County of Santa Cruz 0311

DEPARTMENT OF PUBLIC WORKS

701 OCEAN STREET, ROOM 410, SANTA CRUZ, CA 95060
(931) 454-2160 FAX (931) 454-2395 ADD (831) 454-2123

THOMAS L. BOLICH
DIRECTOR OF PUBLIC WORKS

AGENDA: JUNE 5, 2001
May 23,200 1

SANTA CRUZ COUNTY BOARD OF SUPERVISORS
701 Ocean Street
Santa Cruz, California 95060

SUBJECT: APPLICATION FOR THE CALIFORNIA DEPARTMENT OF FISH AND GAME FISHERY RESTORATION GRANTS PROGRAM (SB271) SWANTON ROAD DEMONSTRATION PROJECT AND THE ROAD CROSSING AND SALMONID PASSAGE ASSESSMENT PROJECT

Members of the Board:

The Department of Public Works is requesting your Board's approval to submit two grant applications (copies attached) for $66,971 and $91,766 to the California Department of Fish and Game Fishery Restoration Grants Program. The first grant proposal is for the Swanton Road Demonstration Project, which provides funding for embankment improvements incorporating woody material, revegetation, and biotechnical soil stabilization techniques along Swanton Road. The second grant application proposal is for a Road Crossing and Salmonid Passage Assessment Project. The assessment project will identify, evaluate, and rank fish passages at County road crossings along four watershed areas (San Lorenzo, Arana, Soquel, and Aptos) for future watershed enhancement projects.

It is therefore recommended that the Board of Supervisors adopt the attached resolution authorizing the Department of Public Works to submit two grant application proposals in the amount of $66,971 and $91,766 to the California Department of Fish and Game Fishery Restoration Grants Program for the Swanton Road Demonstration Project and the Road Crossing and Salmonid Passage Assessment Project.

Yours truly,

THOMAS L. BOLICH
Director of Public Works

WBW:mg
Attachments
RECOMMENDED FOR APPROVAL:

County Administrative Officer

copy to: Public Works
fgm.wpd

BEFORE THE BOARD OF SUPERVISORS
OF THE COUNTY OF SANTA CRUZ, STATE OF CALIFORNIA

RESOLUTION NO. _____

On the motion of Supervisor
duly seconded by Supervisor
the following resolution is adopted:

RESOLUTION APPROVING SUBMITTAL OF GRANT APPLICATIONS

WHEREAS, grant funding is available from the California Department of Fish and Game Fishery Restoration Program; and

WHEREAS, the County of Santa Cruz has completed two grant applications titled Swanton Road Demonstration Project and Road Crossing and Salmonid Passage Assessment Project; and

WHEREAS, the County of Santa Cruz is willing to enter into the grant agreement with the State of California;

NOW, THEREFORE, BE IT RESOLVED AND ORDERED that the Board of Supervisors of the County of Santa Cruz by adoption of this resolution hereby agrees to the terms and conditions set forth in the grant agreement and authorizes the Director of Public Works as agent of the County to execute and submit all documents, including, but not limited to agreements, amendments, payment requests and so on, which may be necessary for the completion of the aforementioned projects.

PASSED AND ADOPTED by the Board of Supervisors of the County of Santa Cruz, State of California, this o___day f_____ 200 1, by the following vote:

AYES: SUPERVISORS

NOES: SUPERVISORS

ABSENT: SUPERVISORS

_____
Chairman of said Board

ATTEST:_____
Clerk of said Board

Approved as to form:

Chief Assistant County Counsel

Distribution: County Counsel
Public Works
Planning Department-Water Resources Section
Auditor/Controller

fgm.wpd

0313

Summary Sheet

1. Contractor ..... County of Santa Cruz
2. Type of Contractor ..... Public Agency
3. Street Address ..... 701 Ocean Street
4. City ..... Santa Cruz
5. State ..... California
6. Zip Code 95060
7. Contact Person.. ..... Kristen Schroeder
8. Telephone Number ..... (831) 454-3154, Fax (831) 454-2131
9. Project Title ..... County of Santa Cruz Road Crossing and Salmonid Passage Assessment
10. Funding Request ..... $ 91,766
11. Objective: (1) Complete an initial assessment of all County road crossings on salmonid streams; (2) Evaluate passage conditions at up to 70 stream crossings that may be passage impediments for salmonids; (3) Create a priority list for mitigation; and (4) complete initial passage improvement designs and construction estimates for the 2 high priority projects.
12. Species Benefitted ..... Steelhead, Coho Salmon
13. Work Schedule ..... April 2002 – April 2003
14. County ..... Santa Cruz
15. Stream.. ..... San Lorenzo, Arana, Soquel, Aptos, Corralitos and tributaries
16. Tributary to.. ..... Monterey Bay
17. Major Drainage Systems ..... San Lorenzo, Soquel, Aptos, Pajaro
18. Assembly District 27
19. Senate District ..... .15
20. Past Contractor (Contracted with DFG in the past for fisheries restoration work). ..... Yes

2 1. Federal Taxpayer ID# 94-6000534

22. Project Site Falls Within Coastal Zone?. ..... Yes, some sites

23. Project Site Falls Within Klamath River Basin? ..... No

24. Project Site Falls Within Trinity River Basin?. ..... No

25. Project Type ..... PL

0315

BACKGROUND

Introduction

Fish passage through culverts is a significant limiting factor for anadromous salmonids along the California Coast. Culverts often create temporal, partial or complete barriers for anadromous fish on their spawning migrations. As well, there is a growing awareness of how stream crossings can disrupt the movement of resident and juvenile fish. Juvenile coho salmon spend usually one year in fresh water before migrating to sea, while juvenile steelhead may rear in fresh water one to three years.

Project Summary

This project will identify, evaluate and rank barriers to fish passage that lie within County of Santa Cruz road rights-of-way in four small watersheds (San Lorenzo, Arana, Soquel and Aptos) tributary to Monterey Bay and two small sub-basins of the Pajaro River (Corralitos and Salsipuedes). The initial assessment will include bridges, but the detailed assessment will focus on culvert crossings, While the exact number, condition and location of road crossings is currently unkown, the development of this information will be a valuable product of the proposed project.

It is anticipated that the project will be conducted in two phases with a series of tasks outlined in each step. The steps and related tasks have been modeled on the methods that are presented in the April 2001 Draft of the Fish Passage Evaluation Chapter of the *CDFG California Salmonid Stream Habitat Restoration Manual,* (Taylor and Assocs). The project proposes to follow the technical guidelines which are outlined in this chapter and which will be taught at the For Sake of the Salmon stream crossing workshops beginning in September 2001 (funded by the CDFG Fisheries Restoration Grants Program). County staff will attend those trainings and contractors will be hired who are experienced in employing these standardized methods.

Project Area

The project area includes four small coastal watersheds (San Lorenzo, Arana, Soquel and Aptos), and a portion of the Pajaro watershed (Corralitos and Salsipuedes sub-basins). While this project area includes several watersheds, it makes sense for this project for several reasons. First, the project area comprises a common drainage flowing into the ocean (RFP, criteria #6). The project area will focus on county road stream crossings that are under the jurisdiction of a single agency (County of Santa Cruz). Consequently, the assessment will be comprehensive for all county road stream crossings, allowing the County to prioritize in order to maximize the benefit to steelhead and coho salmon. Under the Steelhead 4-d rules, the County of Santa Cruz is responsible for all road crossings under their jurisdiction.

A preliminary assessment of county road stream crossings has narrowed the scope of the project area to these four watersheds and two sub-basins to include a total of 149 road stream crossings. The number of county road stream crossings varies throughout the project area, with the

majority in the San Lorenzo watershed (97). The Corralitos-Salsipuedes sub-basins have 27, Soquel has 19, and Aptos has 6.

The proposed project area does not include North Coast streams, where the few county road crossings are bridges, with the exception of Bonny Doon Road (Liddell Creek). Two of the three Bonny Doon culverts will be mitigated during summer 2001 and the third will be evaluated by the California Department of Fish and Game and the National Marine Fisheries Service in the summer of 200 1. In addition, the project area does not include road crossings on non fish-bearing streams or above known complete barriers (e.g. waterfalls and gradient). During the initial assessment, county staff will work with CDFG and local fishery biologists to further refine the list of culverts to include only those on fish-bearing stream reaches.

Project Area Land Use

Residential land use, including rural and mountain residential zoning, timber harvest preserve, and a mix of commercial and special districts (schools, a harbor) dominate the project area. The lower portions of the watershed, close to the coast, are more urbanized with residential, commercial and special districts land use. State Parks manages property in San Lorenzo and Aptos watersheds, which includes Henry Cowell, Fall Creek and Nisene Marks State Parks. State Parks also manages the lagoon area of Aptos Creek. Upper watershed land use consists predominantly of rural residential, timber harvest preserve and/or open space. The California Department of Forestry manages a demonstration forest in the Soquel watershed. In Corralitos and Salsipuedes sub-basins, the lower watershed is dominated by row crop, berry, and orchard agricultural land use, while the upper watersheds are dominated by rural residential and timber harvest preserve land use.

Steelhead and Coho Salmon Populations in the Project Area

Steelhead populations in the project area are moderate to small and are considered low compared to historic populations due to human impacts such as urbanization, water diversion, sedimentation and other habitat degradation. San Lorenzo River and tributaries support an estimated 1,650-2500 adult steelhead (DW Alley, 2001). San Lorenzo tributaries, where most of the culvert stream crossing exist, contribute much of the overall watershed production and in 2000, contributed the greater percentage of young-of-the-year juveniles to the overall population (DW Alley, 2001). Arana Gulch is a small watershed (3.5 square miles) that supports less than 50 adult steelhead. Estimate of returning adults from a limited number of reaches was 12-l 3 steelhead (DW Alley, 2000). In 1998, Soquel Creek watershed estimates of returning adults was 578, based on sampling of 15.2 miles of the mainstem and selected tributaries (DW Alley, 1999).

The San Lorenzo, Soquel and Aptos watersheds are identified as coho salmon recovery streams, and will be considered for re-introduction when habitat conditions improve (CDFG, 1998). Aptos Creek Watershed is dominated by Nisene Marks State Park; there are no estimates of the adult steelhead population. Corralitos Creek and its tributaries provide some of the most important steelhead habitat in the Pajaro River Basin. Salsipuedes Watershed supports steelhead in its headwater tributaries. There are no estimates for adult steelhead populations in either Corralitos or Salsipuedes watersheds

Established Need for Fish Passage Assessments

Compliance with the Federal Endangered Species Act Section 4(d) rule.
The 4(d) rule lists blockages at road/stream intersections as a potential form of "take" by disruption of migration (for feeding, breeding, and sheltering) and as potentially causing death (direct take) to salmonids. The County of Santa Cruz is actively seeking to comply with the 4(d) rule as it relates to stream crossings and other forms of "take".

