NMFS believes that the overall PCEs for rearing are moderately degraded because some essential elements (*e.g.,* pool depth and shelter) appear to have been impacted by past logging related activities and the overall PCE for migration are poor due to the barrier located below the SR 1 culvert. Overall, the PCEs for spawning are in good condition based on the high quality substrate observed throughout Dunn Creek in 2008 (CDFG 2008) and during recent site visits.

B. Status of Listed Species within the Action Area

In September 2008, CDFG conducted a snorkel survey at seventeen sites (*i.e.,* pools) in Dunn Creek that extended from 40 feet upstream of the confluence with North Fork Cottaneva Creek to 5,535 feet upstream of the confluence. CDFG observed 2 young-of-the-year (YOY) coho salmon, 81 YOY steelhead/rainbow trout, and 8 age 1+ steelhead /rainbow trout. Of these, only three YOY steelhead/rainbow trout and two age 1+ steelhead/rainbow trout were found upstream of the SR 1 culvert passage barrier, which is located 2,852 feet upstream of the North Fork Cottaneva Creek confluence (CDFG 2008).

Based on the limited survey information described above, NMFS assumes that the density of coho salmon within the action area is extremely low and non-existent upstream of the action area due to the current migration barrier. Multiple age classes of steelhead/rainbow trout were present during the recent survey indicating that successful reproduction persists. Overall, the abundance of steelhead within the action area also appeared to be low (89 total steelhead/rainbow trout observed at 17 pools throughout Dunn Creek), and steelhead/rainbow trout densities upstream of the action area were extremely low.

C. Factors Affecting Species Environment within the Action Area

The drop below the culvert at SR 1 has been identified as a significant barrier to fish passage for all life stages based on its height, the complete absence of juvenile coho salmon upstream, and very low abundance of juvenile steelhead/rainbow trout upstream of this structure. This location has been identified as a high priority restoration target for anadromous fish by both CDFG (2008) and NMFS (2010).

Logging is the current and historic dominant land use in the Cottaneva Creek watershed. Pool tail embeddedness and spawning gravels are currently rated as good in Dunn Creek (CDFG 2008). However, pool development and shelter throughout Dunn Creek are limited due largely to a lack of large woody debris (CDFG 2008), which may be adversely affecting the abundance of both salmonid species.

D. Previous Section 7 Consultations and Section 10 permits in the Action Area

In 1998, NMFS issued a biological opinion for the construction of gabion weirs downstream of the culvert outlet and baffles within the existing culvert which were designed to enhance fish passage. According to NMFS (2009), no other Section 7 consultations have occurred in the action area. A search of the Public Consultation Tracking System (PCTS) for more recent Section 7 Consultations that may have occurred since 2009 resulted in no additional records.

Restoration actions also occur each year throughout Mendocino County and may include the action area. These programmatic consultations include the NOAA Restoration Center's (RC) restoration program and the Regional General Permit programmatic consultation with the CDFG. Both of these consultations authorize a limited amount of take for juvenile salmonids during instream work conducted in the summer months.

Section 10(a)(1)(A) research and enhancement permits and section 4(d) limits or exceptions have been approved for the Cottaneva Creek watershed. Salmonid monitoring approved under these programs includes carcass surveys, smolt outmigration trapping, and juvenile density surveys. In general, these activities are closely monitored and require measures to minimize take during the research activities. Through 2009, no research activities have occurred in Dunn Creek.

VI. EFFECTS OF THE PROPOSED ACTION

The purpose of this section is to identify the direct and indirect effects of the proposed action, and any interrelated or interdependent activities, on endangered CCC coho salmon and threatened NC steelhead and their designated critical habitat. Data to quantitatively determine the precise effects of the proposed action on these species and their critical habitat are limited or not available; the assessment of effects therefore focuses mostly on qualitative identification. This approach was based on knowledge and review of the ecological literature concerning the effects of loss and alteration of habitat elements important to salmonids, including the primary constituent elements of critical habitat. This information was used to gauge the likely effects of the proposed project via an exposure and response framework that focuses on what stressors (physical, chemical, or biotic), directly or indirectly caused by the proposed action, that salmonids and their critical habitat are likely to be exposed to. Next, we evaluate the likely response of salmonids and critical habitat to these stressors in terms of changes to salmonid survival, growth and reproduction, and changes to the ability of PCEs to support the value of critical habitat.

The following effects analysis was done assuming that all aspects of the project were to be completed within the same year. However, according to Caltrans (Lisa Embree, Caltrans, personal communication, November 4, 2010) vegetation clearing on the upper bank slopes, may take place in fall of the year prior to instream work. If so, NMFS assumes that this will likely reduce the total impacts to a portion of the juvenile salmonid populations present within the action area during the two different periods. Many of the juvenile salmonids present in the action area in fall while vegetation clearing occurs will have emigrated during the following winter and spring prior to the instream activities the following summer. Similarly, the new winter/spring cohort of each species will have not been subjected to any potential effects associated with the vegetation removal conducted the previous fall.

A. Fish Relocation Activities

Before and during dewatering the construction site, the applicant proposes to capture and relocate fish away from the work site to avoid direct mortality and minimize the possible stranding of fish in pools that become isolated during the dewatering process. Fish in the project site will be captured by seine, dip net and/or electrofisher, and then transported and released to a suitable location upstream of the project area. Both juvenile steelhead and coho salmon are known to occur in the action area during the summer months. NMFS recognizes that inter-annual variation in abundance of both coho salmon and steelhead may occur within the action area. The length of stream habitat in the project area (263 feet, excluding the 87 feet currently occupied by the culvert) represents less 3 percent of the total available habitat in Dunn Creek

(9,504 feet) and does not include two small tributaries that are also known to support salmonids (CDFG 2008). NMFS anticipates only a small number of juvenile coho salmon will be present in the project reach during the proposed action. NMFS anticipates a greater abundance of juvenile steelhead to be present during the proposed action but overall, the number present of each species within the action area will be minimal compared to the drainage's total population. Salmonid relocation activities will occur during the summer low-flow period after smolts of both species will have emigrated and before adults have immigrated to the proposed project site. Therefore, NMFS expects that only juvenile salmonids will be present in the action area and effected by relocation activities.

Fish relocation activities pose a risk of injury or mortality to rearing juvenile steelhead. Any fish collecting gear, whether passive (Hubert 1996) or active (Hayes *et al.* 1996) has some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish capture varies widely depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Since fish relocation activities will be conducted by qualified fisheries biologists following both the CDFG and NMFS guidelines, direct effects to and mortality of juvenile salmonids during capture will be minimized. Data from two years of similar salmonid relocation activities in Humboldt County indicate that average mortality rate is below one percent (Collins 2004).

Although sites selected for relocating fish should have ample habitat, in some instances relocated fish may endure short-term stress from crowding at the relocation sites. Relocated fish may also have to compete with other fish causing increased competition for available resources such as food and habitat (Keeley 2003). Some of the fish released at the relocation sites may choose not to remain in these areas and may move either upstream or downstream to areas that have more habitat and/or a lower density of fish. As each fish moves, competition remains either localized to a small area or quickly diminishes as fish disperse. NMFS cannot estimate the number of fish affected by competition, but does not believe this impact will be large enough to affect the survival chances of individual fish. For example, the use of multiple release sites will help facilitate fish dispersion, limiting competition. Once the project is complete and following the first precipitation event, juvenile coho salmon and steelhead rearing space will return to the dewatered area.

B. Dewatering

NMFS does not anticipate changes in stream flow within and downstream of project sites during dewatering activities. Although a perennial stream, stream flow in this reach of Dunn Creek during summer is anticipated to be minimal (*i.e.,* less than 0.5 cubic feet per second, (cfs)) and fish will largely be isolated to small pools dispersed in the creek channel. During a site visit in late August 2010, habitat at the project site was reduced to small pools connected by shallow riffle and run habitats (Joel Casagrande, NMFS, personal observation, August 25, 2010).

A stream diversion set-up area will be constructed upstream of the culvert inlet. A coffer dam will be constructed using either sandbags or water bladders. Impounded water will be diverted around the construction area in a pipe and discharged back into the creek channel below the

action area. The total dewatered work area will be approximately 350 feet in length, of which 87 feet is in the existing culvert.

Juvenile salmonids that avoid capture in the project site prior to dewatering will likely die during dewatering. NMFS expects that the number of juvenile salmonids that will be killed as a result of stranding during dewatering activities will be less than those killed during relocation. During the dewatering process, the biologist on site will make every effort to collect and relocate fish that avoided capture prior to the beginning of the dewatering process.

Another manner by which juvenile salmonids may be harmed or killed during dewatering activities is to be entrained into the pumps or discharge line. To eliminate this risk, the applicant will screen all pumps according to NMFS criteria, to ensure that juvenile steelhead will not be harmed by the pumps during dewatering events.

Juvenile salmonids rearing downstream of the action area may be inadvertently affected by the loss of benthic (*i.e.*, bottom dwelling) aquatic macroinvertebrate production within the dewatered area (Cushman 1985). However, effects to aquatic macroinvertebrates resulting from dewatering will be temporary because construction activities will be relatively short-lived, drift from upstream will continue through the pipe, and rapid recolonization (about two to three months) of disturbed areas by macroinvertebrates is expected following construction (Cushman 1985, Thomas 1985, Harvey 1986).

Additional macroinvertebrate loss affected by the removal of bank vegetation will likely be minimal because of the relatively small amount of riparian disturbance related to the project. Based on the foregoing, the loss of aquatic macroinvertebrates as a result of dewatering activities and riparian disturbances is not expected to adversely affect juvenile salmonids present in reaches downstream of the project area. Re-vegetation of the area with native species is expected to restore the food source directly in the disturbed area, while restoring the natural biota.

C. Increased Mobilization of Sediment and Petrochemical Use within the Stream Channel

NMFS anticipates that only short-term increases in turbidity will occur during proposed dewatering activities, construction and removal of cofferdams, sediment removal activities, and potentially during bank vegetation removal. The effects of this turbidity may extend downstream to the confluence with the North Fork Cottaneva Creek, approximately 2,863 feet. After joining the North Fork Cottaneva Creek, NMFS assumes that the turbidity will be reduced to negligible levels due to dilution from greater flows present in the North Fork Cottaneva Creek. In-stream and near-stream construction activities may cause temporary increases in turbidity (reviewed in Furniss *et al.* 1991, Reeves *et al.* 1991, and Spence *et al.* 1996). Sediment may affect salmonid feeding behavior and efficiency, resulting in reduced growth rates (Sigler *et al.* 1984, Newcomb and Jensen 1996). High turbidity concentrations can reduce dissolved oxygen in the water column, effecting respiratory function. Also, because of turbidity, salmonids disperse from established territories, which can temporarily displace fish into less suitable habitats and which can lead to reduced growth rates (Sigler *et al.* 1984).

Much of the research discussed in the previous paragraph focused on turbidity levels higher than those expected to occur during implementation of the proposed activities. Monitoring of newly replaced culverts within Humboldt County indicated temporary increases in turbidity following winter storm events in which the measured turbidity was generally less than the turbidity threshold commonly cited as beginning to cause minor behavioral changes (Henley *et al.* 2000), and always less than turbidity levels necessary to injure or kill salmonids. Impacts associated with degraded water quality will likely be limited to behavioral effects, such as temporarily vacating preferred habitat or temporarily reduced feeding efficiency. These temporary changes in behavior, may reduce growth rates, but are not likely to reduce the survival chances of individual juvenile salmonids. Caltrans has included BMPs to reduce the likelihood of sediments from entering the streams. NMFS assumes that these actions will be effective at reducing sedimentation rates. Any increases in turbidity due to the construction of coffer dams and during the initial re-wetting of the reconfigured channel will likely be minimal due to the incorporation of BMP's and adherence to the listed terms and conditions in this biological opinion. Therefore, any short-term impact associated with turbidity during implementation of this project is expected to be insignificant.

Equipment refueling, fluid leakage, equipment maintenance, and road surfacing activities near the stream channel pose some risk of contamination of aquatic habitat and subsequent injury or death to listed salmonids. The applicant and its contractors propose to maintain any and all fuel storage and refueling site in an upland location well away from the stream channel; that vehicles and construction equipment be in good working condition, showing no signs of fuel or oil leaks, and that any and all servicing of equipment be conducted in an upland location. For instream construction activities, NMFS does not anticipate any localized or appreciable water quality degradation from toxic chemicals or adverse effects to ESA-listed salmonids associated with the proposed project, as the stream will be dewatered, giving the applicant and its contractors ample opportunity to attend to any spill prior to toxic chemicals reaching the waters of Dunn Creek. NMFS anticipates that proposed BMPs and responses by the applicant and its contractors to any accidental spill of toxic materials should be sufficient to restrict the effects to the immediate area and not enter the waterway.

D. Habitat Loss

Temporary habitat loss will result in approximately 0.15 acres (6,534 square feet) of aquatic habitat from the coffer dam and diversion placements and 0.69 acres (30,056 square feet) of upland forested habitat and approximately 70 feet of riparian tree removal on each bank. The proposed activities will only result in temporary disturbances to creek substrate, riparian and upland vegetation, and creek banks during construction. The project necessitates a total of 59 trees, to be removed in the mixed conifer forest on the upland slopes. Of these trees, only three conifers have a diameter at breast height (DHB) of three feet or more, five have a DBH greater than two feet, and 38 of the trees are less than 1.5 feet DBH. While there will be a temporary loss of shade due to the tree clearing, the bridge deck will provide shade to the stream in this exposed area once it is completed. Also, Caltrans will implement a re-vegetation plan for all temporarily affected areas that will include replacing removed trees with the same species. NMFS anticipates that within approximately 10 years the re-planted trees will be of sufficient size to contribute shade to the stream.

Some reduction in large woody debris (LWD) recruitment may occur due to permanent tree removal for the new crossing. LWD is important in providing the habitat complexity in streams needed by salmonids. The creek in and near the action area contains large woody debris in amounts likely to reduce the impacts of this loss of LWD recruitment potential. In addition, the number of large trees removed is small (as described above) and Caltrans will replant all remaining exposed areas after project completion, including the area currently occupied by the road crossing. Therefore, NMFS expects impacts to LWD recruitment in the action area will be minor.

Due to the steepness of the slopes, Caltrans anticipates that it may be necessary to place some temporary fill material on the slopes to allow construction equipment to gain access to the work areas. Overall, these disturbances, in the small area in which they will occur, will not result in permanent adverse impacts to instream habitat.