State Restoration Plan for California Coastal Salmonids.
In November 1999, the California State Resources Agency convened a Fish Passage Work Group of interested state, local and federal agencies, fisheries conservation groups, researchers, restoration contractors and others, to discuss ways to restore anadromous salmonid migration by improving fish passage at barriers. One of the products that has come out of this work group is a multi-agency Memorandum of Understanding, which sets the framework for a coordinated approach to restoring fish passage for anadromous salmonids. County of Santa Cruz has been asked to become signatories to that MOU, as partners in the FishNet 4C Program. One of the principle intentions of the MOU is to "identify, prioritize, remediate and monitor current barriers to fish passage in California" [1] This proposal seeks funding for County of Santa Cruz to take the first important step in meeting the goals of the MOU and the Fish Passage Work Group, that being an of assessment and prioritization of barriers which will then lead to focused action and implementation.

California is close to achieving a comprehensive assessment of county related barriers along a major portion of its northern and central coast. In recent years, the California Department of Fish and Game Fishery Restoration Grants Program has supported barrier assessments for the Counties of Humboldt, Trinity, Del Norte, Siskiyou and Mendocino, as part of the Northern Five Counties' Salmon Conservation Program. In the last funding cycle of the Fishery Restoration Grants Program (August 2000), the Counties of Mendocino and Sonoma in collaboration with Ross Taylor and Associates, received a grant to conduct a fish passage assessment of county facilities in the Russian River watershed. This proposal to complete an inventory, assessment and prioritization of barriers for County of Santa Cruz road crossings will complete one more piece of the program to eliminate barriers and increase available salmon and steelhead habitat on our coastline.

State Fish Passage Assessment Tools.
The California Department of Fish and Game has recognized the importance of developing methods for inventorying road crossings and evaluating fish passage that complement the new National Marine Fisheries Service Guidelines for Salmonid Passage at Stream Crossings[2]. These methods are in their final stages of development and will be eventually included in the *California*

'Draft Memorandum of Understanding- A Coordinated Approach to Restoring Fish Passage for Anadromous Salmonids. California Resources Agency, April 200 1.

[2] Guidelines for Salmonid Passage at Stream Crossings, Final Draft. National Marine Fisheries Service Southwest Region. May 16, 2000

Department of Fish and Game Salmonid Restoration Manual.[3] The CDF&G Fishery Restoration Grants Program has also funded six fish passage workshops for Coastal California, which will be begin in September 200 1. One of the primary goals of the workshops is to train agency personnel in the new Fish and Game guidelines for fish passage assessment and the new NMFS Guidelines for Fish Passage at Stream Crossings. County staff will attend these trainings and their contractor for this proposed project will use these state and federal endorsed methods for analysis.

County and Regional Passage Efforts

Santa Cruz County has been an active participant in the FishNet 4C Program for over three years. One of the principle tasks of the FishNet program has been to complete an "environmental audit" of county policies and management practices relative to protecting anadromous fish and their habitat. [4] That study was completed in January 2001 by UC Berkeley Department of Environmental, Science, Policy and Management. Recommendations and implementation goals have been presented to County Boards of Supervisors and to staff of Public Works, Planning, and Parks Departments. One of the highest priorities for Santa Cruz County, which was identified in the implementation goals, is the need for the county of identify and eliminate fish passage barriers related to county facilities:

> **"Goal # 15 Fish Migration Barriers-** Develop a program to identify, evaluate and prioritize County facilities that are barriers to sahnonid migration. Develop a systematic program to seek funding for replacement of these identified fish passage barriers. Commit to sending county staff to trainings on fish passage guidelines and culvert design according to new NMFS and CDFG standards. "

This project proposal represents the next important step in this goal. This step will then ultimately lead to actions to eliminate these barriers and provide upstream habitat for migrating and juvenile salmonids.

Salmonid Passage in Santa Cruz County

Fish passage is identified as a universal remedial factor in the Draft Strategic Plan for Restoration of the Endangered Coho Salmon South of San Francisco Bay (CDFG, 1998). The report notes that culverts at road crossing may be passage barriers in the San Lorenzo, Soquel and Aptos watersheds. Passage is also identified as a limiting factor in the Steelhead Management Plan for Southern California Region, which includes Santa Cruz County streams.

The County of Santa Cruz has a strong history of addressing fish passage barriers on public, private and natural barriers. In the past fifteen years, the Planning Department has improved passage conditions at public road crossings on Valencia Creek, Corralitos, and Casserly creeks. One of the tasks of this assessment will be to determine if existing fish mitigation projects at

[3] Fish Passage Evaluation at Road Crossings; Ross Taylor and Michael Love, for the California Salmonid Stream Habitat Restoration Manual. Draft April 17, 2001.

[4] Effects of County Land Use Policies and Management Practices on Anadromous Fish and Their Habitats; Final report prepared for the FishNet 4C Program of Sonoma, Mar-in, San Mateo, Santa Cruz and Monterey Counties; Dr. Richard Harris, UC Berkeley Extension. January 200 1.

public road crossings are adequate to provide passage under all flow conditions or for all life stages. In addition, fish ladders have been installed on natural and human barriers on Zayante, Love, Branciforte creeks.

In the past two years, Public Works has mitigated fish passage at several public road crossings. Culvert replacements on Happy Valley Road (Crystal Creek) and Vine Hill Road (Branciforte Creek) were installed to maximize fish passage with oversized culverts buried below stream grade. In the summer of 2001, Public Works plans to address passage problems at two road crossings on Bonny Doon Road (Liddell Creek). The culvert replacement at PM 0.74 is funded through Coastal Salmonid Protection and Restoration Program. In addition, Public Works will replace the Browns Valley Road Bridge (Corralitos Creek) that is a partial barrier.

Some passage barrier information has been collected for Santa Cruz County streams. In 1986, a comprehensive stream assessment identified all potential barriers in fish-bearing streams. This assessment identified logjams, private and public roads barriers. In 198 1, data on salmonid numbers, habitat information and barriers was collected (Harvey and Stanley, 198 1). Unfortunately, this survey was completed prior to 1982, when storms of historic proportion hit Santa Cruz County. California Department of Fish and Game has completed stream assessments with Americorps crews for many Santa Cruz County streams. These surveys contain habitat data and some passage barrier information. This information will be used as reference information when assessing the existence of passage barriers, especially private roads and flashboard dams, downstream of county road crossings.

Ongoing Watershed Assessments in the Project Area

The proposed project will contribute valuable information to watershed assessments that are ongoing in each of the watersheds and subbasins in the study area. An assessment for the Arana Gulch watershed will be completed by end of 2001. In the San Lorenzo watershed, an update of the 1979 Watershed Management Plan will be completed by Spring 2002 and will include a Steelhead Enhancement Plan. Watershed assessments in Soquel and Aptos watersheds are beginning and will be completed by 2003. In the Paj aro River, an SB27 1 grant is funding a Steelhead Enhancement Plan that will be completed by April 2002.

While watershed assessments will include road assessments and some barrier identification, none of the assessments has funds budgeted for surveys and hydrologic analysis of potential barriers at county road stream crossings. Road assessments in Soquel, Aptos and San Lorenzo will focus on sediment contributions from roads and not on passage at stream crossings. In addition, the road assessment in the San Lorenzo Watershed will focus on inner gorge roads along mainstem streams where bridges are more prevalent, and may not include roads along small tributaries where culvert crossings predominate.

PROJECT DESCRIPTION

Phase I – Stream Crossing Assessment and Prioritization

Step 1: Preliminary Project Scoping and Location of Culverts
Planning and Public Works staff, under the direction of Kristen Schroeder, Fishery Resource Planner, will conduct an assessment of the estimated 149 existing road crossings in the project area. The goal will be to determine the type (bridge/culvert), exact number, and location of road crossings on fish-bearing streams. The assessment will identify approximately 100 crossings for further assessment based on this initial screening of crossing type (bridge/culvert) and stream value to the coho and steelhead fisheries. Kristen Schroeder will provide oversight of all preliminary scoping activities. This preliminary screening will include:

Step 1 Tasks

1) Review of the County road system and existing maps.

2) Identification of fish bearing streams using information from the Nature Conservancy, ongoing watershed assessments, local fishery biologists including Department of Fish and Game, and, as needed field work.

3) Creation of GIS mapping of all stream crossings and a road/stream crossing database.

4) Identification of approximately 100 stream crossings impacting passage in fish bearing streams.

Step 2: Initial site visits, data collection, and first phase passage evaluation with "Green-Gray-Red" filter

During Step 2 of the project, initial site visits are conducted on all crossing identified in Step 1. The Technical Team will visit each site, collect physical measurements of the stream channel and the culvert, enter that data in a standardized date sheet format, and perform preliminary passage evaluation and rankings with Green-Gray-Red criteria.

Step 2 Tasks

5) Data Collection at Field Site- With direction and advisory support from Planning and Public Works staff, a team of two contracted technical field staff will conduct initial site visits and collect site-specific data on stream crossings and existing structures. Information to be gathered will be recorded in a standardized Fish Passage Inventory Data Sheet. Data collected will include channel width measures and longitudinal surveys to measure elevation of culvert inlet, culvert outlet, maximum pool depth within five feet of culvert, outlet pool control, and ordinary high water mark. The longitudinal survey may also serve to measure apparent breaks in slope within the crossing and steep drops in the stream channel profile immediately upstream of the culvert inlet. At each culvert the

amount of road fill prism is calculated. Additional observations include turbulence at culvert inlet, debris accumulation at culvert inlet or within culvert barrel, and condition of culvert and its outlets. Photographs and site sketches will be completed at each site.

6) Survey data will be recorded in the field and then entered into a database for calculations of elevations and to serve as the foundation for the Green-Gray-Red criteria evaluation.

7) The data is then transferred to a consultant who runs a data analysis filtering process to identify sites which either meet, or fail to meet the fish passage criteria for all species of concern at all life stages. The initial number of culverts is then classified as green-gray or red, based on this screening. Only the identified gray structures will go on to receive an in-depth passage evaluation which includes hydrologic calculations.