The replacement of the existing culvert and highway surface with a new bridge will not likely have any permanent adverse impacts to instream habitat. The abutments and piers supporting the new bridge will be constructed at or slightly above the 100 year flood elevation and therefore minimal or no net loss of instream habitat will occur. The removal of the culvert and failed gabion weirs will cause some temporary disturbance during construction; however the long term effects of these activities will be beneficial and will result in additional open channel habitat and enhanced access to upstream habitat for anadromous salmonids that was previously restricted by the barrier.

Bioengineering methods are proposed for the protection of a small section of stream bank (less than 50 feet in length) located at the entrance to the current culvert and two large conifer trees above. If bioengineering methods are not feasible at this location, RSP may have to be used, but Caltrans has acknowledged that riparian trees will be planted at this location if feasible. The creek may extend up to the RSP during OHW flows. In general, the installation of RSP results in reduced channel complexity and simplified, harden channel forms which can be less optimal for aquatic species. Permanent impacts to stream habitat would occur outside of the low flow channel and would not impact summer rearing habitat.

Caltrans also proposes to install RSP along a small section of creek bank in order to protect one of the new bridge abutments. Due to the steepness of the slope in this vicinity, tree plantings will not be incorporated into this RSP, however herbaceous species such as ferns will be planted. Large boulders and cobbles are common along the banks throughout the project area and therefore, based on their abundance, and the small area affected, NMFS does not feel that the introduction of large rocks (*i.e.,* RSP) will result in any significant impact or loss of habitat in the creek at this location.

E. Interrelated and Interdependent Actions

After consulting with Caltrans on projects in the immediate vicinity of the action area (Lisa Embree, Caltrans, personal communication, October 21, 2010), NMFS does not anticipate any interdependent or interrelated actions associated with the proposed action.

F. Beneficial Effects

The activities proposed by Caltrans to improve fish passage and reduce potential head cutting in Dunn Creek have many potential beneficial effects on ESA-listed salmonids. The replacement of the failing culvert with a new bridge will allow for the construction of several rock weirs in the channel that will eliminate a 4.5 foot vertical drop and thus substantially improve fish passage to upstream habitat. Based on a recent habitat assessment in Dunn Creek (CDFG 2008), the quality of available upstream habitat is capable of providing approximately 5,000 feet of additional habitat for both CCC coho salmon and NC steelhead (CDFG 2008). This passage barrier has been identified by NMFS as a priority restoration action for the recovery of CCC coho salmon (NMFS 2010). The replacement of the failing culvert with a bridge will result in the addition of 87 feet of live stream currently occupied by the culvert. The 87 feet of open stream will consist of step-pool habitat created by the constructed rock weirs, which will provide additional and improved rearing habitat for juvenile salmonids within the project area.

VII. CUMULATIVE EFFECTS

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

Soper-Wheeler intends to conduct timber harvest activities upstream of the project area in 2010 and in 2011 (Caltrans 2010). Soper-Wheeler conducts selective logging on its property (Kemset Moore, Caltrans, personal communication, December 1, 2010). If implemented, the logging could result in temporary increases in soil erosion and sediment delivery to the stream bed, which could further impact rearing and spawning PCEs within the action area. This would ultimately depend on the intensity and extent of the timber harvest activities. The proposed action will take place in either 2012 or 2013 and therefore the direct effects of logging in 2010 and 2011 (*e.g.,* temporary increased turbidity levels) will not coincide with those of the proposed activity.

Caltrans has indicated that the only other activity that may occur within the project area in the foreseeable future is routine maintenance of the State Route 1 by Caltrans. This work is not expected to adversely affect Dunn Creek and therefore cumulative impacts from these activities are expected to be avoided.

VIII. INTEGRATION AND SYNTHESIS

CCC coho salmon and NC steelhead present in the action area during the construction window are limited to the juvenile life stage. Only a small number of these fish will be affected by the project, and few (no more than two percent of the total number of captured fish) if any, will perish. This is due to the relocation efforts prior to dewatering and construction and the low injury and mortality rates expected from fish collection methods. The number of juvenile coho

salmon and steelhead likely affected by the proposed project make up a small proportion of juveniles of each species in the entire Cottaneva Creek watershed. NMFS concludes the small potential loss of juveniles during the proposed action is unlikely to impact future adult returns. The relatively large number of juveniles produced by each spawning pair in other areas of the watershed in future years is expected by NMFS to replace the few juveniles that may be lost to effects at the project site. Future populations of juvenile coho salmon and steelhead that do utilize the action area will likely benefit from the improved habitat within the immediate project area and greater access to upstream habitat for spawning and rearing. This will ultimately allow their distribution and abundance within the drainage to improve.

NMFS anticipates that short-term increases in turbidity will occur during proposed dewatering activities, construction and removal of the coffer dams. These impacts will be temporary, and NMFS anticipates that proposed BMPs will control sediment and other pollutants sufficiently to avoid adverse effects to listed salmonids. Also, during the proposed action, NMFS does not anticipate any noticeable change in flow conditions above and below the diversion dam that would affect fish movement in these areas. No permanent adverse changes in stream flow are anticipated. Although temporary reduction in LWD recruitment may occur, the number of large trees removed will be minimal and Caltrans will replant all disturbed areas. Sufficient LWD is likely present in the channel in the action area to buffer the temporary loss of recruitment. Therefore, NMFS believes that the effects of turbidity increases, temporary flow diversions and minor reduction in LWD recruitment from the project activities will not have any long-term impacts to the PCEs of CCC coho salmon and NC steelhead habitat. The value of critical habitat in the action area for species conservation is not likely to be reduced, but instead will be increased by the addition of 87 feet of stream channel currently occupied by the culvert, and enhanced access to a significant portion of habitat in the upper watershed.

IX. CONCLUSION

After reviewing the best available scientific and commercial information, the current status of the species and critical habitat, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is NMFS' biological opinion that the replacement of the culvert with a new bridge and the construction of multiple rock weirs that will enhance fish passage in Dunn Creek in northern Mendocino County, California, is not likely to jeopardize the continued existence of endangered CCC coho salmon and threatened NC steelhead.

After reviewing the best available scientific and commercial information, the current status of critical habitat, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is NMFS' biological opinion that the replacement of the culvert with a new bridge and the construction of multiple rock weirs that will enhance fish passage in Dunn Creek, is not likely to destroy or adversely modify designated critical habitat for endangered CCC coho salmon and threatened NC steelhead.

X. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS as an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, 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 the purpose of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement. Caltrans will adhere to the Term and Conditions detailed in this section of the biological opinion and other BMPs discussed in the biological assessment for the entirety of the project.

The measures described below are nondiscretionary, and must be undertaken by Caltrans, as appropriate, 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 require their designee(s) 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 NMFS as specified in the incidental take statement (50 CFR §402.14(i)(3)).

A. Amount or Extent of Take

The number of endangered CCC coho salmon and threatened NC steelhead that may be incidentally taken by capture and relocation during project activities is expected to be small relative to the number of each species present throughout the Dunn Creek sub-watershed, as described above in the accompanying biological opinion. All take will occur within the project area between June 15 and October 15 from capture and relocation activities or killed from dewatering over one season. NMFS anticipates no more than two percent of each of the coho salmon and steelhead juveniles present in the area to be dewatered will be killed during relocation and dewatering efforts.

B. Effect of the Take

In the accompanying opinion, NMFS determined that this level of anticipated take is not likely to result in jeopardy to the species.

C. Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize and monitor the impacts of the anticipated incidental take of CCC coho salmon and NC steelhead:

1. Undertake measures to ensure that harm and mortality to listed salmonids resulting from fish relocation and dewatering activities is low.

2. Undertake measures to maintain water quality at pre-construction levels to avoid or minimize harm to CCC coho salmon and NC steelhead.

3. Prepare and submit a report to document the effects of construction and relocation activities and performance.

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, Caltrans, its permittee, and their designees must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

The following terms and conditions implement Reasonable and Prudent Measure 1, to minimize harm or mortality to listed salmonids from fish relocation and dewatering activities.

1. Caltrans shall provide a list of all BMP's and the Terms and Conditions of this biological opinion that are specific to the Dunn Creek culvert replacement project to their contractors and ensure that they are followed for the length of the project.

2. Caltrans shall provide NMFS with a "Fish Relocation Plan" for review 30 days prior to the start of dewatering and fish relocation activities and shall outline all confirmed fish relocation methods, including the location and a description of the habitat where coho salmon and steelhead are to be relocated. The plan shall be submitted to NMFS North Central Coast Office (see address below).

3. The project biologist shall notify NMFS biologist Joel Casagrande at (707) 575-6016 or Joel.Casagrande@noaa.gov one week prior to relocation activities in order to provide an opportunity for NMFS staff to observe the activities.

4. Caltrans and its contractors will follow NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act (NMFS 2000). Listed salmonids shall be handled with extreme care and kept in water to the maximum extent possible during relocation activities. All captured fish shall be kept in cool, shaded, and aerated water that is protected from excessive noise, jostling, or overcrowding any time they are not in the stream, and fish shall not be removed from this water except when released. To avoid predation, the biologist shall have at least two containers and segregate young-of-

year salmonids from older salmonids and other potential aquatic predators. Captured salmonids shall be relocated as soon as possible.

5. Any large rocks with diameters greater than 10 inches and wood with diameters greater than 6 inches that are removed during dewatering activities will be placed back into the creek following construction activities.

The following terms and conditions implement Reasonable and Prudent Measure 2, undertake measures to maintain water quality at pre-construction levels to avoid or minimize harm to CCC coho salmon and NC steelhead.

6. Contractors must have a supply of erosion control materials, and fuel and hydraulic fluid spill containment supplies onsite to facilitate a quick response to unanticipated storm events, or fuel or hydraulic fluid spill emergencies. In the event of a spill and/or discharge of harmful material into potentially suitable habitat for special-status species, the discharge will be immediately contained, cleaned up and/or removed. All work will be stopped immediately, and NMFS will be notified.

7. Construction equipment used within the river channel will be checked each day prior to work within the channel (top of bank to top of bank) and, if necessary, action will be taken to prevent fluid leaks. If leaks occur during work in the channel, Caltrans, or their contractor, will contain the spill and remove the affected soils.

8. Caltrans shall monitor in-channel activities and performance of sediment control or detention devices for the purpose of identifying and reconciling any condition that could result in take of listed salmonids.

9. Caltrans shall provide NMFS with a copy of the project's site specific Storm Water Pollution Prevention Plan (SWPPP) or applicable plan(s), which specifies BMPs to control mobilization of sediment from the project. If BMPs must be modified, or when additional BMPs are implemented, the SWPPP will be updated to reflect needed changes. Documents shall be submitted to NMFS North Central Coast Office (see address below).

10. Construction work shall not create conditions that mobilize sediment or concentrate over-land flow from construction areas into the creek, or other channels leading directly to the creek.

The following terms and conditions implement Reasonable and Prudent Measure 3, prepare and submit a report to document the effects of construction and relocation activities and performance.

11. Caltrans staff will notify NMFS biologist and or engineers no later than one month prior to the beginning of weir construction in order to provide NMFS staff with an opportunity to be present during weir construction activities.

12. Caltrans shall provide NMFS with a summary report by January 15 of the year following the completion of fish relocation and monitoring activities. The report shall include the methods

used during the fish relocation and monitoring efforts, location, number and species captured, number of mortalities by species, and other pertinent information related to the monitoring and fish relocation activities. Reports shall be submitted to NMFS North Central Coast Office (see address below).

13. Caltrans or its contractor shall allow any NMFS employee(s) or any other person(s) designated by NMFS, to access the work area during the construction period for the purpose of observing monitoring activities, evaluating fish and stream conditions, monitoring performance of Caltrans BMPs, monitoring water quality, collecting fish samples, or perform other monitoring/studies. NMFS will notify the Caltrans Resident Engineer 48 hours prior to planning a site visit and will contact Caltrans personnel prior to entering the construction site.

14. All reports or plans required for the above terms and conditions shall be sent to:

NMFS North Central Coast Office
Central Coast Branch Supervisor, Protected Resources Division
Southwest Region
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404

XI. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA 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, or to develop information.

1. NMFS recommends that Federal Highway Administration (FHWA) and Caltrans consult with NMFS to develop a long range planning approach that seeks to minimize and avoid the impacts of road-related projects on listed salmonids.

2. Caltrans should identify and prioritize any maintenance and construction projects which, if implemented, can improve ESA-listed salmonid migration or in-stream environmental conditions.

3. Caltrans and its contractors should utilize all large trees (greater than or equal to 3 feet DBH) cut and removed as a result of the proposed activities for stream restoration projects (*i.e.,* fish passage, bank erosion protection, etc.) on-site or in nearby watersheds.

XII. REINITIATION NOTICE

This concludes formal consultation for the proposed replacement of a nine-foot diameter SSPP culvert with a new bridge along SR 1 and the construction of multiple rock weirs below the

existing culvert that will enhance fish passage in Dunn Creek in northern Mendocino County, California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; 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, formal consultation shall be reinitiated immediately.

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and Atmospheric Administration, United States Department of Commerce. Federal Register, Volume 71 Pages 834-862.

XIV. PERSONAL COMMUNICATION AND OBSERVATIONS

Joel Casagrande, NMFS, personal observation, August 25, 2010.

Joel Casagrande, NMFS, personal observation, December 2, 2010.

Lisa Embree, Caltrans, correspondence via electronic mail with Joel Casagrande (NMFS) on October 21, 2010 concerning cumulative effects and interrelated and interdependent activities in Dunn Creek.

Lisa Embree, Caltrans, correspondence via electronic mail with Joel Casagrande (NMFS) on November 4, 2010 concerning the potential for bank and upland vegetation removal occurring in the fall prior to the in-stream work.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arcata Fish and Wildlife Office
1655 Heindon Road
Arcata, California 95521
Phone: (707) 822-7201 FAX: (707) 822-8411

In Reply Refer To:
AFWO-11B0039-10I0068

MAR 1 4 2011

Dana York, Chief
North Regional Environmental Services Branch E2
California Department of Transportation, District 1
P. O. Box 3700
Eureka, California 95502-3700

Subject: Informal Consultation for the Dunn Creek Bridge and Fish Passage Project, Mendocino County, California

Dear Mr. York:

We have reviewed your request, dated April 26, 2010 and received April 27, 2010, for informal consultation with the Fish and Wildlife Service (Service) for the Dunn Creek Bridge and Fish Passage Project (Caltrans EA 01-385720) at PM 92.83 on State Route 1 in Mendocino County, California. This response is prepared in accordance with the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act), and its implementing regulations (50 CFR § 402). The California Department of Transportation (Caltrans) is seeking concurrence that the proposed project may affect, but is not likely to adversely affect the federally listed as threatened northern spotted owl (*Strix occidentalis caurina*) and that the project will have no effect on the federally listed as threatened marbled murrelet (*Brachyramphus marmoratus*). On June 23, 2010, Caltrans requested that the Service postpone submitting this letter of concurrence until several issues with the project design had been resolved. On March 4, 2011 Caltrans notified the Service that the design issues had been resolved and that proposed changes would not alter the original determination of potential impacts to the northern spotted owl or marbled murrelet made by Caltrans as presented in the April 26, 2010 request letter. This letter transmits the Service's concurrence on the may affect, not likely to adversely affect determination made by Caltrans for the northern spotted owl and the no effect determination for the marbled murrelet.