Stream crossings will be ranked on level of impact on the fishery:

Ranking Category	Definition	Potential Impacts
Green –	Crossing probably passes all species and life stages	None
Gray –	Crossing may be: partial barrier – impassable to some fish at all times or Temporal barrier - impassable to all fish some of the time	 Exclusion of certain species and life stages from portions of a watershed Delay in movement beyond the barrier for some period of time
Red –	Crossing is most likely a total barrier - impassable to all fish at all times	Exclusion of all species from portions of watershed

Step 3 – Analysis of stream crossings evaluated as partial or total barriers.

A hydrological assessment of Gray stream crossings will be analyzed by the consultant using the software FishXing to confirm and quantify the degree of impact on juvenile and adult fish. For Gray crossings that are identified as barriers, and all Red crossings, habitat will be evaluated by the consultant for its value to salmonid populations. Where available, existing information on habitat will be used. County staff will assist with the compilation of existing habitat information or the collection of new habitat information. Flow gage records will be employed in the analysis when available.

Using FishXing, a priority ranking matrix will cross-reference barrier condition, hydrologic, and habitat information to rank the stream crossings. Department of Public Works staff and our local Fish and Game biologist will participate in a final ranking of sites to incorporate other factors (economic, social and political). This ranking will be incorporated in a final report and will serve as a guide to implementing treatments at high-priority sites with future project funding.

Step 3 Tasks

8) Conduct additional passage analyses, including hydrologic calculations will be completed for all "gray" ranked culverts using FishXing software.

9) Collect or obtain existing biological and habitat information to include in the ranking matrix.

10) Conduct preliminary ranking of Red and Gray sites using priority ranking matrix.

11) Develop final ranking of sites considering professional judgment and other factors (economic, social, and political).

The Report will be presented to the County of Santa Cruz Board of Supervisors, and provided to the Department of Public Works and Planning. It is anticipated that the final report and the ranked list of barriers will be used by the team and the Department of Public Works to identify projects and implement treatments at high-priority sites to provide unimpeded passage for juvenile and adult fish. The success of these treatments will be evaluated and maintained by the Department of Public Works.

Phase II – Design for two passage barriers

In this phase of the project, a hydrology and geomorphology consulting team will complete the mitigation design and permitting for two of the high priority passage barriers. The consultant will provide the design and pennitting for two of the high priority projects that are beyond the expertise of Public Works. For example, the consultant team will design a project for a site that needs a fish ladder or extensive channel rehabilitation. Pennitting is included so that the program can be assured that the mitigation design meets the criteria of the permitting agencies such as California Department of Fish and Game, National Marine Fisheries Service and the County of Santa Cruz Planning Department. A local hydrology and geomorphology consulting finn estimated that passage improvement design and pennitting will cost $25,000 each for two projects (Steve Weisner, Swanson Hydrology and Geomorpholoy, personal communication).

WORK SCHEDULE

Phase I

- April-June 2002 - Preliminary Project Scoping to identify the number and location of road crossings – conducted by Planning and Pubic Works staff
- Julv-September 2002 – Initial site visits, gathering of site-specific information, preliminary passage evaluation and ranking
- October 2002 - December 2003 – hydrologic study, analysis of passage data and biological and habitat information, development of final ranking of barrier sites

Phase II

- January 2003 – April 2003 – Design and initial permitting for the two high priority sites for salmonid passage mitigation.

PERMITS

No permits are required.

PROPOSED LAND USE Land use in the project area is not expected to change during this project.

OBJECTIVES

(1) Complete an initial assessment of all County road stream crossing on salmonid streams; (2) Evaluate passage conditions at up to 70 stream crossing that may be passage impediments for salmonids; (3) Create a priority list for mitigation; and (4) complete initial designs and budgets on the 2 high priority projects.

STATEMENT OF QUALIFICATIONS

The County of Santa Cruz has extensive experience administering grants and consultant contracts. Analysis of county road stream crossings will follow protocols established by the California Department of Fish and Game. Passage mitigation project design will meet National Marine Fisheries and California Department of Fish and Game passage design criteria.

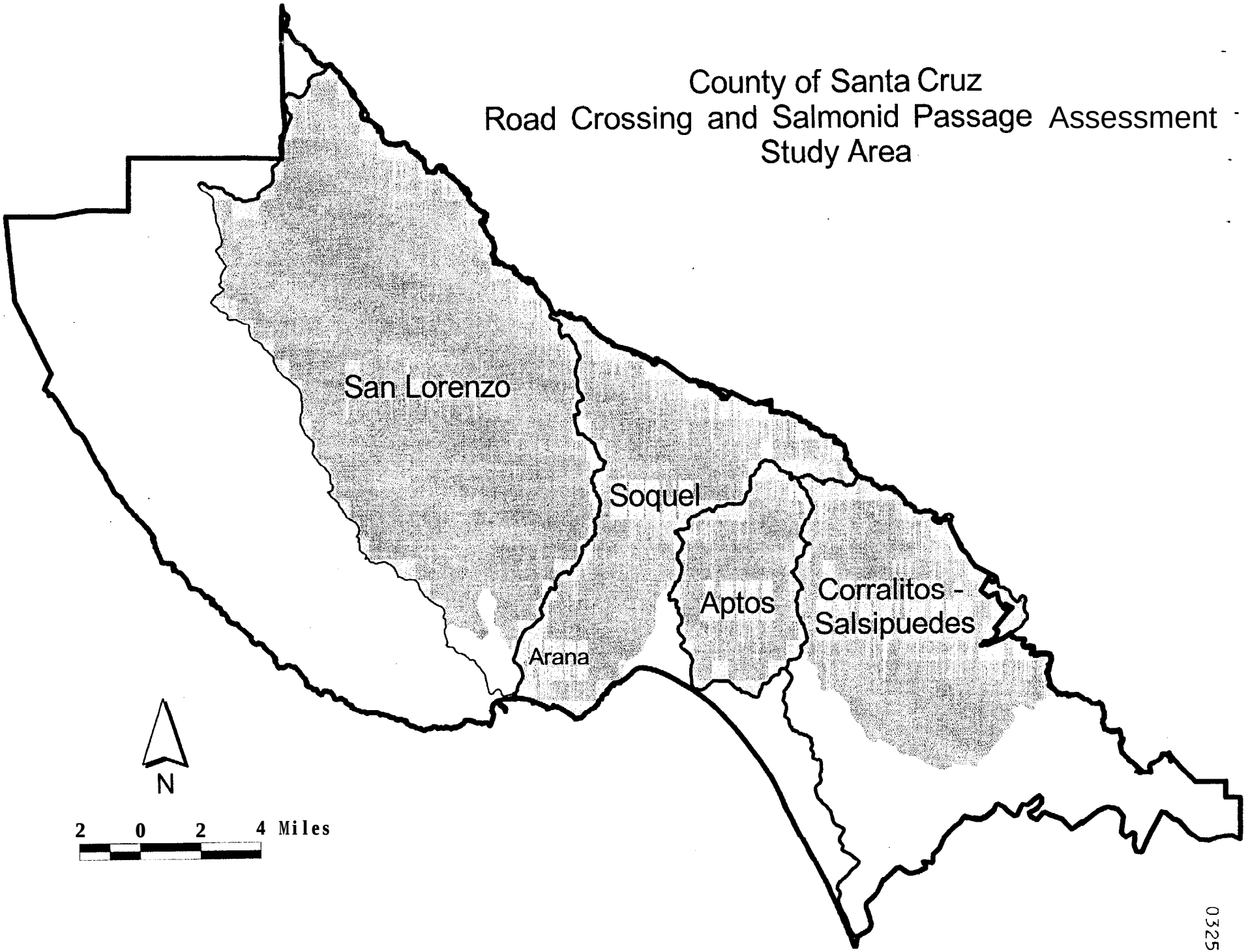
Kristen Schroeder, Fishery Resource Planner, County of Santa Cruz Planning Department, will administer the proposed project. Ms. Schroeder has a Masters Degree in Conservation Biology from the University of Michigan, Ann Arbor (1994). She has worked for the County for over four years and is very familiar with local roads, streams, and habitat conditions. She has worked as a fishery biologist consultant and has over ten years experience in the field of watershed management.

LOCATION

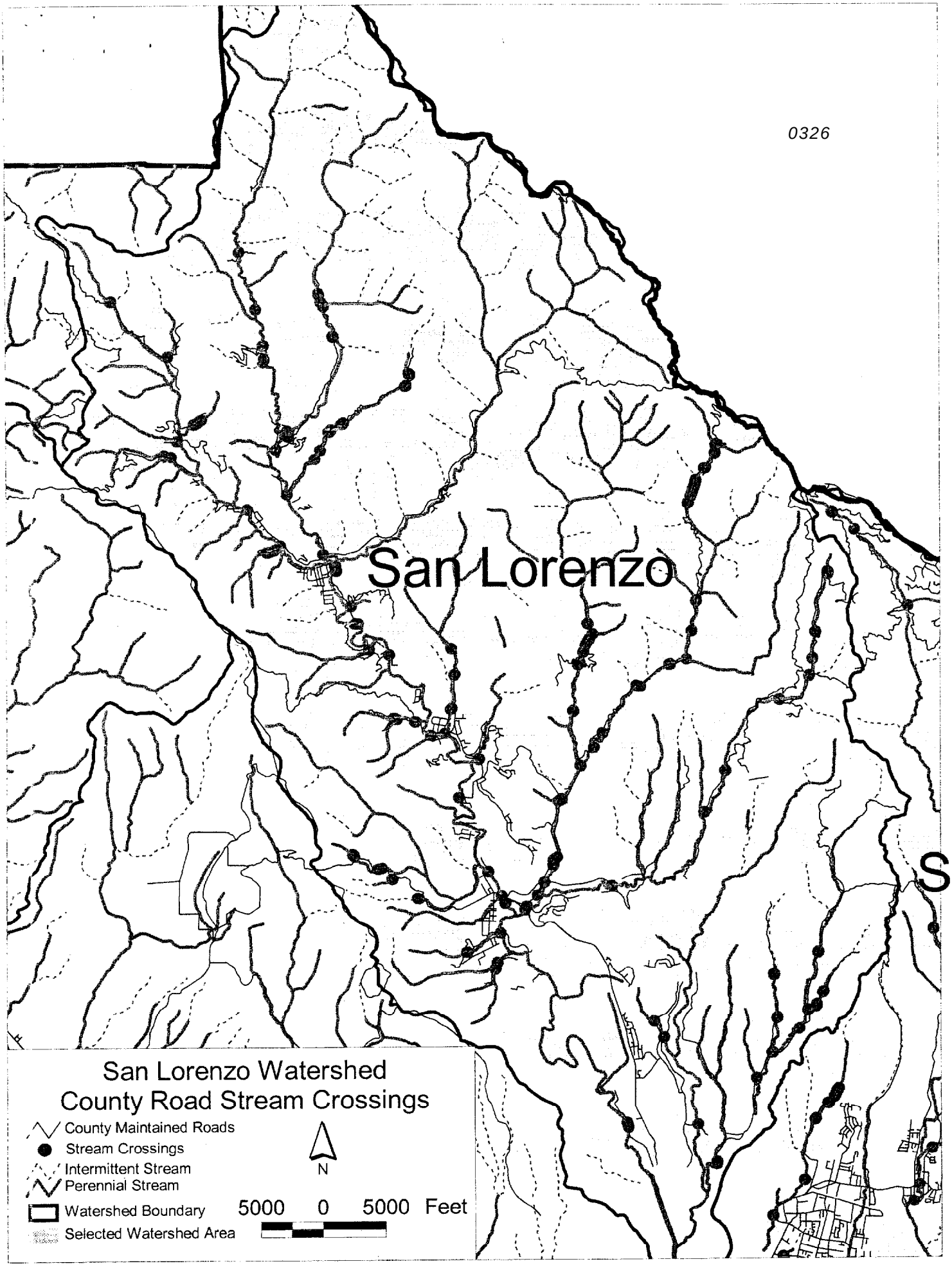
County road crossing on salmonid-bearing streams in Santa Cruz County (see attached map); includes streams in San Lorenzo, Arana, Soquel, Aptos watersheds and the Corralitos and Salsipuedes sub-basins.