The California Department of Fish and Game (CDFG) issued Caltrans an Incidental Take Permit (No. 2081-2006-023-03) for the Ten Mile River Bridge Replacement Project on September 26, 2006. The permit required Caltrans to implement a fish passage restoration project at Dunn Creek. The proposed project includes replacement of a culvert with a bridge, installation of fish

weirs to improve fish passage, realignment of the entrance to an adjacent private road, and removal of a portion of the existing highway. The construction area will cover approximately 1.5 acres and will span the creek and the adjoining banks from approximately 100 feet upstream of the culvert inlet to 165 feet downstream of the culvert outlet. Impacts to potential northern spotted owl foraging and dispersal habitat will occur with the removal of approximately 0.69 acre of redwood (*Sequoia sempervirens*) and Douglas-fir (*Pseudotsuga menziesii*) dominated mixed conifer habitat. Within the 0.69 acre of mixed conifer forest only three relatively small, less than 2 foot diameter-at-breast-height (dbh), Douglas-fir trees will be removed. In addition, of the 29 redwood trees that will be removed, only three have dbh greater than 2.5 feet (dbh = 3, 3.5, and 4 feet).

The nearest northern spotted owl activity center (CDFG MEN 0291) is approximately 0.55 mile to the north of the project area. The CDFG MEN 0134 northern spotted owl activity center is approximately 0.96 mile to the northeast. Northern spotted owl designated critical habitat occurs 6.3 miles to the east-southeast of the project area. The nearest known marbled murrelet nest site (CDFG OCC_NUMB 1465) to the project area is over 57 miles to the north; however, the nearest murrelet detection (CDFG OCC_NUMB 1478) is 1.35 miles to the southwest near Usal Road, only 0.22 mile from the ocean. Marbled murrelet designated critical habitat occurs 2.6 miles to the northwest of the project area.

Using 2006 Service guidance on estimating the effects of auditory disturbance to the northern spotted owl and marbled murrelet Caltrans estimated that the harassment distance, due to elevated project-generated sound levels (81–90 decibels), was 165 feet from the project area. After a field site visit on December 15, 2009, a Service biologist concluded that no suitable northern spotted owl or marbled murrelet nesting habitat occurred within 165 feet of the project area.

Concurrence

The Service concurs with your determination that the proposed construction activities of culvert removal, bridge construction, fish weir construction, road realignment, and associated tree removal may affect, but are not likely to adversely affect, the northern spotted owl, and will have no effect on the marbled murrelet, based on the following factors:

1. No construction activities will occur within northern spotted owl or marbled murrelet designated critical habitat.
2. No suitable nesting habitat for either species is present within the action area and no suitable nest trees will be removed. Replanting of affected areas with native plant species will minimize the impacts to northern spotted owl foraging and dispersal habitat.
3. Noise levels during construction are unlikely to affect the MEN 0291 or MEN 0134 northern spotted owls due to the low level of anticipated noise and the distance between construction activities and known northern spotted owl activity centers.

Conclusion

This concludes informal consultation on the proposed Dunn Creek Bridge and Fish Passage Project. However, obligations under section 7 of the Act, as amended, should be reconsidered if: (1) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; 2) this action is subsequently modified in a manner that was not considered; 3) a new species is listed or critical habitat designated that may be affected by the action; or 4) you are unable to implement all of the measures described above.

Thank you for your coordination on this project. Please contact staff biologist Gregory Schmidt at (707) 825-5103 should you have further questions regarding this consultation.

Sincerely,

Nancy J. Finley
Field Supervisor

cc:
CDFG, Eureka, CA (Attn: M. van Hattem)

Memorandum

Flex your power!
Be energy efficient!

To: MICHAEL CULLEN
Senior Bridge Engineer
Bridge Design Branch 5
Office of Bridge Design North
DIVISION OF ENGINEERING SERVICES,
STRUCTURE DESIGN

Attention: Mario Guadamuz

Date: August 18, 2011

File: 01-MEN-1-PM 92.83
Dunn Creek Bridge
Br. No. 10-0304
01-385721
0100000143

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Foundation Report for Dunn Creek Bridge

Scope

Per your Foundation Report (FR) request, dated July 21, 2009, your Revised (FR) request, dated November 19, 2009 and e-mail communications, dated April 12, 2011 and May 31, 2011 our Office prepared the following (FR) for the above referenced project. The scope of work consisted of a site reconnaissance, subsurface investigation, installation and monitoring two Slope Inclinometers (SI), and previous investigations close to the proposed bridge site. Structure types proposed are a three span cast-in-place (CIP) reinforced concrete slab bridge on pile extensions and two retaining walls supported on soldier piles.

Project Description

The proposed bridge site, a realignment of the roadway over Dunn Creek, is on a stretch of mountainous Highway 1 between Leggett and Rockport that runs west to east (See Figure 1, Project Location). At the project site the road consists of 2 lanes with no shoulder on either side. The difference in elevation from the creek to the roadway is about 30 feet. The slope (about 1.5:1 or steeper) leading down to the creek is highly vegetated. See attachments for Project Location and General Plan.

The recommendations presented in this report are based on the data generated during this field investigation, and on review of pertinent documents including the following:

- Foundation Report for Soldier Pile Wall # 10E0013 at 01-MEN-001-PM 92.35, dated December 4, 2007.
- Geotechnical Review for Repair Slipout, at 01-MEN-1 PM 104.4, dated November 13, 1996.
- Culvert Erosion at 01-MEN-1 PM 90/105, dated September 4, 1998.
- Abutment 1 Layout for Dunn Creek Bridge Fish Passage, dated May 27, 2011.
- Retaining Wall Details for Dunn Creek Bridge Fish Passage, dated May 24, 2011.
- Geologic Map of California, Ukiah Sheet, Scale 1:250,000, Published by California Geological Survey, 1960.

Field Investigation and Testing

The subsurface was explored with 2 mud rotary test borings to depths of 80 feet in September 2009. Then in November, two slope inclinometers (SI) were installed near the proposed location of Abutment 4. The two SIs, SI09-1 and SI09-2, were installed to the depth of 50 feet. See attachment for General Plan.

Geology and Subsurface Conditions

Based on Caltrans Foundation Report for the soldier pile wall at 01-MEN-001-PM 92.35 (Wall # 10E0013 and EA 01-473801), the site is underlain by greywacke sandstone interbedded with mudstone and is mapped as the Coastal Belt of the Franciscan complex. Here these deep marine rocks range from intensely weathered to fresh, very soft to hard, and moderately to very intensely fractured. The soil above the bedrock consists of clayey sand and gravel.

Borehole R-09-001, near the proposed Abutment 1, was drilled from a ground elevation of 332 feet, indicates that the upper 35 feet consists of clayey gravel with sand to a depth of 14 feet, and silty clayey sand with gravel for the remaining 21 feet. Underlying the granular material, from elevation 297 feet, there is an intensively to moderately weathered, very hard bedrock classified as a greywacke. The Standard Penetration Test (SPT) blow counts indicate the relative density of granular material ranges from loose at elevation 329 feet to dense at elevation 308 feet.

Borehole R-09-002, near the proposed Abutment 4, was drilled from a ground elevation of 328 feet, indicates that upper 20 feet consists of loose to medium dense clayey gravel with sand. The alluvial material is underlain, from elevation 308 feet to maximum depth

of exploratory boring, by intensively to moderately weathered, very hard greywacke interbedded with thin to thick layers of moderately hard slate.

Soil and Rock Design Properties

The soil and rock properties recommended for design and presented in the table below, were selected based on the corrected SPT N-values, soil grain size distributions, and soil laboratory results of unit weights.

Table 1. Soil and Rock Properties

Location	Depth (ft)	Soil Description	Unit Weight γ (pcf)	Cohesion C (psf)	Angle of Internal Friction ϕ^o
Abutment 1 (Boring R-09-001)	0 - 33.5	Clayey Gravel with Sand	110	100	30
	33.5 - 80	Graywacke	160	500	35
Abutment 2 (Boring R-09-002)	0 – 20	Clayey Gravel with Sand	110	100	30
	20 – 80	Slate & Graywacke	150	300	33

Settlement

The section of road at the proposed Abutment 4 had experienced some ground subsidence(s) in the past. Gabion walls were installed in at the bottom of the slope near the culvert outlet to stabilize the movement. According to Caltrans Maintenance personnel at Leggett, since the installation of the gabion in the 1990s there has not been any need to repave the road.

The initial reference reading of the SIs was taken on December 1, 2009. There have been subsequent SI readings from December 15, 2009 to February 16, 2010. Thus far these readings indicate no significant deflection.

Ground Water

Ground water readings taken at SI09-1 and SI09-2 from December 1, 2009 to February 16, 2010 fluctuate between approximately 26 to 28 feet below ground surface or elevations of 304 to 306 feet.

Scour

Based on the information provided by the Designer (personal communication, June 15, 2011) the scour potential at both piers has been estimated to 7 feet below ground surface.

Corrosivity

Corrosion samples tested from the September 2009 drilling program indicate the site materials to be not corrosive. Results from corrosion laboratory tests are shown in Table 2 below.

Table 2: Results of Corrosion Testing

Sample	Sample Type	Borehole	Sample Depth (feet)	Minimum Resistivity (ohm-cm)	pH
C703565	Soil	R-09-001	16.5-18	5997	6.80
C703566	Soil	R-09-001	42-44	1755	7.70
C703567	Soil	R-09-002	25-27	3760	8.28
C703568	Soil	R-09-002	30-32	6524	8.31

The Department considers a site to be corrosive to foundation elements if one or more of the following conditions exist for the representative soil samples taken at the site: Chloride concentration is greater than or equal to 500 ppm, sulfate concentration is greater than or equal to 2000 ppm, or the pH is 5.5 or less.

Seismicity

Please refer to the memorandum entitled Seismic Recommendations dated February 1 2010, by Reza Mahallati.

Foundation Recommendations

The Office of Bridge Design North (OBDN) has proposed 24-inch diameter cast-in-drilled-hole piles (CIDH) at all bridge support locations. All piles will be embedded at least 10 feet into competent rock. The calculated geotechnical capacity of all CIDH piles is based on skin friction provided by the bedrock only since skin friction produced by the soils represents a negligible portion of the calculated capacity of the piles. Pile end-bearing was not considered in the calculation of the geotechnical capacity of the piles.

Tables 3 and 4 are the pile data information provided by Caltrans Structure Design Branch 5, dated November 19, 2009 and May 15, 2011.

Table 3. Foundation Design Loads

Foundation Design Loads												
Support Location	Service-1-Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Event Limit State (Seismic, kips)				
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension		Lateral Demand
	Per Support	Max. Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Max. Per Pile
Abut 1	1719	173	1027	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pier 2	1294	N/A	718	1673	279	0	0	1706	298	0	0	40
Pier 3	1284	N/A	721	1659	274	0	0	1495	266	0	0	40
Abut 4	1391	244	750	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: All Piles are assumed to be 24" Diameter CIDH.

Table 4. Foundation Design Data Sheet

Foundation Design Data Sheet						
Support Location	Design Load	Pile Type	Finished Grade Elevation	Cut-Off Elevation	Permissible Settlement (Service Load)	Number of Piles Per Support
A-1 South 20 ft	WSD	24" CIDH	328	323.5	1"	3
A-1 Mid 49.5 ft	WSD	24" CIDH	325	321.5	1"	9
A-1 North 22.5 ft	WSD	24" CIDH	327	324.5	1"	4
Pier 2	LRFD	24" CIDH	305	306	1"	8
Pier 3	LRFD	24" CIDH	305	307	1"	8
A-4 South 20 ft	WSD	24" CIDH	318	317.5	1"	4
A-4 Mid 20 ft	WSD	24" CIDH	322	318.5	1"	4
A-4 North 20 ft	WSD	24" CIDH	324	321.5	1"	3

Tips elevations for the CIDH piles are presented in Tables 5, 6, and 7.

Table 5. Foundation Recommendations for Abutments

Abutment Foundations Design Recommendations								
Support	Pile	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)
			Total	Permanent				
Abut 1 South 20 ft	24" CIDH	323.5	1719	1027	175	350	286 (a)	286
Abut 1 Mid 49.5 ft	24" CIDH	321.5	1719	1027	175	350	286 (a)	286
Abut 1 North 22.5 ft	24" CIDH	324.5	1719	1027	175	350	286 (a)	286
Abut 4 South 20 ft	24" CIDH	317.5	1391	750	245	490	291 (a)	291
Abut 4 Mid 20 ft	24" CIDH	318.5	1391	750	245	490	291 (a)	291
Abut 4 North 20 ft	24" CIDH	321.5	1391	750	245	490	291 (a)	291

Notes:

1. Design tip elevations are controlled by: (a) Compression.
2. The CIDH specified tip elevation shall not be raised.
3. Design tip elevation for Lateral Load is typically provided by Structure Design.

Table 6. Foundation Recommendations for Bents

Bent Foundations Design Recommendations										
Support Location	Pile Type	Cut-off Elevation (ft)	Service-I Limit State Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevations (ft)
					Strength Limit		Extreme Event			
					Comp. (ϕ=0.7)	Tension (ϕ=0.7)	Comp. (ϕ=1)	Tension (ϕ=1)		
Pier 2	24" CIDH	306	1294	1"	279	0	298	0	285 (a-I),	285
Pier 3	24" CIDH	307	1284	1"	274	0	266	0	285 (a-I),	285

Notes:

1. Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event).
2. The CIDH specified tip elevation shall not be raised.
3. Design tip elevation for Lateral Load is typically provided by Structure Design.

Table 7. Pile Data Table

Pile Data Table					
Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Abut 1	24" CIDH	350	0	286 (a)	286
Pier 2	24" CIDH	400	0	285 (a-I)	285
Pier 3	24" CIDH	400	0	285 (a-I)	285
Abut 4	24" CIDH	490	0	291 (a)	291

Notes: Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event). The minimum embedment depth into bedrock shall be 10 feet for Abutments 1, and 4, and Piers 2 and 3, respectively.

The static axial capacity analysis of the proposed bridge foundation was performed using the All Pile Version 7.9a, (CivilTech).

Retaining Walls

Two retaining walls will be constructed on the left side of Abutment 1 and the right side of Abutment 4. The first proposed retaining wall is situated approximately 40 feet left from the "DC8" Line between stations 404+33 and 404+44.7. The height of this retaining wall is 12 feet. The second proposed retaining wall starts from approximately 23 feet right from the "DC8" Line at station 405+65 and ends approximately 20 feet from the "DC8" Line at station 406+12.5. The height of this retaining wall varies from 10 to 4 feet.

The Office of Bridge Design North (OBDN) has recommended that both retaining walls be soldier pile walls. The soldier pile will consist 14 by 145 H-Pile placed in 30-inch diameter pre-drilled holes.

Pile tip elevations were calculated using using the All Pile Version 7.9a, (CivilTech). A minimum safety factor of 2 was used for the static axial capacity analysis. Pile axial capacity is to rely solely upon skin friction. Unlike the soldier piles at retaining wall at Abutment 1, the soldier piles at retaining wall at Abutment 4 will be installed into competent rock since bedrock is present at a higher elevation. The table below presents the pile tip elevations for the retaining walls.

Table 8. Soldier Pile Tip Elevations for Retaining Walls

Structure	Pile			Average Cut Off Elevation (ft)	Nominal Resistance Compression (kips)	Specified Tip Elevation (feet)
	Type	Number	Location			
Retaining Wall at Abutment 1	Soldier Pile (WF 14 X 145 H-pile)	1	4(1)	326.0	60	304
		2	8(1)	326.0	60	304
Retaining Wall at Abutment 4	Soldier Pile (WF 14 X 145 H-pile)	1	5(2)	319.0	160	304
		2	13(2)	322.0	160	304
		3	21(2)	324.0	160	304
		4	29(2)	326.0	160	304

(1) Distance from intersection of edge of Abutment 1 edge of deck. (2) Distance from intersection of Abutment and Piles center lines.

Settlement

Settlement is expected to primarily occur within a short time after construction of the bridge and retaining walls. Settlement is expected to be on the order of ½ inch.

Subsurface information as requested by OBDN (electronic mail dated May 31, 2011) is provided in the table below:

Table 9. Subsurface information for Retaining Walls.

Location	Earth Pressure Coefficients		Soil		Bed Rock Elev.	Water Table Elev.
	Active (Ka)	Passive (Kp)	Density γ (lb/ft^3)	Friction Angle ϕ	(ft)	(ft)
Retaining Wall (Abutment 1)	0.53	1.9	110	30	297	305
Retaining Wall (Abutment 4)	0.53	1.9	110	30	310	305

Lateral Earth Pressure Coefficients at Abutments, Wing Walls and Retaining Wall Locations

Recommended lateral earth pressures coefficients on abutment and wing walls under static conditions were obtained by using Coulomb's method because of the presence of a

26.6 ° sloping backfill. Earth lateral forces for Abutment 1 and 4 are presented in the table below:

Table 10. Lateral Earth Pressures Coefficients

Location	Soil and Rock Description	Angle of Internal Friction ϕ^o	Unit Weight γ (pcf)	K_a	K_o	K_p
Wing Walls and Retaining Walls at Abutment 1	Structure Backfill	35	125	0.38	0.62	2.6
	Clayey Gravel with Sand	30	110	0.53	0.72	1.9
	Graywacke	40	160	0.29	0.52	3.5
Wing Walls and Retaining Walls at Abutment 4	Structure Backfill	35	125	0.38	0.62	2.6
	Clayey Gravel with Sand	30	110	0.53	0.72	1.9
	Slate and Graywacke	35	150	0.29	0.52	3.5

Notes to Designer

The Design Engineer shall indicate on the plans, in the pile data table, the design pile tip elevations required to meet lateral load demands. The minimum embedment depth into bedrock shall be 10 feet for Abutments 1, and 4, and Piers 2 and 3.

Construction Considerations

Ground water is expected to be encountered during the installation of the CIDH piles. If soil conditions do not allow dewatering of the shaft excavation, the wet method will be required for the installation of the CIDH piles at all the bridge support locations.

Ground water may be encountered in the construction of the soldier piles. Temporary casing and tremie method may be utilized if soil and ground water conditions are favorable. When using temporary casing for the construction of the soldier piles, casing should be advanced a few inches into the bedrock to seal the excavation and reduce the water seepage.

Special attention should be given to the soldier piles for the retaining wall at abutment 1. The designed pile tip elevation is above bedrock and slightly below the estimated ground water table. A hydraulic gradient should be maintained in the excavation to avoid ground

water or sand heaving into the casing, resulting in formation of a cavity around the casing.

Difficult drilling may be encountered during installation for the bridge and retaining wall piles due to the presence of soil layers containing gravel, cobbles and boulders, and hard graywacke bedrock. Although cobbles and boulders were not encountered during exploratory drilling, they are present on the ground surface. Decomposed and friable greywacke soil-like materials overlaying hard graywacke will be encountered during pile installation at Abutment 1. Drilling into hard greywacke by coring should be anticipated. Rock core samples/core boxes are stored at the Department of Transportation (Caltrans), Translab at 5900 Folsom Blvd. Sacramento, CA 95819. We highly recommend that the Contractor inspect/review the rock core samples obtained from the project site.

CIDH concrete piling excavation shall not be left open for more time than is necessary for placement of reinforced concrete.

Caving conditions in the native material and the upper section of bedrock may be encountered during the CIDH pile construction. Temporary casing may be required to control caving during construction. It is recommended that the outside diameter of the temporary casing be 6 inches larger than the specified drilled shaft diameter below the casing.

Our Office should be consulted to assess the bedrock during pile installation for the bridge and retaining wall.

Project Information

Standard Special Provisions S5-280, "Project Information," discloses to bidders and contractors a list of pertinent information available for their inspection prior to bid opening. The following is an excerpt from SSP S5-280 disclosing information originating from Geotechnical Services. Items listed to be included in the information Handout will be provided in Acrobat (pdf) format to the addressee(s) of this report via electronic mail.

Data and information attached with the project plans are:

Data and Information included in the Information Handout provided to the bidders and contractors are

A. *Foundation Report for Dunn Creek Bridge, Structure Number 10-0304, dated August 18, 2011.*

B. *Fourteen boxes of cores available for viewing at 5900 Folsom Blvd Sacramento, CA 95819.*

Data and Information available for inspection at the District Office:

A. None

Please direct any questions concerning this report to Luis Paredes-Mejia at (916) 227-1081.

LUIS M. PAREDES-MEJIA
Engineering Geologist
Geotechnical Design – North

Attachments

c: Steven Blair D1 PM (E-copy)
Michael Stapleton D1 DME (E-copy)
Mark_Willian (E-copy)
DES Office Engineer, Office of PS&E
RE_Pending_File
Doug Brittsan
OGDN Files

REFERENCES

Federal Highway Administration, December 2007, Earth Retaining Structures, Reference Manual, Publication No. FHWA NHL-07-071

Federal Highway Administration, December 2006, Soils and Foundations, Reference Manual, Publication No. FHWA NHI– 06-088.

Federal Highway Administration, May 2002, Subsurface Investigations, Geotechnical Site Characterization, Reference Manual, Publication No. FHWA NHI 01-031.

Federal Highway Administration, May 2010, Drilled Shafts: Construction Procedures and LRFD Design Methods, Publication No. FHWA NHI 10-016.

American Association of State Highway and Transportation Office (AASHTO), 2007, ASSHTO LRFD Bridge Design Specifications, Customary U.S. Units, 4th Edition.

State of California - Department of Transportation
Division of Engineering Services
Structure Design Services

FINAL HYDRAULIC REPORT

Dunn Creek Bridge

Br. No. 10-0304

1 - MEN - 1 - PM 92.83

Located near Rockport, California

PROJECT DESCRIPTION:
Proposed New Bridge Structure to Replace Existing Culvert (EA 01-385721)

Prepared by:

Jose J. Vargas

Jose J. Vargas, P.E.
Transportation Engineer (Civil)
Structure Hydraulics & Hydrology Branch
November 5, 2010

TABLE OF CONTENTS

DESCRIPTION OF WATERSHED

The watershed drainage area located upstream of the proposed bridge site is undeveloped mountainous (redwood) forestland with relatively steep slopes. Based on USGS topographic maps, elevations within the watershed vary from approximately 1,760 feet in the higher elevations to roughly 320 feet near the proposed bridge site (National Geodetic Vertical Datum of 1929, NGVD29). Available site photos and other information indicate the current channel geometry of Dunn Creek varies greatly along this reach. Typical flows in the channel are due to seasonal runoff from coastal precipitation. Based on USGS topographic maps, Dunn Creek is a small tributary which drains into Cottaneva Creek approximately 2,400 feet downstream of the proposed bridge site. Cottaneva Creek continues southerly and eventually outfalls into the Pacific Ocean at Rockport Bay.

Based on a watershed delineation using the USGS 7.5-Minute Series (Topographic) Quadrangle map for *Hales Grove, California* (revised 1994), the watershed drainage basin area above the bridge site was estimated as 1.9 square miles. For comparison purposes, the Watershed Modeling System (WMS, version 8.0) software program delineated the watershed area as 1.89 square miles based on available topographic data (10-meter Digital Elevation Maps, DEM's). Additionally, a USGS streamgage site (no longer active) located near the proposed bridge site on Dunn Creek indicated a drainage area (above the streamgage) of 1.88 square miles. For this study, the estimated watershed basin area (above the proposed bridge location) is 1.9 square miles.

PEAK DISCHARGES

There were no previous detailed hydrologic/hydraulic studies located for Dunn Creek for reference or comparison purposes. Peak discharges at the proposed bridge site were estimated by using the estimated drainage area and the Regional Flood-Frequency Analysis method (North Coast Region). The estimated California mean annual precipitation for the Dunn Creek watershed area ranges from 52 to 64 inches per year (Oregon Climate Service Map, dated November 2000). The more conservative value of 64 inches per year was used to estimate the peak discharges for this study. At the proposed bridge site, the 50-year and 100-year frequency discharges were estimated as 850 cubic feet per second (cfs) and 910 cfs, respectively.

It should be noted that there was a USGS streamgage (No. 11468850) located on Dunn Creek near the proposed bridge site at one time, however, only 12 annual data records (from 1962 to 1973) were available. There were insufficient historical streamgage records available for a reliable statistical analysis method for comparison purposes. It should also be noted that the peak discharges used for this report were conservatively estimated for the purpose of bridge hydraulics/scour analysis only. Other hydrology studies may estimate or consider different discharges than what are shown here based on different assumptions or if used for different purposes.

WATER SURFACE ELEVATIONS

Field survey data for the bridge site was provided by the District 1 Survey Branch in early 2009 (CAiCE file dated March 9, 2009). Supplemental field survey data was provided by Preliminary Investigations (P.I.) - North Survey Branch in May 2009. The survey data was based on the NAVD88 vertical datum and was used to obtain channel cross-sections along the study reach. A hydraulic model

of the bridge site was created using HEC-RAS (Version 4.0) software based on geometric data provided by the field surveys, the proposed channel design details, and information shown on the proposed General Plan sheets. The Hydrologic Engineering Center - River Analysis System (HEC-RAS) is a one-dimensional hydraulic analysis program developed by the U.S. Army Corps of Engineers (USACOE).

Based on photos of the site and engineering judgment, Manning's roughness coefficients ("n") for the main channel area and the more heavily-vegetated overbank areas were estimated as 0.040 and 0.120, respectively. The hydraulic analysis for the proposed bridge site included the "tentatively-approved" fish passage design/channel modification details (including the rock weirs) for the channel as provided by District 1 Hydraulics Branch in October 2010.

Based on the estimated 50-year and 100-year frequency discharges, the HEC-RAS model calculated corresponding water surface elevations (WSEL's) at the bridge site (at the upstream face of the proposed bridge structure) as 309.7 feet and 309.9 feet, respectively.

PEAK VELOCITY

For both existing and proposed conditions, the HEC-RAS models indicate a mixed flow regime (subcritical and supercritical conditions) along the studied reach of Dunn Creek. Due to transitions from supercritical to subcritical flow regimes, "hydraulic jumps" occur at several locations along the study reach. Calculated local peak velocities varied greatly along this reach due to the flow complexities introduced by the proposed fish passage design (rock weirs) and other site-specific factors. Based on the 100-year frequency discharge and other current assumptions, the HEC-RAS model calculated a local peak (water) velocity of roughly 8.0 feet per second (ft./sec.) at the proposed bridge site.

WATERWAY CAPACITY & MINIMUM SOFFIT ELEVATION

Based on available information, the waterway capacity of the proposed new bridge structure is sufficient to convey the estimated discharges with adequate available freeboard. Based on calculated WSEL's at the bridge site and assuming a conservative 3.0 feet of recommended freeboard above the 50-year WSEL for potential drift purposes, the calculated recommended minimum soffit elevation for the bridge site is 312.7 feet. Based on an estimated minimum soffit elevation of 327.8 feet from the proposed plan sheets at Abutment 4 (Right Edge of Deck, EOD), there is roughly 15 feet of available freeboard above elevation 312.7 feet.

DRIFT POTENTIAL

The proposed bridge site is located in a steep mountainous area surrounded by thick (redwood) forest and areas of heavy brush and vegetation. Upstream of the proposed bridge site, potential drift/debris sources are located within or adjacent to the waterway. Under lower and more typical flow conditions, the relatively small discharges and flow depths will not generally be expected to transport significant (amounts or size) of drift downstream to the bridge site. However, under certain high flow conditions, some amount of drift located within the active waterway may potentially be transported further downstream to the bridge site.

Actual drift/debris loading conditions at the proposed bridge site is unknown due to many variables, however, the proposed fish passage design (series of rock weirs) along this section of Dunn Creek may tend to reduce the drift actually reaching the bridge site by helping reduce local velocities and possibly retaining some of the larger drift material as it flows downstream toward the bridge during higher flows. In addition, it is assumed most typical drift reaching the bridge site during high flows would likely be transported within the deeper thalweg section under the center span (in Span 2, between Piers 2 and 3) due to the anticipated rock weir design and creek re-alignment and therefore not tend to flow directly toward the piers.

For the purpose of this study, an additional "drift/debris width" of 2.0 feet (on each side of the upstream pier columns) was considered for the scour analysis as a relatively conservative assumption. It is generally anticipated that any significant amounts of drift/debris which may tend to accumulate at the proposed pier columns during high flow events will be removed periodically by Caltrans Maintenance or others, as needed, to help prevent significant long-term accumulation of drift/debris at the bridge piers.