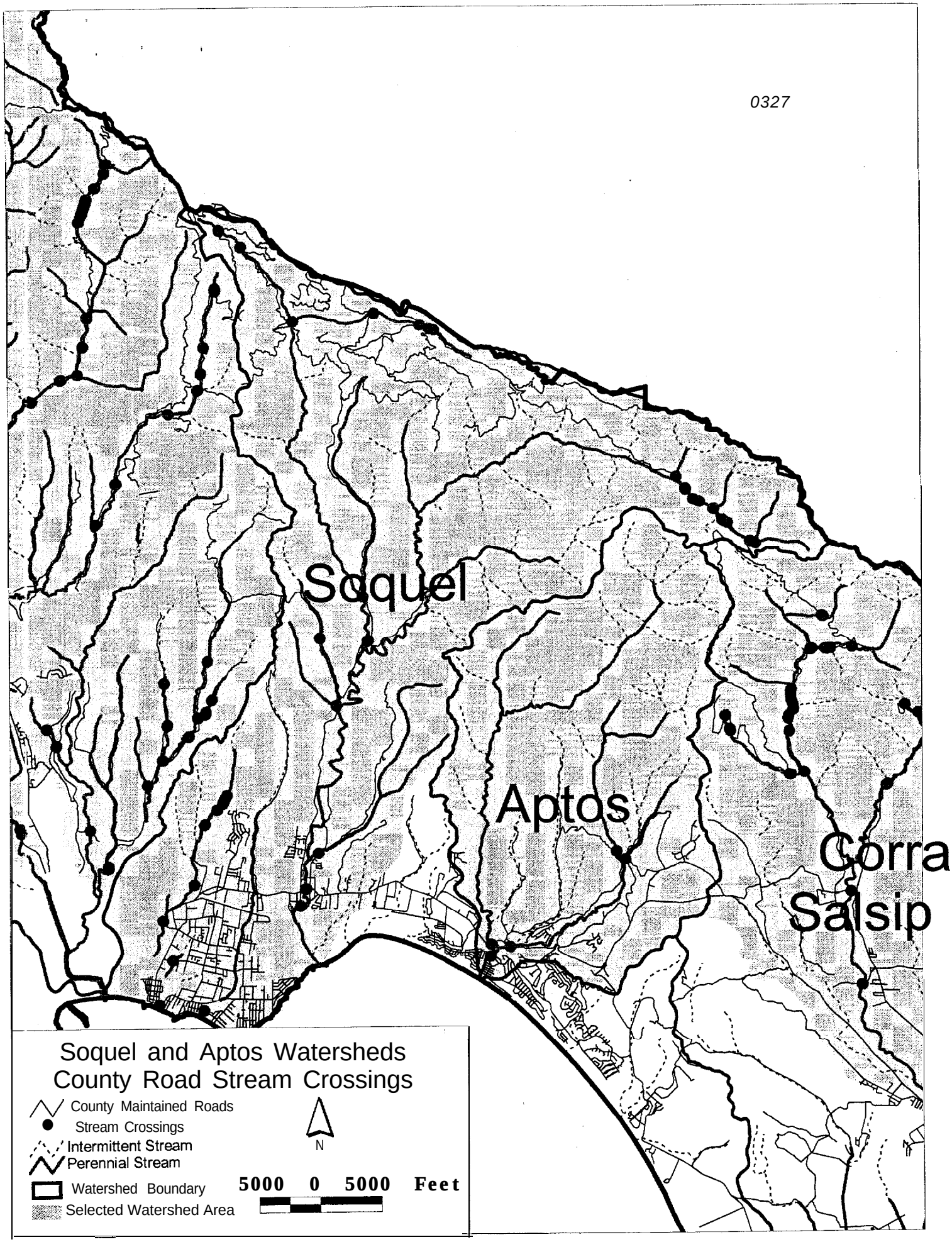
County of Santa Cruz Roads Salmonid Passage Assessment Budget

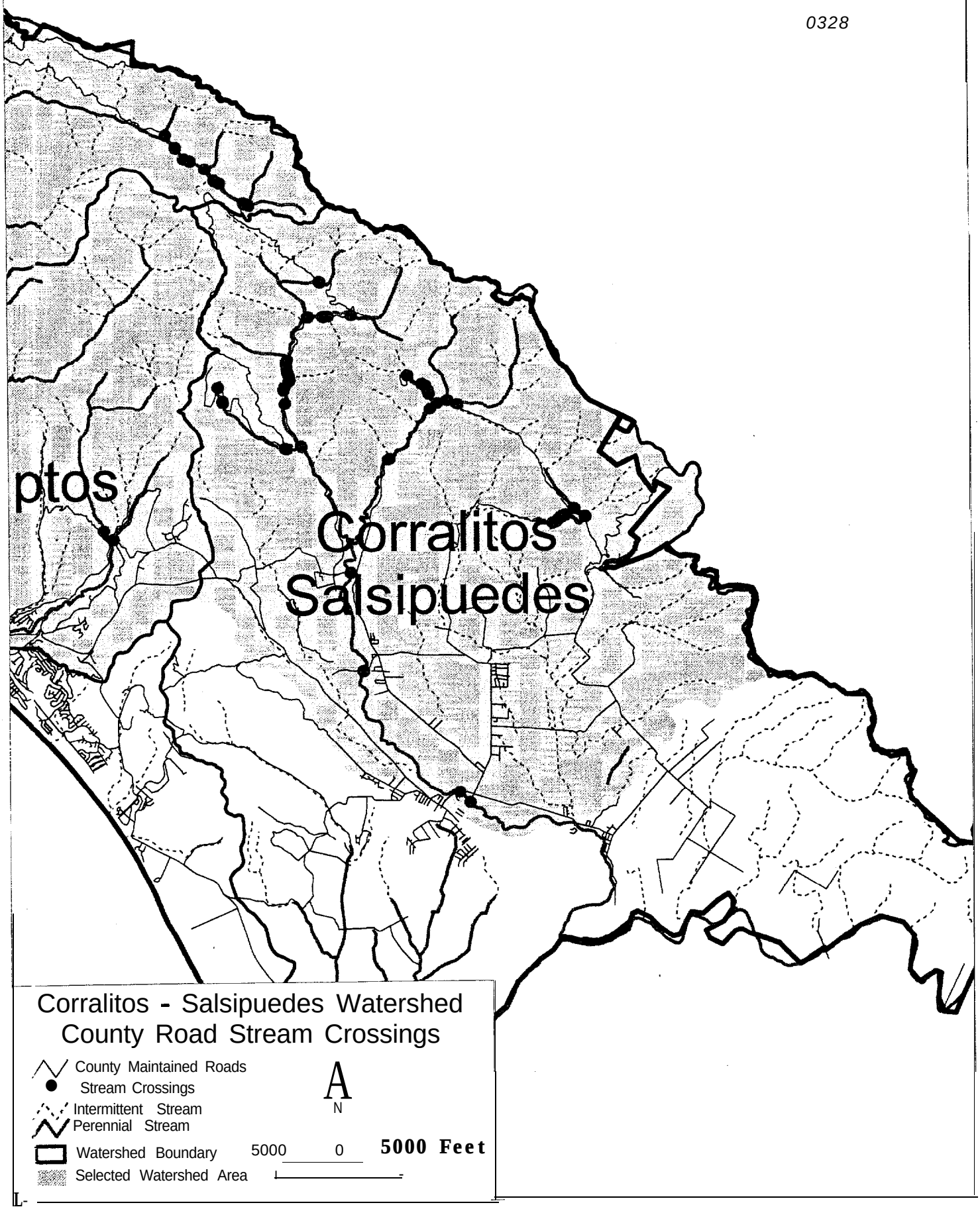
				Amount Requested	Cost-Share	Total
Phase I						
Personnel Costs	No. of Hours	Hourly Rate	cost			
Administration County Staff	150	$31 .00	$4,650		$4,650	$4,650
Project Assist. Roads Supervisor	30	$54.00	$1,620		$1,620	$1,620
Roads Asst. Supervisor	20	$46.00	$920		$920	$920
Fishery Biologists	4	$60.00	$240		$240	$240
CDFG Fishery Biologists	12	$42.00	$504		$504	$504
Road Design Supervisor	20	$64.00	$1,280		$1,280	$1,280
Operations Engineer	20	$55.00	$1,100		$1,100	$1,100
GIS map production	4	$50.00	$200		$200	$200
Step 1: Initial Site Visits						
County Staff	120	$31 .oo	$3,720		$3,720	$3,720
Step 2: Initial Site Visits (100: 5/day)						
Technical Team (2)	400	$18.00	$7,200	$7,200		$7,200
Step 2: Data Entry						
Technical Team	50	$18.00	*$900*	$900		*$900*
Step 3: Green-Gray-Red Analysis (100 x 0.5 hrs)						
Consultant	50	$60.00	$3,000	$3,000		$3,000
Step 3: Analysis of Gray culverts (70 x 1.5 hrs)						
Consultant	105	$60.00	$6,300	$6,300		$6,300
Step 3: Collection of habitat data, identify other barriers d/s						
County Staff	80	$31 .oo	$2,480		$2,480	$2,480
Step 3: Priority Analysis, Habitat Data Interpretation and Document Preparation						
Consultant	180	$60.00	$10,800	$10,800		$10,800
Technical Team Benefits (28%)	450	$5.04	$2,268	$2,268		$2,268
Consultant Admin (10%)	335	$6.00	$2,010	$2,010		$2,010
County Overhead (10%)			$1,403.40		$1,403	$1,403
Operating Expenses	Quantity	Unit cost	Total Cost			
Technical Team						
Equipment Rental	20	$50.00	$1,000.0	$1,000		$1,*000*
Mileage	3400	$0.33	$1,122.0	$1,122		$1,122
Per Diem	28	$200.00	$5,600.0	$5,600		$5,600
Consultant						
Mileage	2100	$0.33	$693.0	$693		*$693*
Per Diem	4	$200.00	$800.0	$800		$800
County						
GPS Unit (initial assess)	15	$25.00	$375.0		$375	$375
Rite-in-the-Rain paper	2	$10.00	$20.0		$20	$20
Duplicating	700	$0.07	$49.0		$49	$49
GIS Maps	5	$14.50	$72.5	$73		$73
Mileage- County	800	$0.33	$264.0		$264	5264
Phase II						
-Prepare Design & Permitting (2 sites)						
Hydrology &Geomophology Consultant	2	$25,000.00	$50,000	$50,000		$50,000
			Totals	***$91,766***	***$18,825***	***#######***
				Percent Mat	17.02%	