POTENTIAL SCOUR & LONG-TERM CHANNELBED TRENDS

Potential scour for the proposed bridge site was evaluated based on the Hydraulic Engineering Circular No. 18 (HEC-18) Manual, "*Evaluating Scour at Bridges*" (4th Edition, March 2001). Total scour at a highway crossing generally consists of three main components: general/contraction scour, local scour at piers/abutments, and long-term channelbed aggradation/degradation. Potential lateral stream/thalweg migration to the pier locations and abutments is also evaluated as part of the scour analysis procedure.

The hydraulic and scour analysis for this study was based on current information available, site-specific assumptions, and the HEC-RAS model results based on the 100-year frequency discharge. As previously noted, the most recent proposed fish passage design details provided by District 1 Hydraulic Branch in October 2010 were included in the HEC-RAS model of the proposed bridge/project site.

General/Contraction Scour

Based on the HEC-RAS model, the proposed channel modifications (the channel re-grading and re-alignment only) terminate approximately 14 feet upstream from the downstream face of the proposed bridge structure. Underneath the proposed bridge structure, the main channel section narrows as it transitions from the proposed re-graded waterway to the existing channel *(refer to **ATTACHMENT 1 - FIGURES 1A/1B/1C**, p.11)*. The horizontal narrowing of the main channel at this location will increase local flow velocities through this narrowed section (i.e. contracted opening) which may cause some localized contraction scour. Based on the HEC-RAS model results for the proposed conditions, potential contraction scour at the bridge site was estimated at 1.0 foot (depth).

Local Scour - Piers

Based on the proposed General Plan sheet, Piers 2 and 3 are each to be founded on a row of multiple, 24-inch diameter CIDH or CISS piles. Under high flow conditions, the multiple-column pier rows appear to be generally aligned in the direction of flow; therefore, hydraulic skew at both piers was assumed negligible for this study. Other basic assumptions used for the local pier scour analysis at the

bridge site included: potential lateral thalweg migration to either pier location (Pier 2 or 3), two (2.0) feet of additional drift/debris width (applied to each side of the upstream piers), and a small amount of channelbed armoring (reduces calculated local scour). Based on assumed flow conditions and proposed pile details, the potential local pier scour depth at Piers 2 and 3 was estimated as 7.0 feet.

Channelbed armoring (due to larger-sized channelbed material) tends to reduce calculated local pier scour. Due to environmental and site/channel restrictions, the Geotechnical Branch was unable to obtain boring samples at the proposed pier locations or within the channel area. In the absence of actual gradation analysis data, rough visual estimates of the channelbed material size were assumed based on site photos taken in May 2009 of the proposed bridge site showing typical (visible) channelbed material. In order to minimize potential over-estimation of the channelbed armoring factor without actual data available and based on engineering judgment, a reduced amount of channelbed armoring was considered for the scour analysis (K_4 factor = 0.8). If actual channelbed material (size) information does becomes available after the report is completed, the estimated local pier scour may be re-evaluated, which could further reduce the calculated local pier scour.

Local Scour - Abutments

Both proposed abutments are located outside and above the calculated 100-year WSEL and are not expected to be subject to local abutment scour under expected flow conditions. No localized abutment scour was assumed for this study. However, there is an unknown amount of risk of potential long-term lateral stream/thalweg migration toward either abutment location *(refer to "**Lateral Thalweg Migration**", p.6)*.

Long-Term Channelbed Trends

The existing CMP culvert and fish passage elements have been in place for many years and the creek has been naturally adjusting to this condition. Once the existing culvert and fish passage/grade control structures are removed and the channel is significantly re-graded/re-aligned to accommodate the new fish passage design (rock weirs) and new bridge structure, the local hydraulic conditions will be significantly different and the creek will begin naturally adjusting to the new site conditions.

Assuming the proposed series of rock weirs remain in place and continue to function effectively, they may help dissipate energy, reduce local (water) velocities, and generally help stabilize the channelbed within the project area. In the short-term and under typical flow conditions, the rock weirs may lower the overall potential for localized channelbed degradation. However, eventual deterioration and/or possible "failure" of one or more of the rock weirs may be anticipated in the future, which may facilitate local channelbed degradation and allow upstream headcut migration.

Based on the HEC-RAS model of the longitudinal channel profile of the proposed channel, the overall channel slope for the sections located both upstream and downstream of the series of rock weirs is approximately 2%. Within the area of the rock weirs, the overall channel slope is significantly steeper (roughly 5%). The bridge structure and the downstream limits of the rock weirs are both located near the bottom of the 5% channel slope *(refer to **ATTACHMENT 2 - FIGURE 2**, p.12)*. A small headcut located at the bottom of the 5% slope may tend to slowly migrate upstream through the bridge site, which may lower the local channelbed elevation at the bridge foundations.

Accurately forecasting or predicting future channelbed trends at the proposed bridge site is difficult due to the significant proposed changes to the existing channel and many unknown variables that may directly and indirectly affect potential localized degradation. For the purpose of this study, 3.0 feet of potential long-term channelbed degradation at the bridge site was assumed for a 75-year design period, which is a typical design period for new bridge structures. The degradation estimate considered long-term deterioration of the rock weirs in the future and potential headcut migration upstream to the bridge foundations.

Lateral Thalweg Migration

As mentioned previously, lateral thalweg migration to either Pier 2 or Pier 3 was assumed for this study. The potential risk of lateral thalweg migration to either abutment location is more difficult to forecast due to many unpredictable variables but is important to consider. Significant lateral movement of the channel thalweg toward either abutment location may lead to some removal of the abutment approach and channel bank/side slope material and subsequent exposure of the abutment foundations.

There are some site-specific factors which may tend to reduce the overall risk of stream/thalweg migration to either abutment. As long as the proposed series of rock weirs remain in place and function effectively, they may help maintain the thalweg (low-flow channel) location near the center of the proposed waterway and therefore reduce the overall tendency of lateral stream/thalweg migration toward either abutment. The relatively steep and heavily-vegetated channel bank/side slopes both upstream and downstream of the proposed bridge site may create additional flow resistance and help reduce local velocities along the banks. Proposed General Plan sheets indicate the abutments will be placed 45 feet away from the proposed pier (centerline) locations, which would require the creek to first remove a significant amount of channel bank/side slope material before finally reaching either abutment and ultimately exposing the abutment foundations.

Although several factors may help lower the overall risk of significant thalweg migration toward either abutment, unknown future site conditions and other factors increase uncertainty. For example, several existing redwood trees and groups of trees within the project area are designated to be preserved for environmental reasons; therefore, these trees will be left in place and the new channel alignment and re-grading is required to accommodate these protected areas. Leaving the trees (and supporting soil material) in place within or adjacent to the main channel area may tend to redirect flows under certain flow conditions and may affect the overall long-term horizontal stability of the new channel.

For abutment foundation design considerations, a rough estimate of the "ground elevation" at both abutments based on the potential effects of lateral thalweg migration toward the abutments was determined. Cross-sections from the HEC-RAS model of the proposed channel at the bridge were used to establish general channel bank/side slope angles on each side of the channel and also determine the proposed geometry (width, depth, etc.) of the main channel area. In order to estimate the local "ground elevation" at each abutment, the assumed long-term channelbed conditions (lateral thalweg migration, local channelbed degradation, and contraction scour) were first applied to the channel cross-sections and the corresponding channel bank/side slope angles were projected back toward each abutment face. It should be noted this rough method assumes that the approximate centerline of the main channel area only migrates to the centerline of either pier location (i.e. the centerline of the main channel area does not migrate beyond the centerline of the columns at Piers 2 or Pier 3). Based on these assumed site

conditions and the side-slope projection method, the lowest "ground elevation" estimated at both abutments is roughly 318.0 feet.

This abutment foundation design recommendation does assume some unknown amount of potential risk due to limiting the lateral channel migration (centerline of main channel area) to the centerline of either pier location. However, in the event that significant lateral thalweg migration toward the abutments does become an issue in the future, it may be a relatively gradual process that would likely allow adequate time to detect (during scheduled bridge inspections or site visits) and address any concerns as required.

ADDITIONAL CONSIDERATIONS

For this hydraulic/scour evaluation, the assumed thalweg elevation for the bridge site was obtained from the HEC-RAS model (based on 2009 field survey data). The estimated current thalweg elevation of 302.2 feet at the downstream face of the proposed bridge structure was conservatively assumed for the entire bridge site. In order to minimize any potential issues with elevation differences or datum inconsistencies, ground/channel elevations referenced in the report should be independently verified. The estimated scour/degradation depths provided in the report should be applied to the most updated bridge site elevations available.

The Caltrans Geotechnical Branch may be consulted regarding any site-specific geotechnical considerations which may potentially impact the structure foundation design. Geotechnical studies and recommendations may better indicate whether there are any local geotechnical features or conditions (i.e. rock outcroppings, "scour resistant" layers of material, soil material characteristics/composition/ location/etc.) which may affect or limit the estimated scour/degradation depths provided in the report and/or which may affect the overall risk of potential abutment foundation exposure due to long-term lateral thalweg migration to the abutments.

SUMMARY INFORMATION FOR THE BRIDGE DESIGNER

GENERAL NOTES:

(1) Unless otherwise indicated, elevations shown in the report are based on the North American Vertical Datum of 1988 (NAVD88).

(2) Hydraulic/scour analysis results are based on currently-proposed fish passage design (series of rock weirs & channel modifications) as of October 2010.

Estimated Current Thalweg Elevation [1] *(at downstream face of proposed bridge)*	302.2 feet
Long-Term Channelbed Change [2] *(Depth)*	4.0 feet
Long-Term Channelbed Elevation	298.2 feet
Local Pier Scour at Piers 2 & 3 [3,4] *(Depth)*	7.0 feet
Long-Term Channelbed Change & Local Pier Scour Elevation at Piers 2 & 3	291.2 feet
Estimated Long-Term "Ground Elevation" at Abutments 1 & 4 *(at abutment face)*	318.0 feet
Local Peak (Water) Velocity at Proposed Bridge *(based on 100-year discharge)*	8.0 ft./sec.
Recommended Minimum Soffit Elevation *(includes 3.0 feet of freeboard for drift passage)*	312.7 feet

FOOTNOTES:

[1] *Estimated current thalweg elevation is based on HEC-RAS model cross-section (2009 survey data).*

[2] *Total depth = 3.0 feet of long-term channelbed degradation & 1.0 foot of general/contraction scour over a 75-year period.*

[3] *Lateral stream/thalweg migration to either pier location was assumed.*

[4] *Local pier scour assumes 2.0 feet of debris/drift width (on each side of upstream piers) and some channelbed armoring.*

Hydrologic / Hydraulic Summary

Total Drainage Basin Area: 1.9 square miles

	Design Flood	Base Flood	Overtopping Flood
Frequency, *years*	50	100	N/A
Discharge, *cubic feet per second (cfs)*	850	910	N/A
Water Surface Elevation at Bridge *, *feet*	309.7	309.9	N/A

Flood plain data are based upon information available when the plans were prepared and are shown to meet federal requirements. The accuracy of said information is not warranted by the State and interested or affected parties should make their own investigation.

* *Calculated WSEL at the upstream face of the proposed bridge.*

N/A = Not Applicable

LIST OF ACRONYMS USED IN THE REPORT

CAiCE	Computer-Aided Civil Engineering *(software program)*
CFS	Cubic Feet per Second
CIDH	Cast-In-Drilled-Hole
CIP	Cast-In-Place
CISS	Cast-In-Steel-Shell
CMP	Corrugated Metal Pipe *(culvert)*
DEM	Digital Elevation Map
DFG	California Department of Fish & Game
EOD	Edge of Deck
EB	End of Bridge
FHR	Final Hydraulic Report
GP	General Plan
HEC-18	Hydraulic Engineering Circular No. 18 "Evaluating Scour at Bridges"
HEC-RAS	Hydrologic Engineering Center - River Analysis System *(software program)*
NAVD88	North American Vertical Datum of 1988
NGVD29	National Geodetic Vertical Datum of 1929
NOAA	National Oceanic and Atmospheric Administration
P.I. - North	Preliminary Investigations - North *(Survey Branch)*
RC	Reinforced Concrete
USACOE	United States Army Corps of Engineers
USGS	United States Geological Survey
WMS	Watershed Modeling System *(software program)*
WSEL	Water Surface Elevation

REFERENCES

1) California Department of Transportation (Caltrans) - Bridge Inspection Reports (BIR's), Supplemental Bridge Reports (SBR's), Bridge File, As-Built Plans, Photos, Digital Highway Inventory Photography Program (DHIPP) - aerial photos, Final Hydraulic Report (FHR) request letter from Bridge Design Branch 5 *(dated 8/5/09)*, proposed General Plan sheets *(dated 7/22/09, 9/17/09)*

2) Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS)
Mendocino County, CA and Unincorporated Areas
Community Number 060183
(Last Revised: June 16, 1992)

3) FEMA Flood Insurance Rate Map (FIRM)
Mendocino County, California (Unincorporated Areas)
Map Number: 060183 0175 B (Panel 175 of 1100)
(Map Revised: June 1, 1983)

4) Additional References:
- Google (search engine) *http://www.google.com/*
- Google Maps *http://maps.google.com/*
- Google Earth

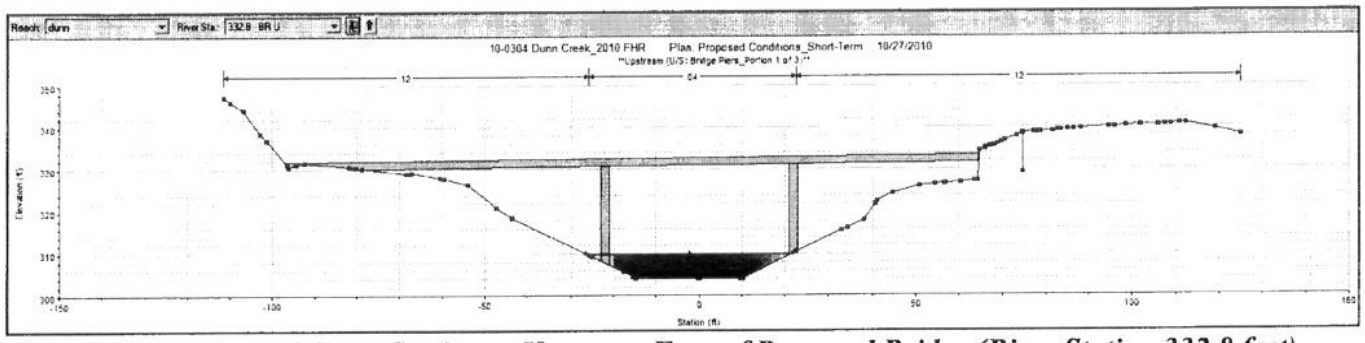


FIGURE 1A - Channel Cross-Section at Upstream Face of Proposed Bridge (River Station 332.8 feet)

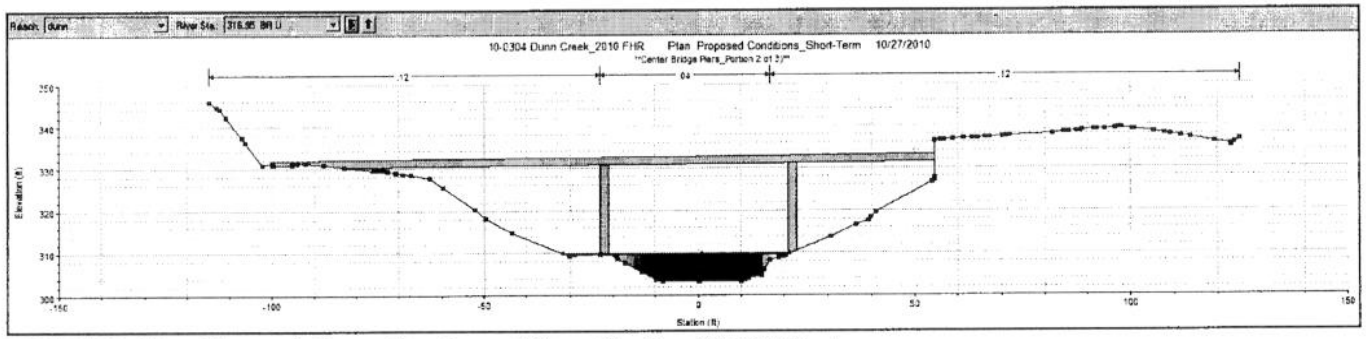


FIGURE 1B - Channel Cross-Section at River Station 316.95 feet

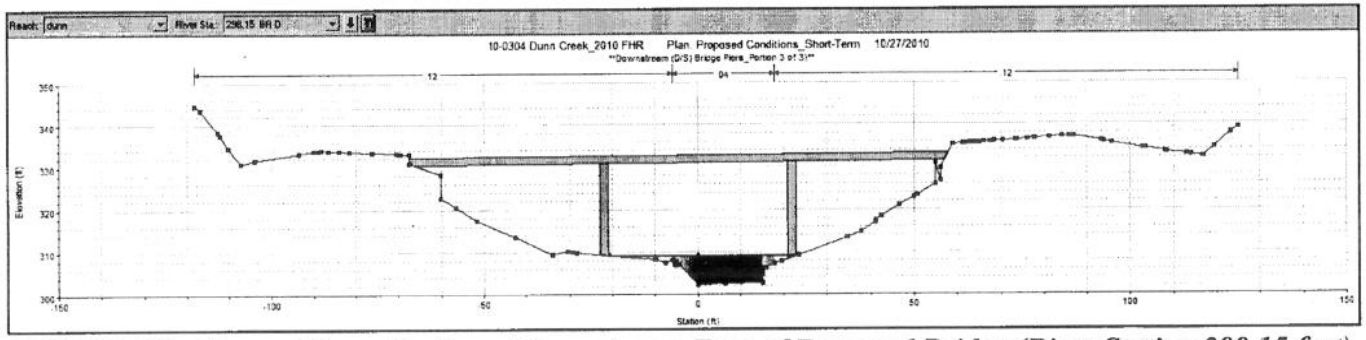


FIGURE 1C - Channel Cross-Section at Downstream Face of Proposed Bridge (River Station 298.15 feet)

(NOTE: Cross-sections viewed while looking in the downstream direction.)

ATTACHMENT 1

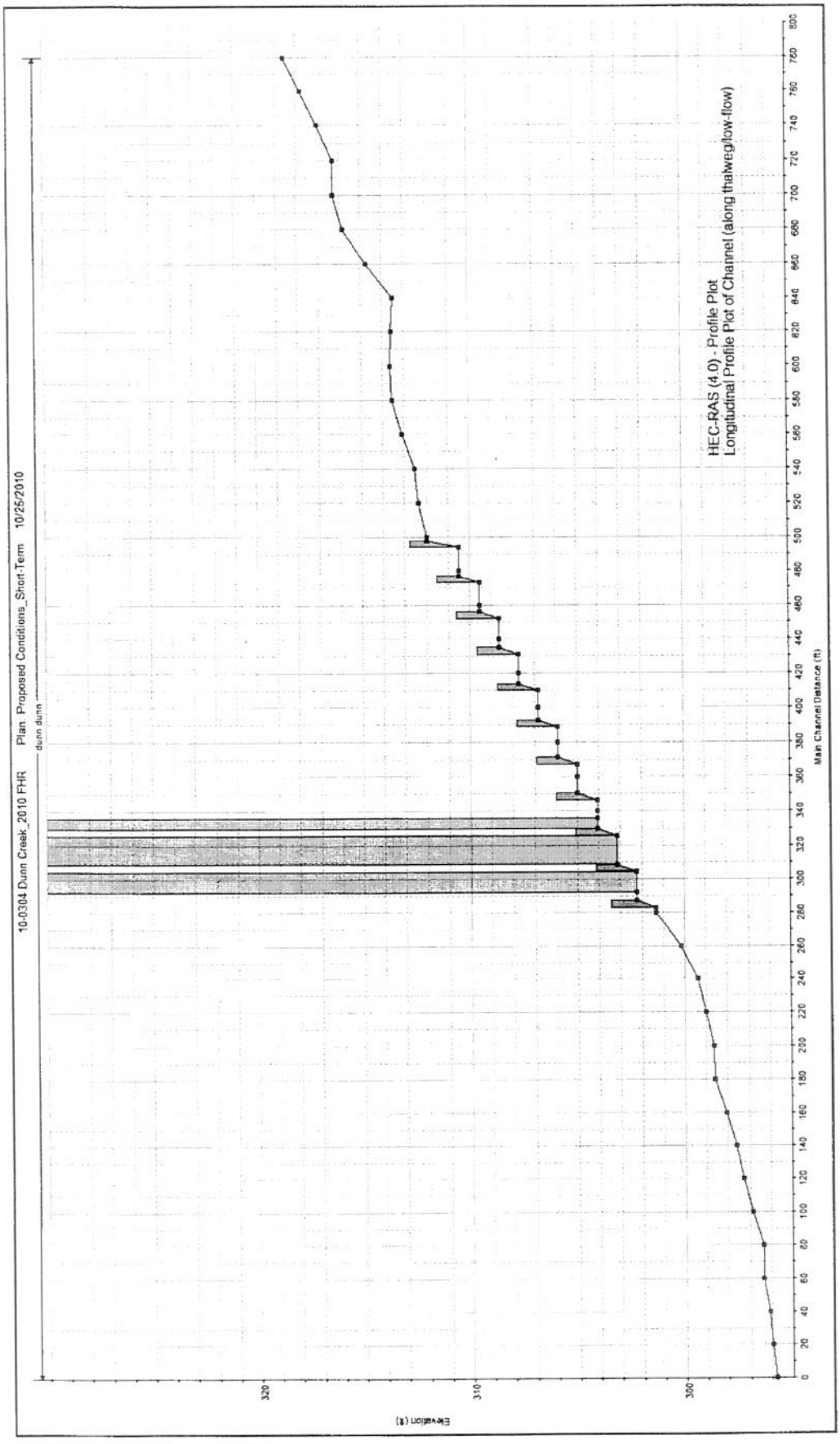


FIGURE 2 - Longitudinal Channel Profile Plot of HEC-RAS Model

STATE OF CALIFORNIA EDMUND G. BROWN, JR., Governor

DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT
2211 Park Towne Circle, Suite 2
Sacramento, California 95825

Telephone (916) 574-2540
FAX (916) 574-2542

September 2, 2011

Department of Transportation
PO Box 3700
Eureka, CA 95502

Attention: Dianne Edwards (via e-mail: dianne_edwards@dot.ca.gov)

Subject: Underground Classification #: C011-045-12T

Route 1 Improvements – Mendocino County

Ms. Edwards:

The information provided to this office relative to the above project has been reviewed. On the basis of this analysis, Underground Classification of "Potentially Gassy with Special Conditions" has been assigned to the shaft(s) identified on your submittal. Please retain the original Classification for your records and deliver a true and correct copy of the Classification to the shaft contractor(s) for posting at the job site.

When the contractor who will be performing the work is selected, please advise them to notify this office to determine if a mandated Prejob Conference with the Division is required prior to commencing any activity associated with drilling of the shaft(s).

Should you have another bore under construction that is not required to have an Underground Classification (i.e.: less than 30 inches in diameter), please contact the Mining and Tunneling Unit prior to any employee entry of such a space.

If you have any questions on this subject, please contact this office at your earliest convenience.

Sincerely,

R. Brockman for J. Leahy
Senior Engineer

cc: R. Brockman
File

State of California

Department of Industrial Relations

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT

Underground Classification

C011-045-12T

DEPARTMENT OF TRANSPORTATION
NAME OF TUNNEL OR MINE AND COMPANY NAME

of PO Box 3700, Eureka, CA 95502
MAILING ADDRESS

at ROUTE 1 IMPROVEMENTS - MENDOCINO COUNTY
LOCATION

has been classified as ***POTENTIALLY GASSY with Special Conditions***
CLASSIFICATION

as required by the California Labor Code § 7955.

The Division shall be notified if sufficient quantities of flammable gas or vapors have been encountered underground. Classifications are based on the California Labor Code Part 9, Tunnel Safety Orders and Mine Safety Orders.

SPECIAL CONDITIONS

1. A Certified Gas Tester shall perform pre-entry and continuous monitoring of the underground environment to measure Oxygen and detect explosive, flammable, and toxic gasses whenever an employee is working in the underground environment.
2. Mechanical ventilation shall provide for continuous exhaust of fumes and air at any time an employee is working in the underground environment. The primary ventilation fans must be located outside of the underground environment and shall be reversible by a single switch near the fan location.
3. The Division shall be notified immediately if any **Flammable Gas** or **Petroleum Vapor** exceeds 5% of the Lower Explosive Limit.
4. All utilities that may be in conflict with the project shall be identified and physically located (potholed) prior to the start of project operations.

The four 30-inch diameter by 22 feet deep drilled shafts for a retaining wall located on Route 1 at Dunn Creek, approximately 5 miles north of Rockport, Mendocino County.

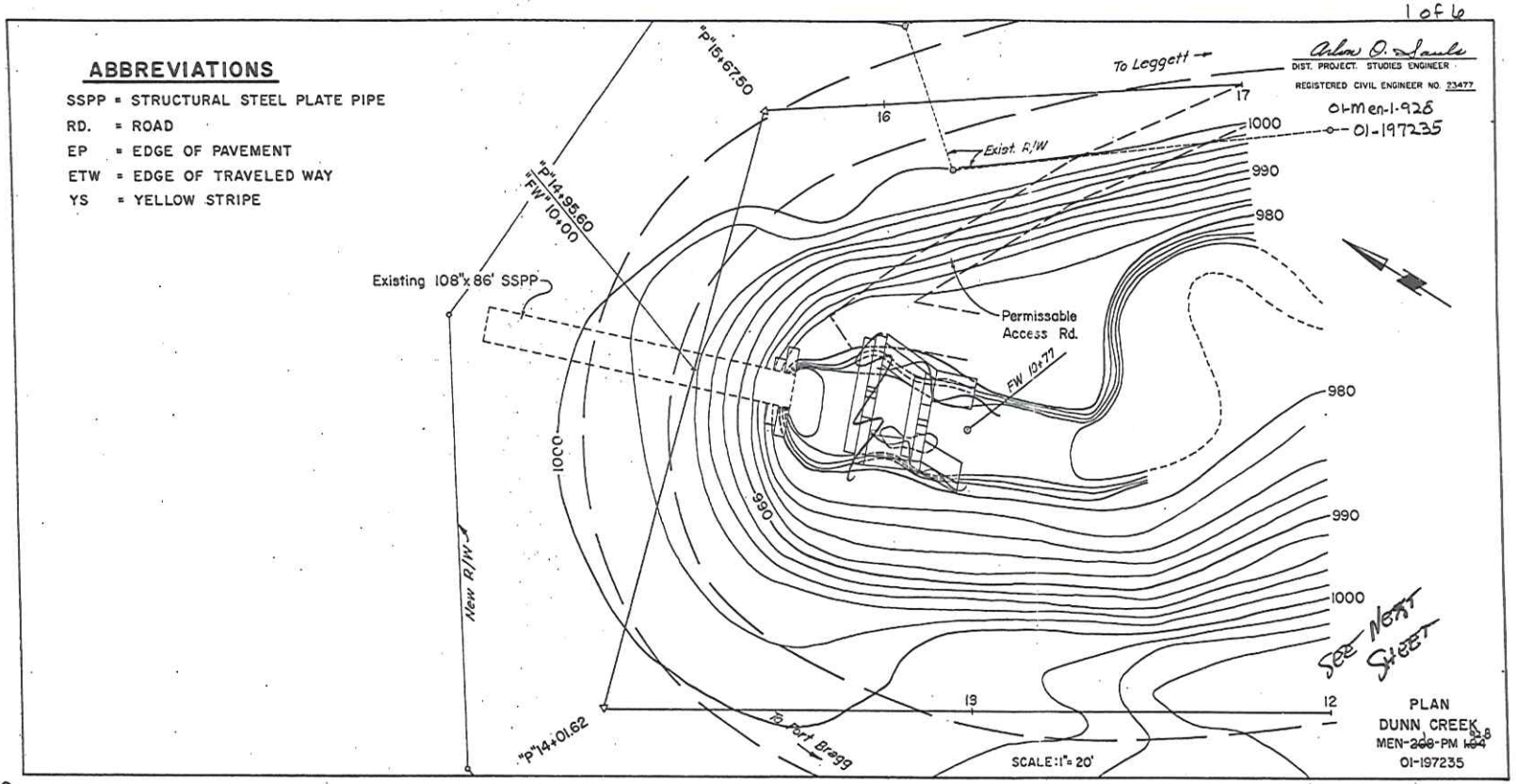
This classification shall be conspicuously posted at the place of employment.