County of Santa Cruz
Road Crossing and Salmonid Passage Assessment
Study Area
San Lorenzo
Soquel
Aptos
Corralitos -
Salsipuedes
Arana
N
2 0 2 4 Miles

0325


0326
San Lorenzo
S
San Lorenzo Watershed
County Road Stream Crossings
County Maintained Roads
Stream Crossings
Intermittent Stream
Perennial Stream
Watershed Boundary
Selected Watershed Area
N
5000 0 5000 Feet


0327
Soquel
Aptos
Corra
Salsip
Soquel and Aptos Watersheds
County Road Stream Crossings
County Maintained Roads
Stream Crossings
Intermittent Stream
Perennial Stream
Watershed Boundary
Selected Watershed Area
N
5000 0 5000 Feet



Corralitos - Salsipuedes Watershed
County Road Stream Crossings

County Maintained Roads
Stream Crossings
Intermittent Stream
Perennial Stream
Watershed Boundary
Selected Watershed Area

A
N

5000 0 **5000 Feet**

WATERSHED BACKGROUND SUMMARY AND OVERVIEW

You are required to provide all of the following summary information that is applicable to your proposed project. Use reverse of pages as needed for descriptive answers.

1. Project Name: County of Santa Cruz Road Crossing and Salmonid Passage Assessment Type: PL

A. Watershed Name:
San Lorenzo, Arana, Soquel and Aptos (coastal watersheds); Corralitos and Salsipuedes (sub-basins of the Pajaro watershed).

B. Watershed area (square miles):
San Lorenzo: 138.0, Arana: 3.5, Soquel: 42.0, Aptos: 24.4, Corralitos: 28.3, Salsipuedes: 23.9, TOTAL: 260.1

C. Project location: T N/A R N/A S N/A ; Latitude N/A ;Longtitude N/A

D. Total length of perennial blue line streams in watershed (from top):
San Lorenzo: 36.0, Arana: 7.0, Soquel: 50.0, Aptos: 19.8, Con-alitos: 27.0, Salsipuedes: 2.5, TOTAL: 142.3

E. List known salmonid species present in watershed:
coho salmon, steelhead trout. (source(s): D.W. Alley /date(s) 1998-2001).
(source(s): Harvey and Stanley /date(s) 1981).

F. List known historic salmonid species found in watershed:
coho salmon, steelhead trout. (source(s): Ca. Dept. of Fish and Game /date(s) 1996).

G. List known limiting factors that are addressed by the project (source). List item numbers From the attached list (page A16):
1, 4, 5, 6, 7 and barriers to fish migration.

H. List surveys or plans used to develop this proposal (include source and dates).

- Determination of Juvenile Steelhead Densities in Soquel Creek, Santa Cruz County, California with a 1997 Estimate of Juvenile Production and Expected Adult Returns; D.W. Alley and Associates; 1998.
- Effects of County Land Use Policies and Management Practices on Anadromous Salmonids and Their Habitats; Harris et al.; 2001.
- San Lorenzo River Watershed Management Plan; County of Santa Cruz Planning Dept. and State Resources Agency; 1979.
- Steelhead Restoration and Management Plan for California; Ca. Dept. of Fish and Game; 1996.
- Comparison of Juvenile Steelhead Densities, 1996-2000, in the San Lorenzo River and Tributaries, Santa Cruz County, California with an Estimate of Juvenile Population Size and an Index of Adult Returns from That Population; D.W. Alley and Associates; 2000.
- DRAFT California Salmonid Stream Habitat Restoration Manual, Part X, Fish Passage Evaluation at Road Crossings; Taylor and Love; 2001

I. List percent of hydrologic watershed area included in the proposal: N/A , and/or the length of the blue line stream in affected project reach:
Approximately 142.3 miles.

J. Watershed ownership percentages:
Federal: 0% State: 23% Private: 68% Local Government: 9%

K. Provide the percentage of the hydrologic watershed area with landowners supportive of proposal and project:
100% since the project will be performed entirely in County road easements.

L. Attach a list and area map of landowners granting access to project area.
Project will occur within County of Santa Cruz road easements. 0330

2. Watershed Land Use:

A. List current major land uses in the hydrologic unit where work is proposed.
Rural and mountain residential development, timber preserves, state lands, open space, urban/commercial development, agriculture.

B. List planned major land uses in the hydrologic unit where work is proposed.
Same as above.

C. Is the work in this proposal required as mitigation in a CEQA approval process, Timber Harvest Plan, or
or other required mitigation activity? Yes:___ No:_X_.

3. Prooosal Objective:

A. Briefly state the project objective, and explain how how it is consistent with the declared project type.
(1) Complete an initial assessment of all County road stream crossing on salmonid streams; (2) Evaluate passage conditions at up to 70 stream crossing that may be passage impediments for salmonids; (3) Create a priority list for mitigation; and (4) complete passage improvement initial designs and construction estimates for the 2 highest priority projects. This is consistent with the declared project type since it is a necessary first step for the removal of barriers to endangered salmonid migration. This is a recommendation of the FishNet 4(c) study as well as a requirment of the ESA section 4(d).

C. List keystone fishery problems and how they will be addressed by the project.
The proposed project will address critical fish passage issues by identifying, prioritizing and and developing projects to mitigate migration barriers at county road stream crossings in the project area.

4. Project Description:

A. List DFG acceptable protocols that were use in proposal development or will be used in project implementation (document in the text of the proposal how these protocols were/will be used). List the applicable alpha-numeric from the attached list (page A16):
DRAFT California Salmonid Stream Habitat Restoration Manual, Part X, Fish Passage Evaluation at Road Crossings; Taylor and Love; 200 1.

B. If other than DFG acceptable protocols, list and explain why the are being used.
N/A

C. List the methods and tasks, with a time line, the project will utilize.
Methods for inventorying road crossings and evaluating fish passage developed by California Fish and Game in conjunction with the NMFS will be used. It is the understanding of the applicant that these guidelines are currently in draft form.

Tasks

1. Review of the County road system and existing maps.

2. Identification of fish bearing streams using information from the Nature Conservancy, ongoing watershed assessments, local fishery biologists including Department of Fish and Game, and, as needed field work.

3. Creation of GIS mapping of all stream crossings and a road/stream crossing database.

0331

4. Identification of approximately 100 stream crossings impacting passage in fish bearing streams.

5. Data Collection at Field Site- With direction and advisory support from Planning and Public Works staff, a team of two contracted technical field staff will conduct initial site visits and collect site-specific data on stream crossings and existing structures. Information to be gathered will be recorded in a standardized Fish Passage Inventory Data Sheet. Data collected will include channel width measures and longitudinal surveys to measure elevation of culvert inlet, culvert outlet, maximum pool depth within five feet of culvert, outlet pool control, and ordinary high water mark. The longitudinal survey may also serve to measure apparent breaks in slope within the crossing and steep drops in the stream channel profile immediately upstream of the culvert inlet. At each culvert the amount of road fill prism is calculated. Additional observations include turbulence at culvert inlet, debris accumulation at culvert inlet or within culvert barrel, and condition of culvert and its outlets. Photographs and site sketches will be completed at each site.

6. Survey data will be recorded in the field and then entered into a database for calculations of elevations and to serve as the foundation for the Green-Gray-Red criteria evaluation.

7. The data is then transferred to a consultant who runs a data analysis filtering process to identify sites which either meet, or fail to meet the fish passage criteria for all species of concern at all life stages. The initial number of culverts is then classified as green-gray or red, based on this screening. Only the identified gray structures will go on to receive an in-depth passage evaluation which includes hydrologic calculations.

8. Conduct additional passage analyses, including hydrologic calculations will be completed for all "gray" ranked culverts using FishXing software.

9. Collect or obtain existing biological and habitat information to include in the ranking matrix.

10. Conduct preliminary ranking of Red and Gray sites using priority ranking matrix.

11. Develop final ranking of sites considering professional judgment and other factors (economic, social, and political).

12. Design new crossings for the two highest priority sites for fish passage barrier mitigation (phase II).

Timeline

Phase

- April-June 2002 - Preliminary Project Scoping to identify the number and location of road crossings – conducted by Planning and Pubic Works staff
- July-September 2002 – Initial site visits, gathering of site-specific information, preliminary passage evaluation and ranking
- October 2002 - December 2003 – hydrologic study, analysis of passage data and biological and habitat information, development of final ranking of barrier sites

Phase II

January 2003 – April 2003 – Design and initial permitting for the two highest priority sites for salmonid passage mitigation.

D. 'List the specific contract products to be delivered by the project (e.g., number of road stream crossings to be treated and how, feet of stream bank stabilized, number of students involved in a education proposal, etc.)

- Database of County road stream crossings in the project area.
- Passage analysis of approximately 70 culverts.
- Priority list of culverts for passage mitigation.
- Two passage improvement designs and construction budgets.

E. Attach photos of your project site if useful for proposal evaluation.
N/A

5. Permits:

A. List all permits required to complete the project. See Part VI of the California *Salmonid Stream Habitat Restoration Manual:*
None.