Date September 2, 2011

R. Brockman for J. Leahy, Senior Engineer

ABBREVIATIONS

SSPP = STRUCTURAL STEEL PLATE PIPE
RD. = ROAD
EP = EDGE OF PAVEMENT
ETW = EDGE OF TRAVELED WAY
YS = YELLOW STRIPE



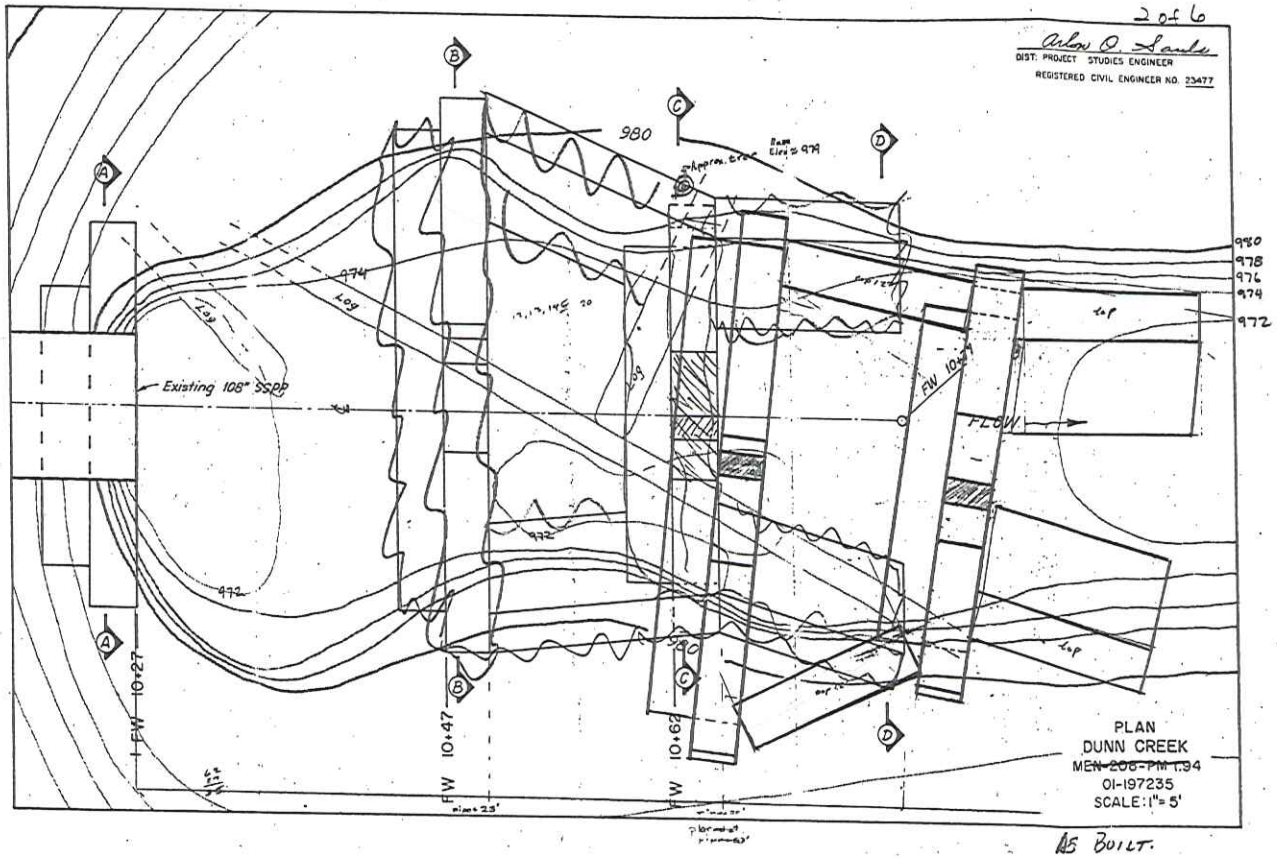
Arlan O. Landis
DIST. PROJECT. STUDIES ENGINEER
REGISTERED CIVIL ENGINEER NO. 23477

01-Men-1-92.8
01-197235

PLAN
DUNN CREEK
MEN-~~128~~-PM ~~1.94~~ 2.8
01-197235

10-145-70

Arlow O. Sanders
DIST. PROJECT STUDIES ENGINEER
REGISTERED CIVIL ENGINEER NO. 23477

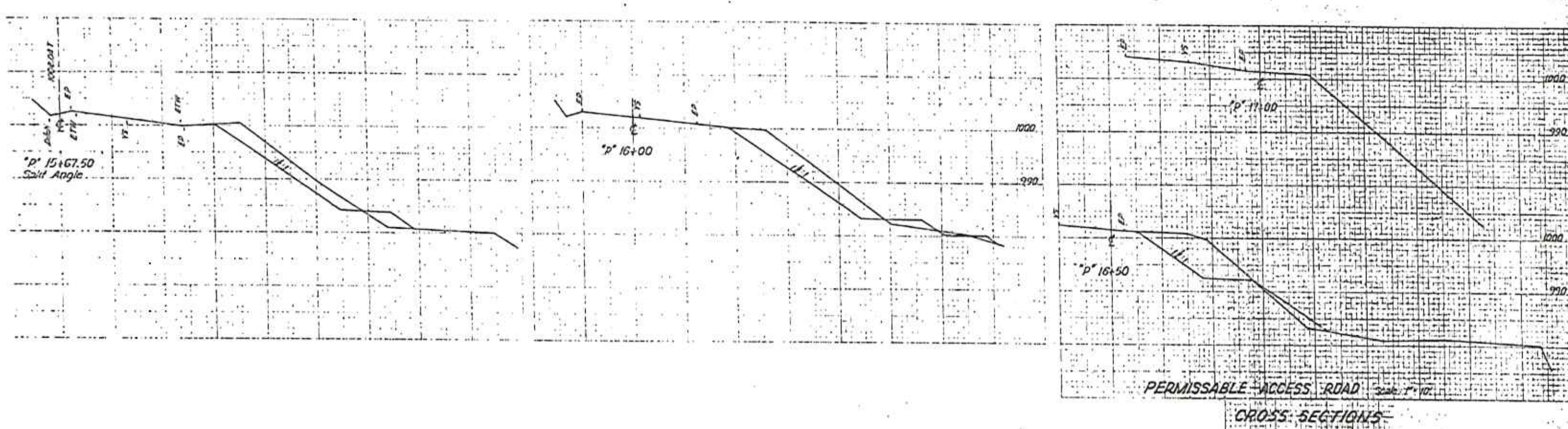


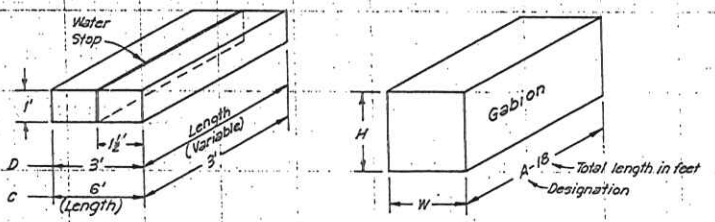
AS BUILT.

10-145-70

3 of 6

DIST. PROJECT STUDIES ENGINEER
REGISTERED CIVIL ENGINEER NO

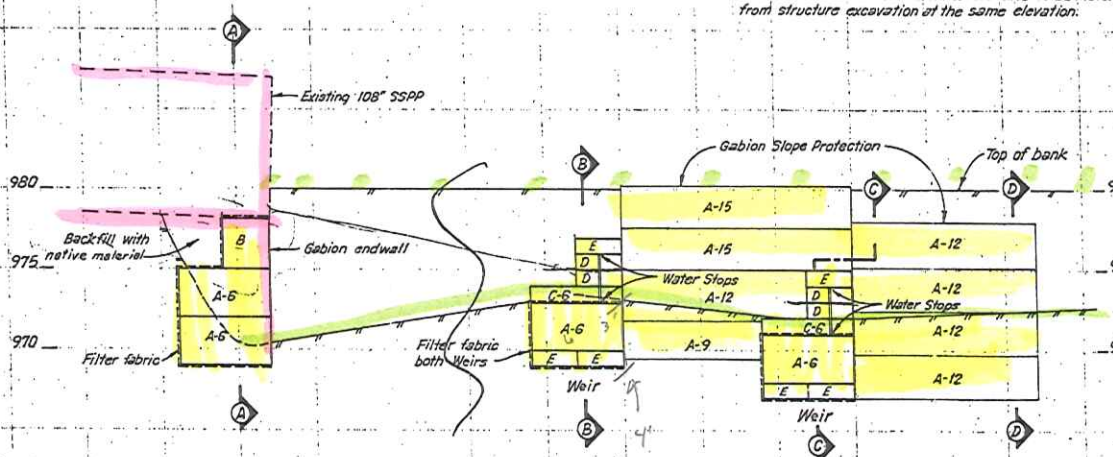




DESIGNATION	H (HEIGHT)	W (WIDTH)	GABION LENGTH RELATION TO CENTERLINE	
			PARALLEL	PERPENDICULAR
A	3'	3'	X	
B	3'	3'		X
C	1'	3'	X	
D	1'	3'		X
E	1'	3'		X

NOTE:
Structure backfill above channel flow line to be material from structure excavation at the same elevation.

Galen O. Sands
DIST. PROJECT STUDIES ENGINEER
REGISTERED CIVIL ENGINEER, NO. 23477



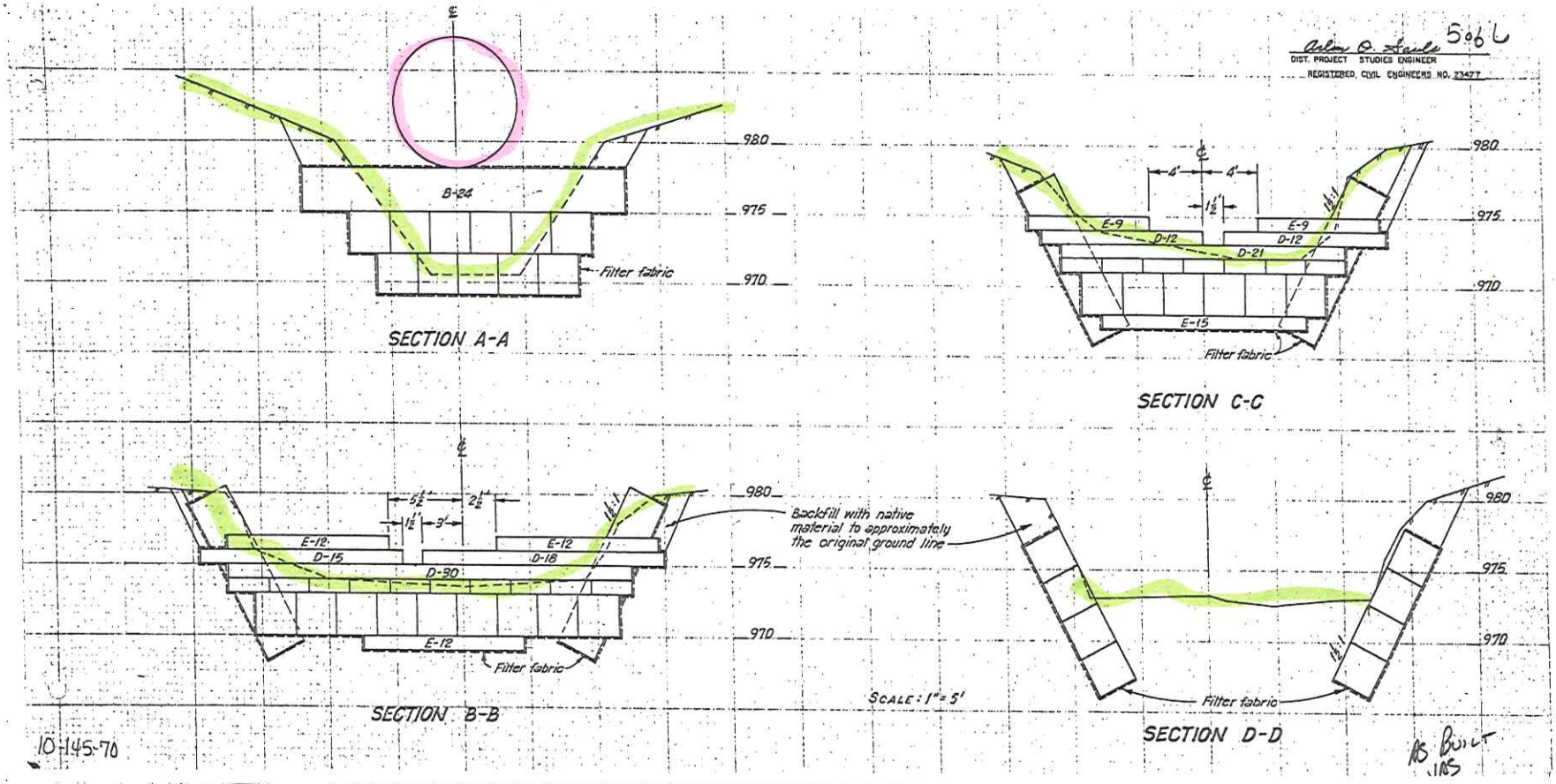
ELEVATION Scale: 1"=5'

SUMMARY		
ITEM	UNIT	QUANTITY
Gabions	Cu. Yds	160
Water Stop	Lin. Ft.	159
Filter Fabric	Sq. Yds	270

As Built
J. Bowen
Registered Engr.
Civil

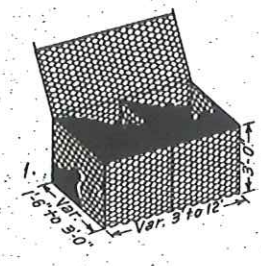
10-145-70

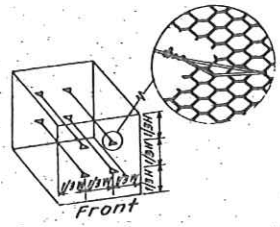
Arlen O. Lauk 5-06
DIST. PROJECT STUDIES ENGINEER
REGISTERED CIVIL ENGINEERS NO. 23477



10-145-70

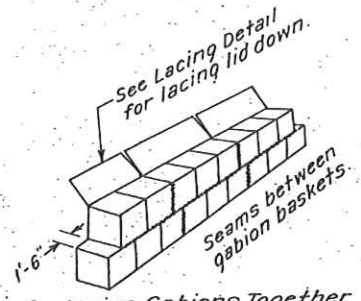
AS BUILT



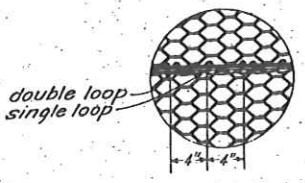


2. Interior Gabion

Note:
No internal connecting wire is required on the 1' high gabions.



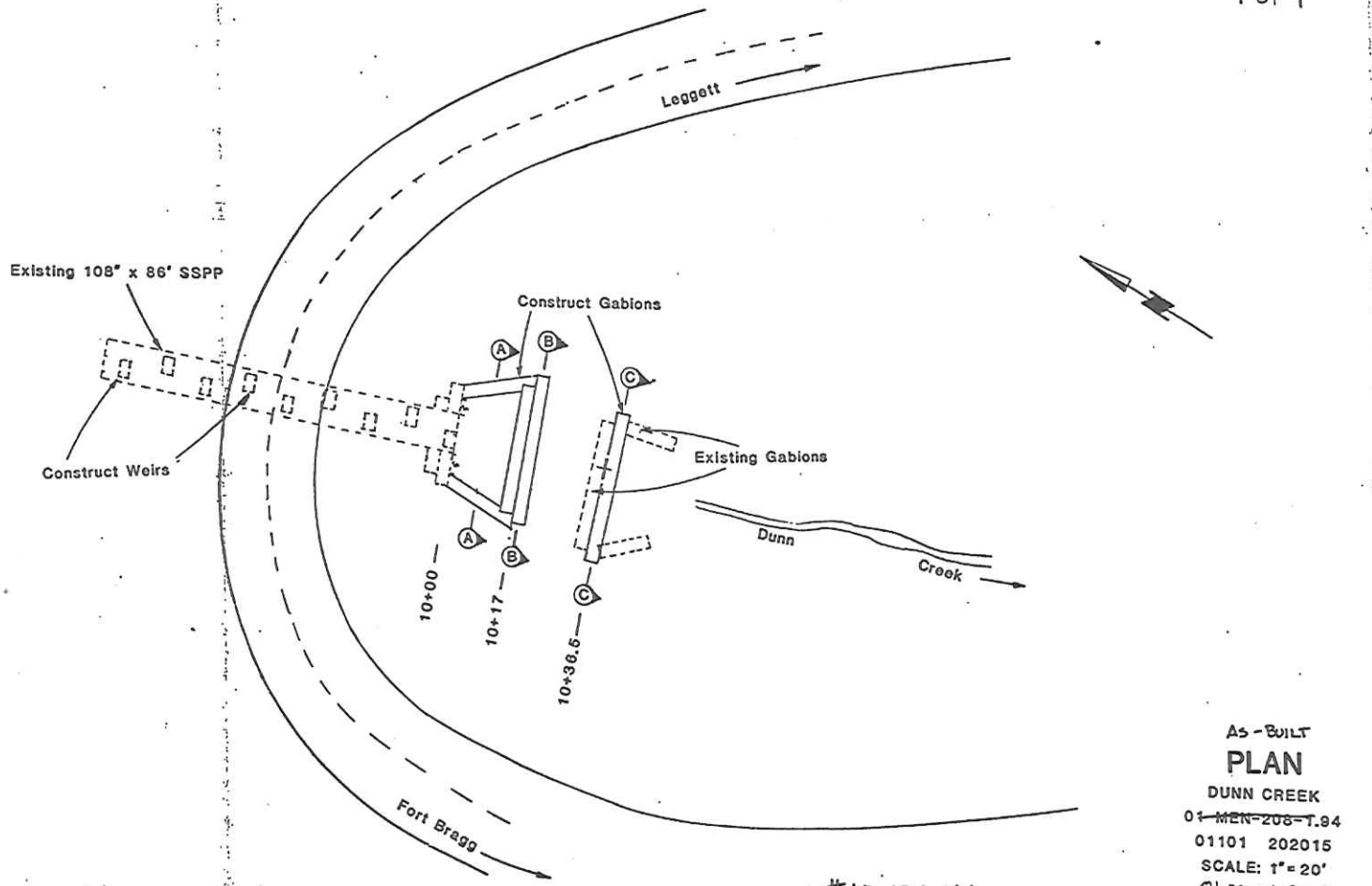
3. Lacing Gabions Together



4. Lacing Detail

Allen R. Lawler
DIST. PROJECT STUDIES ENGINEER
REGISTERED CIVIL ENGINEER NO. 23477

6 of 6



As-Built

PLAN

DUNN CREEK

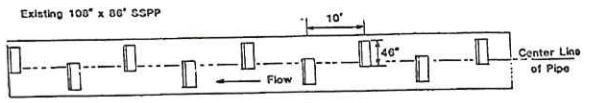
~~01-MEN-208-T.94~~

01101 202015

SCALE: 1" = 20'

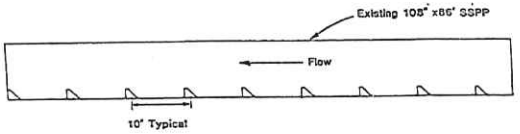
01-Men-1.92.9

#10-136-111



PLAN DETAIL

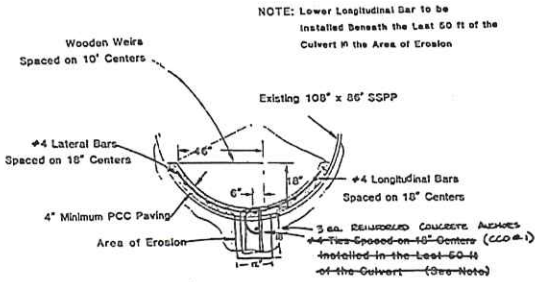
NO SCALE



PROFILE DETAIL

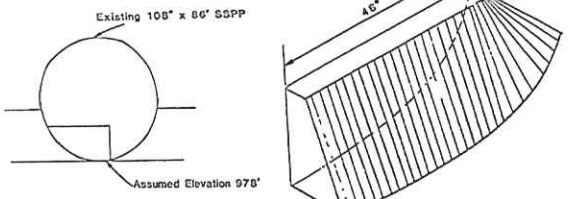
NO SCALE

NOTE: Lower Longitudinal Bar to be Installed Beneath the Last 50 ft of the Culvert in the Area of Erosion



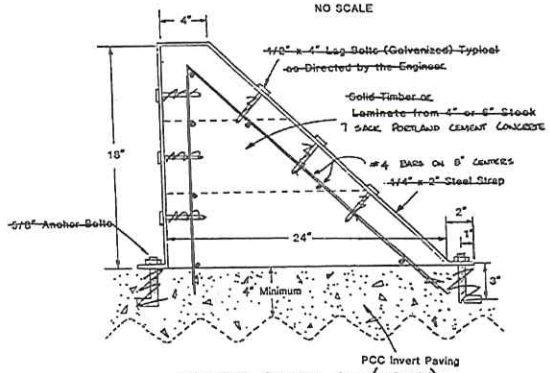
TYPICAL SECTION

NO SCALE



END

ISOMETRIC OF WEIR



~~WOODEN WEIR DETAIL~~ REINFORCED CONCRETE WEIR (CCO #1)

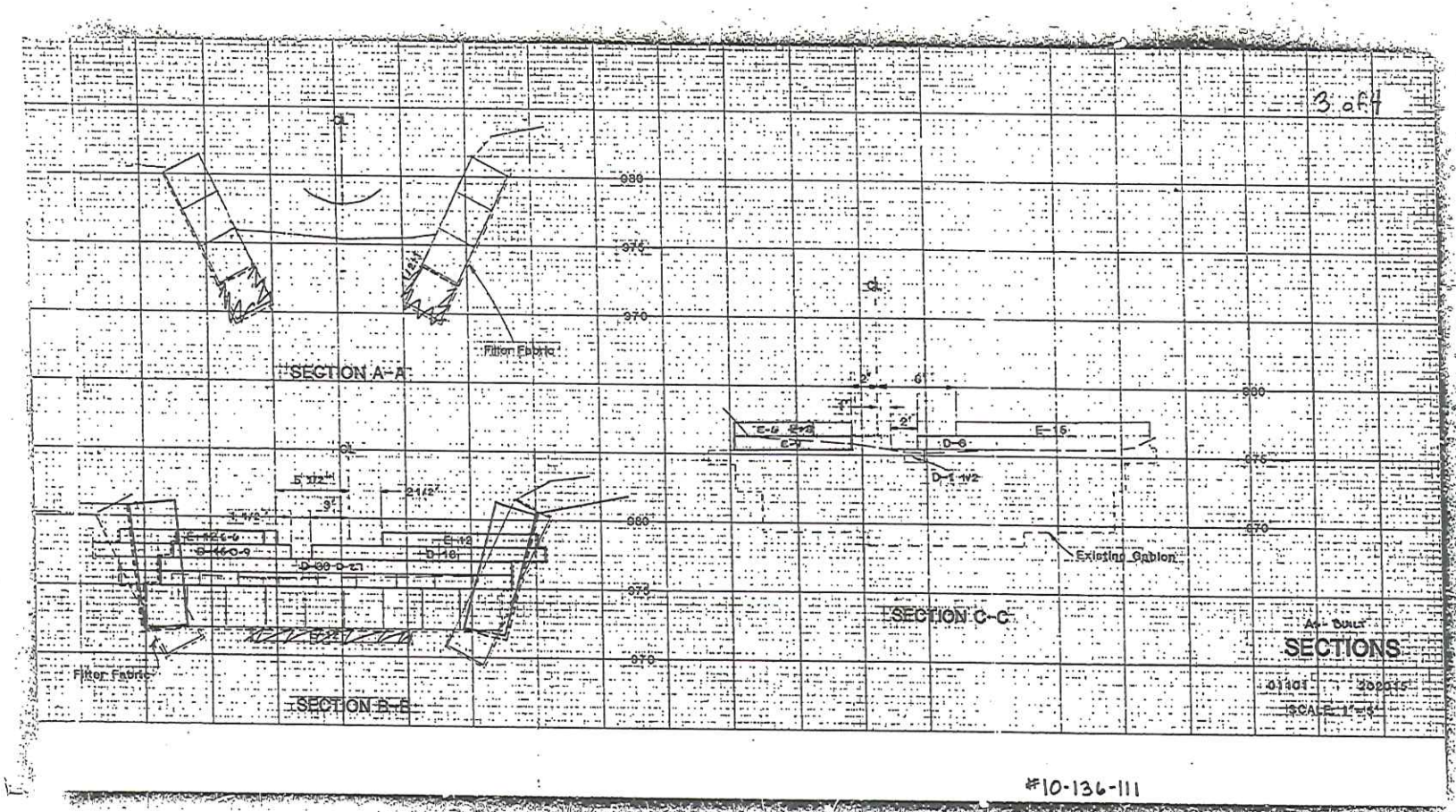
NO SCALE

DETAIL SHEET

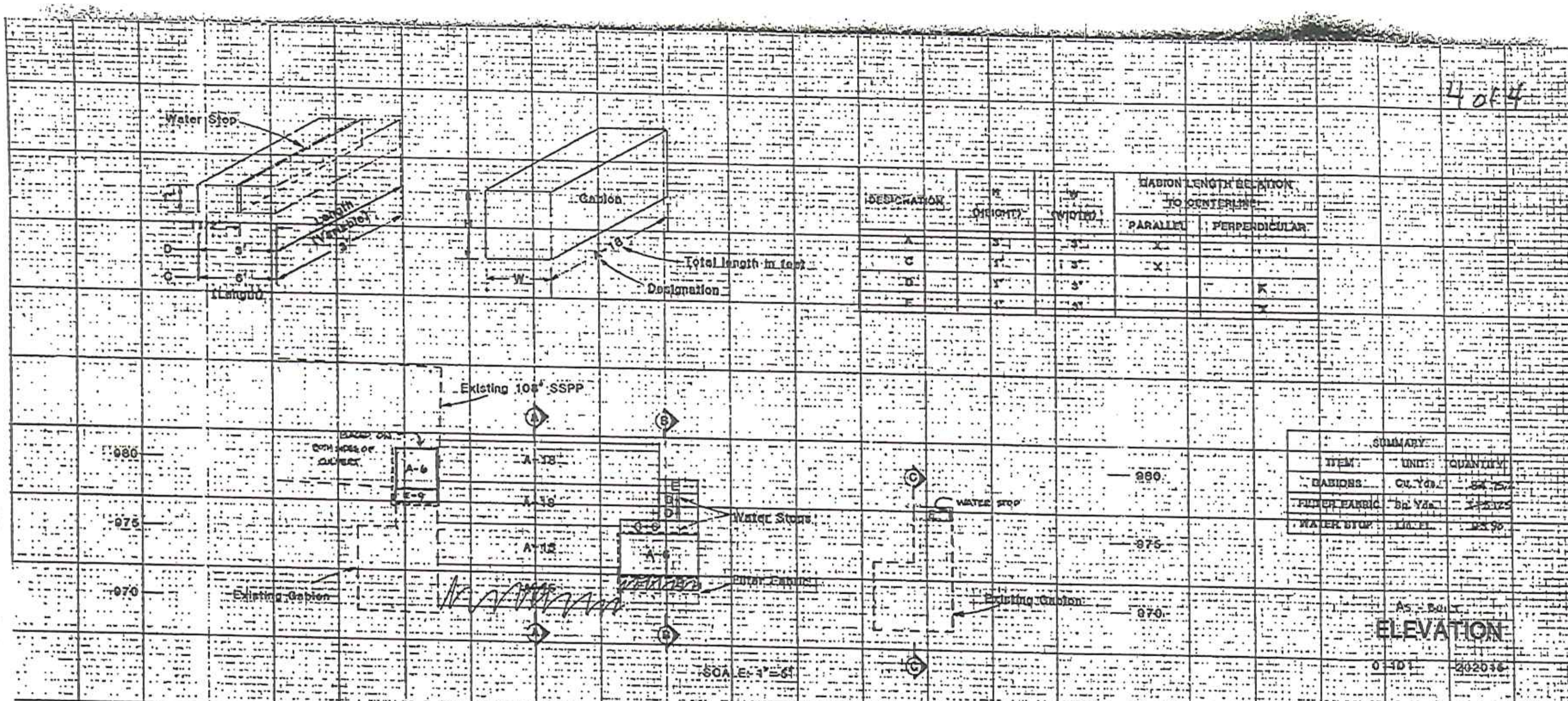
01101 202015

As Built

#10-136-111


SECTION A-A
Filter Fabric
SECTION B-B
Filter Fabric
SECTION C-C
Existing Gabion
AS-BUILT
SECTIONS
SCALE: 1"=4'

#10-136-111



DESIGNATION	H (HEIGHT)	W (WIDTH)	GABION LENGTH RELATION TO CENTERLINE	
			PARALLEL	PERPENDICULAR
A	3'	3'	X	
C	1'	3'	X	
D	1'	3'		K
E	1'	3'		X

SUMMARY		
ITEM	UNIT	QUANTITY
GABIONS	Cu. Yds.	[illegible]
FILTER FABRIC	Sq. Yds.	[illegible]
WATER STOP	Lin. Ft.	[illegible]

As - Built

ELEVATION

0-101 202016

#10-136-111