6. Scheduling:

A. Desired start date: April 1, 2002

B. Estimated duration of the project: 1 year.

7. Cost: (information for this category must be obtained from budget page in your proposal)

A. Match: amount and percent of total budget $18,825 17.02%

B. Request: amount and percent of total budget $91,766 82.98%

C. Total Budget: $110,391 100%

D. Indicate source and type of match (cash, materials, labor, etc.):
County staff will administer grant, perform initial assessment, assemble information, review documents, perform GIS analysis and provide a GPS unit.

8. Location:

A. Attach 8.5" x 11" black and white maps of the project site, surrounding hydrologic area, and regional location. Indicate scale of projection(s).
See Attached.

B. Provide clear directions of the route used to access the watershed or stream, and the project site.
N/A

S ummary prepared by: Kristen Schroeder

SWANTON ROAD DEMONSTRATION PROJECT

0333

Summary Sheet

1. Contractor . . . . . County of Santa Cruz
2. Type of Contractor . . . . . Public Agency
3. Street Address . . . . . 701 Ocean Street
4. City . . . . . Santa Cruz
5. State . . . . . California
6. Zip Code 95060
7. Contact Person . . . . . Connie Silva
8. Telephone Number . . . . . (831) 454-2784, Fax (831) 454-2385
9. Project Title . . . . . Swanton Road Demonstration Project
10. Funding Request $66,971
11. Objective: The objective is to demonstrate the feasibility of using biotechnical techniques including large woody material, erosion control and native vegetation for County Public Works streamside projects to enhance steelhead and coho habitat. While these techniques are used regularly in other parts of the state, they are not used by the Santa Cruz Public Works Department, who are responsible for a majority of roads along steelhead and coho streams.
12. Species Benefitted . . . . . Steelhead, Coho Salmon
13. Work Schedule . . . . . August 2002
14. County . . . . . Santa Cruz
15. Stream. . . . . Scott Creek
16. Tributary to . . . . . Pacific Ocean
17. Major Drainage System . . . . . Scott Creek Watershed
18. Assembly District 27
19. Senate District. 15
21. Federal Taxpayer ID# 94-6000534
22. Project Site Falls Within Coastal Zone? . . . . . Yes
23. Project Site Falls Within Klamath River Basin? . . . . . No
24. Project Site Falls Within Trinity River Basin? . . . . . No
25. Project Type . . . . . HS

INTRODUCTION

This grant application has been substantially modified from the original application from 2000. The embankment protection will consist primarily of large woody material, with anchoring rocks, instead of a rock slope protection incorporating woody material. Artificial woody material structures will not be used in the proposed project. Additional biotechnical soil stabilization techniques will greatly enhance the road embankment protection project. The project will be evaluated by a hydrologist who will meet on-site with County staff and California Department of Fish and Game basin planner to discuss potential off-site impacts of the project.

BACKGROUND

A prominent feature in Santa Cruz County is the location of roads that parallel mountainous streams. Swanton Road, Bonny Doon Road, Zayante Road, Lompico Road, Kings Creek Road, Eureka Canyon Road and Jarvis Road are just a few of the county's roads that are located adjacent to salmonid streams.

Road failures along these steep, mountainous inner gorge roads are frequent, especially during recent wet winter events. During the 19951999 winter seasons, existing data indicates there were as many as 75 road slipouts and failures along streams. In a single intensive storm event in February 2000, there were at least five road failures that impacted salmonid streams.

Due to the proximity to the stream channel, road repairs have a direct impact on in-stream fish habitat, especially cover, pool scour and riparian vegetation. The installation of cribwalls, gabion baskets and rock rip-rap can have cumulative impact on Santa Cruz County streams. More recently, large rip-rap has been favored for stream-side road repairs. In most cases, rock rip-rap reduces impacts on stream habitat heterogeneity and cover, but still impacts riparian vegetation and abundance of woody material. Unfortunately, moving County roadways away from salmonid streams is highly unlikely due to the number of parcels they access, the high cost of land, construction costs, and the steep topography of the area. Presently, road relocation is an unlikely option for fisheries enhancement in Santa Cruz County.

Alternatively, improving the habitat value of these road repairs could have a significant positive benefit on stream habitat quality in Santa Cruz County. Road repairs that incorporate woody material would be especially beneficial, by providing scour elements and cover. Improved revegetation would reduce loss of riparian habitat that often accompanies road failures along streams.

The Swanton Road Demonstration Project would serve to demonstrate the feasibility of using biotechnical techniques including large woody material, erosion control and native vegetation for County Public Works streamside projects to enhance steelhead and coho habitat. This project would train local Public Works engineers and contractor engineers to design more fish-friendly road repair projects. In addition, it will address inadequacies in standard designs when requesting permits through the County of Santa Cruz Planning Department, California Department of Fish and Game and National Marine Fisheries Service. This project will

implement mitigation measures that are supported by National Marine Fisheries Services through the steelhead 4-d rules that went into effect September 8, 2000.

While the use of large woody material for road revetments is common in other parts of the state, County of Santa Cruz Public Works does not incorporate woody material for standard streamside road repairs. Santa Cruz County has just begun programs to improve practices that impact salmonid habitat. The County received a California Department of Fish and Game SB271 grant for $44,603 to train its maintenance crews in erosion control practices and to revise its County Design Criteria Standards for controlling erosion on County maintained roadways. In addition, the County has just received a grant that includes funds to organize a workshop to train local engineers, including Public Works staff, on design and installation of fish-friendly bank stabilization. The proposed Swanton Road Demonstration Project is an on-the-ground project that will be designed to emphasize important ideas acquired from the training program and to address problems with permitting and engineering templates that limit their ability to implement more fish-friendly features.

The demonstration project is located on Swanton Road, PM 3.55, in the Scotts Creek watershed. The Scotts Creek watershed is a 20,000-acre coastal watershed approximately 14 miles north of Santa Cruz. This watershed terminates at the Pacific Ocean in the Monterey Bay National Marine Sanctuary. The Scotts Creek watershed is home to the steelhead trout and is one of a few watersheds along the Central Coast that supports a population of coho salmon. Scotts Creek main tributaries include Quesaria, Archibald, Winter, Little, Big, and Mill creeks. All of these except for Archibald and Winter creeks are perennial streams which support anadromous fish.

Swanton Road is the only county-maintained road in the watershed that primarily serves a small rural population. Given the special status of Scotts Creek as a coho salmon stream, Planning and Public Works staff have been working with the Scotts Creek Watershed Council for over a year to facilitate implementation of FEMA road repair projects from 1998 and other projects for fisheries protection and transportation. This site is identified in a watershed study, ***Road and Landslide Sediment Source Investigation and Sediment Reduction Plan for the Scotts Creek Watershed, Santa Cruz County, California*** (March 2000). Swanton Road PM 3.55 is identified as a **high priority site** for fisheries protection, sediment reduction and transportation.

At the proposed project site, the stream is migrating rapidly toward Swanton Road. A preexisting bench that protected the embankment has been scoured away. Stream channel migration appears to be due, in part, to increased bedload from the recent wet winters and a large bar that formed in conjunction with a logjam upstream of the project site. The project location is on a sharp curve, with a steep bedrock cut on the inner side.

This project is not a typical road repair because the bank erosion has not yet impacted the road pavement. The grantee's intention with this proposed project is to set a precedent for addressing erosion before road failure and before additional sediment enters the stream. It is estimated that a road failure at this site would contribute approximately 500 cubic yards of fine sediment material to Scott Creek.

SWANTON ROAD DEMONSTRATION PROJECT

This important project is more about fostering the design and implementation of fish-friendly road repairs throughout Santa Cruz County than about addressing a single, specific site.

LAND USE

Within the project area, the existing land use is a sensitive habitat, protected under the County's Riparian Corridor Protection Ordinance and a road easement held by Department of Public Works. There is an existing horse trail that bisects the project area that will be incorporated into the project design. There is no anticipated land use change in the next 5 years.

OBJECTIVES

The primary objective is to provide training, through a demonstration project, for County of Santa Cruz Public Works and consulting engineers to incorporate fish-friendly features into road repairs adjacent to salmonid streams. This project will provide training in three key areas design, permitting and installation. These important training components will be done in conjunction with an on-site road and streambank protection project on Swanton Road, along this sensitive coho salmon and steelhead stream.

As part of this training, engineers will hear from County of Santa Cruz Planning Department, California Department of Fish and Game and National Marine Fisheries Service staff on the permitting process and permit requirements. Engineers will be asked to refine design standards and identify any knowledge or computer-based limitations to more fish-friendly project designs.

LOCATION

The demonstration project is located adjacent to Swanton Road, PM 3.55, in the Scotts Creek watershed, in Santa Cruz County. (See location map attached.)

PROJECT DESCRIPTION

The project will occur in six phases:

Salmonid** Habitat Enhancement **Design Training: The final design will be distributed to Public Works engineers and consultant engineers with a description of the project. This group (estimated 12-16 people) will meet on-site to see the project location and discuss the final design. Permitting agency staff will meet on-site with the engineer group to review and discuss the design. At this meeting, engineers will be asked to identify constraints (e.g., computer drawings of woody material and anchoring techniques) that limit their ability to implement these ideas.

Phase II - Permitting. Final design will be routed through the permit process, incorporating additional suggestions from permitting agencies. Permitting documents will be distributed to engineers to serve as an example.

Phase III -Project imvlementation:

The project will consist of a woody material revetment at the toe, a planting bench, and revegetation of the upper slope. Woody material and anchoring rocks will be installed adjacent to the low-flow channel. The project will tie into the existing rootwad at the toe of the slope. A planting bench at the mean high-flow level will be constructed to accommodate greater flow capacity and an existing horse trail. A culvert at the upstream end of the project site that drains that portion of the road, and will be upgraded from 8" to 18" culvert.

Phase IV - Revegetation. Revegetation will be installed under a separate, consultant contract. Upper slope will be planted with native vegetation, including alder, buckeye, and sword fern. Salvaged sword fern clumps will be integrated into the project.

*Phase V - **Post-project** meeting.* Engineers, consultant engineers and will meet on-site to discuss project implementation.

*Phase **VI** - Maintenance and Monitoring*. Plants will be watered twice a month with a water truck during the months of May through September. Additional willow stakes will be installed in late winter as needed. Plants will be replaced as necessary.

PERMITS

County of Santa Cruz Grading Permit and Riparian Exception; State of California Department of Fish and Game 1601 Streambed Alteration Agreement 877-99; Army Corps of Engineers Nationwide permit; Regional Water Resources Control Board.

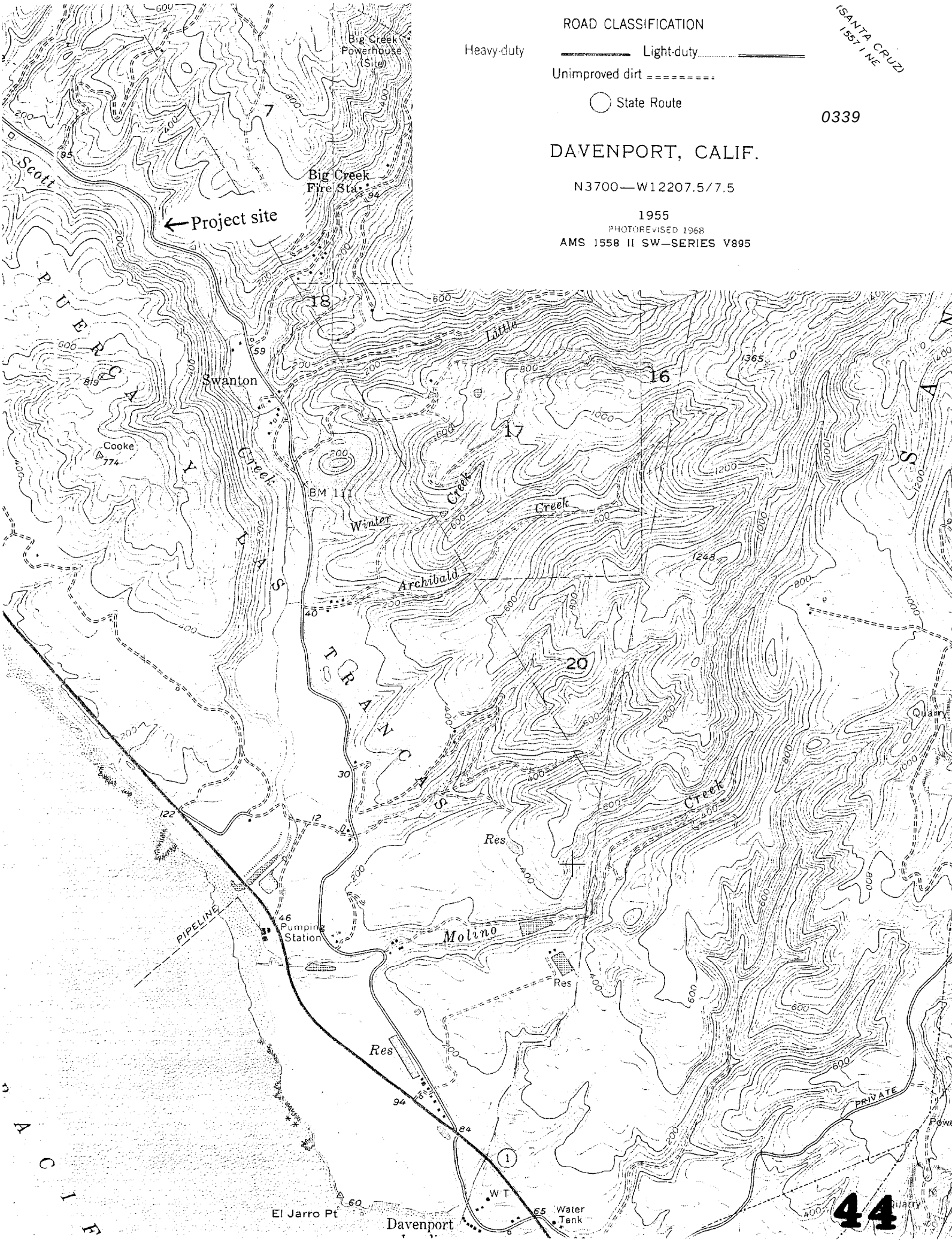
SCHEDULING

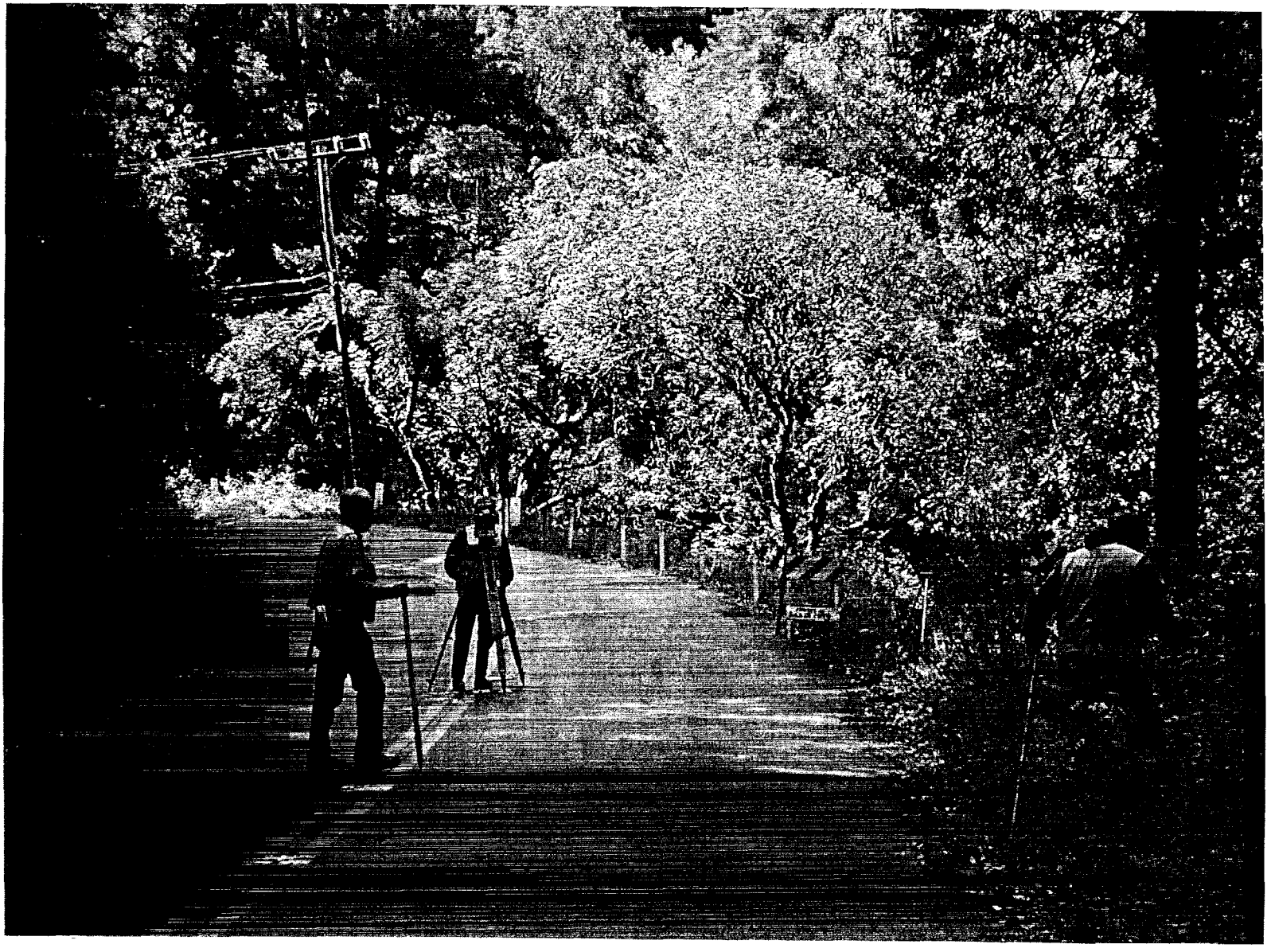
Work will be accomplished during summer low-flow periods when there will be minimal effects on juvenile salmonids. It is estimated that the entire project will require six weeks to complete. Construction is anticipated between August 1 and September 15, 2002. Revegetation will be installed in September.

Swanton Road Demonstration Project

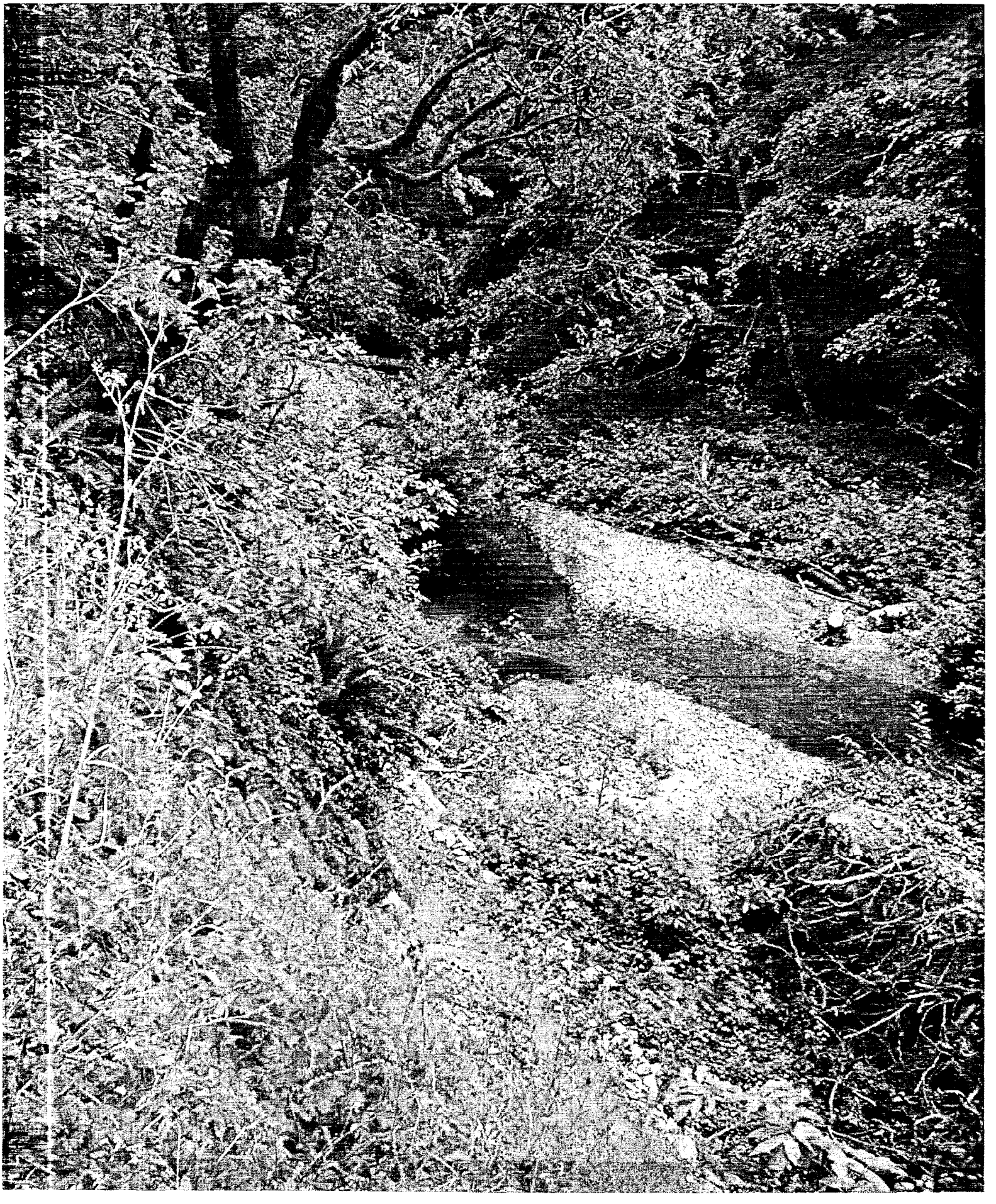
0338

	Jo. of Hours		Hourly Rate	cost	Amount Requested	cost Share	Total
Personnel Costs							
Project Manager	200		$50.00	$10,000		$10,000	***$10,000***
Resource Planner	40		$31 .oo	$1,240		$1,240	
6 Public Works Engineers	60		$45.00	$2,700		$2,700	$2,700
10 Consultant Engineers	60		$100.00	$6,000		$6,000	$6,000
Environmental Planning	10		$42.00	$420		$420	$420
Construction Inspection	60		$52.00	$3,120		$3,120	$3,120
County Hydrologist	4		$50.00	$200		$200	$200
Co. Overhead- 10%				$8,680		$8,680	$8,680
Willows/Erosion Control				$3,000	$3,000		$3.000
Operating Expenses	Qnty.	Units	Unit cost	Total			
Traffic Control			Lump Sum	$1,000	$1,000		$1,000
Clearing and Grubbing			Lump Sum	$3,000	$3,000		$3,000
Compacted backfill	350	cub yrds	$60.00	$21,000	$21,000		$21,000
Rootwad Revetment							
Rootwads	10		$2,000.00	$20,000		$20,000	$20,000
Woody material anchoring				$5,000	$5,000		$5,000
Material transportation	8	loads	*$1,000*	$8,000		$8,000	$8,000
Anchoring Rock	100	tons	$140.00	$14,000	$14,000		$14,000
Equip mobilization				$3,000	$3,000		$3,000
Erosion Control / Straw Rolls				$6,000	$6,000		$6,000
culvert upgrade				$11,000		*$11,000*	$11,000
Revegetatation							
Plants	48	plants	$20.00	$960	$960.00		$0
Browse Protection	48	units	$15.00	$720	$720.00		$720
Replacement	10	plants	$20.00	$200	$200		$200
Irrigation/Maintenance	18	months	$325.00	$5,850	$5,850		
Photographs	8	rolls	$15.00	$120		$120	$120
Duplication	200	pages	$0.07	$14		$14	$14
Permits				$1,646	$1,646		$1,646
Travel - Contractor	1600	miles	$0.40	$320	$320		$320
Per Diem - Contractor	15	days	$85.00	$1,275	$1,275		$1,275.00
				Totals	**$66,971**	**$71,494**	**$130,415**
				***Percent* Cost-Share**	55%		


ROAD CLASSIFICATION
Heavy-duty
Light-duty
Unimproved dirt
State Route
(SANTA CRUZ)
1557 I NE
0339
DAVENPORT, CALIF.
N3700—W12207.5/7.5
1955
PHOTOREVISED 1968
AMS 1558 II SW—SERIES V895
Big Creek Powerhouse (Site)
Big Creek Fire Sta.
Project site
Scott
Swanton
Cooke
774
819
Little Creek
Winter Creek
Archibald Creek
BM 111
Molino Creek
Res
Pumping Station
PIPELINE
El Jarro Pt
Davenport
WT
Water Tank
PRIVATE
Quarry
PUERCA
TRANCAS
SANTA CRUZ
18
17
16
20
30
40
59
65
84
94
122
1365
1248
44

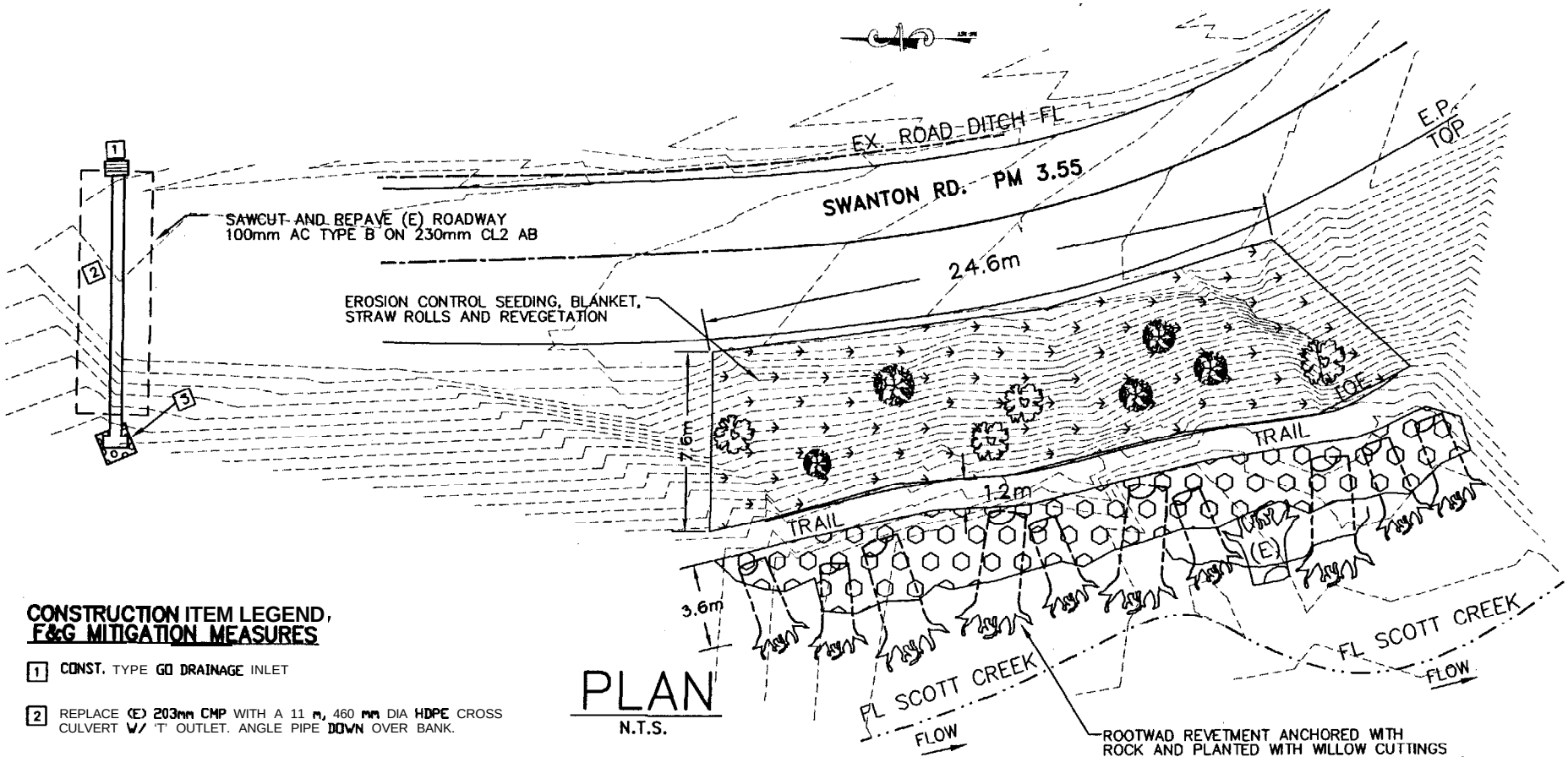


Swanton Road at MP 3.55



Looking down from road to project site. Note existing alder rootwad at lower right of photo

Looking downstream, eroded bank on left. Note existing alder root wad.

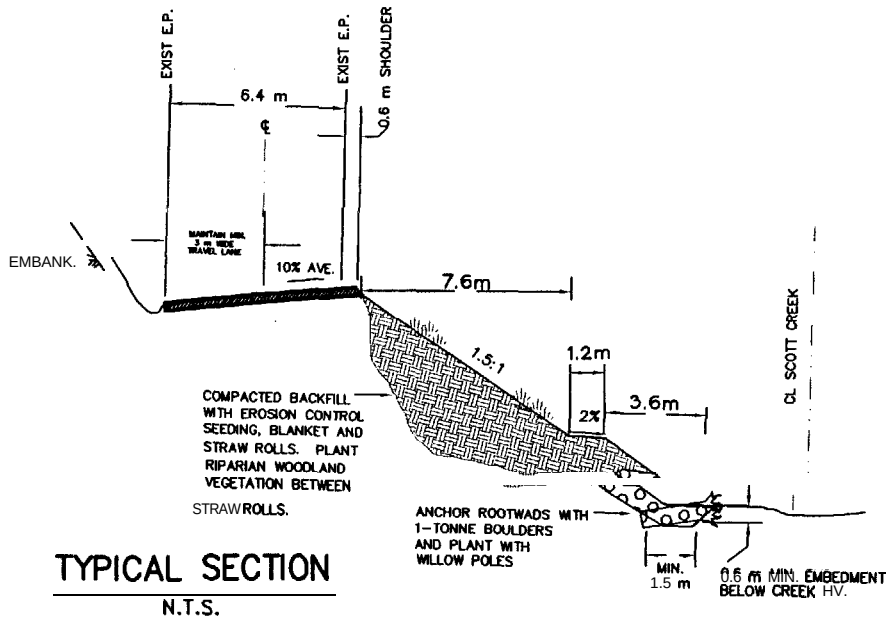


PLAN
N.T.S.

CONSTRUCTION ITEM LEGEND, F&G MITIGATION MEASURES

1. CONST. TYPE GO DRAINAGE INLET
2. REPLACE (E) 203mm CMP WITH A 11 m, 460 mm DIA HDPE CROSS CULVERT W/ 'T' OUTLET. ANGLE PIPE DOWN OVER BANK.
3. CONST. 1.2 m X 1.2 m X 0.66 m ROCK ENERGY DISSIPATOR. 600 mm X 800 mm SIZE ROCK AT OUTLET OF PIPE.
4. CONSTRUCT SILT FENCE AROUND WORK SITE.
5. THE TOP 1 m OF ROOTWAD REVETMENT SHALL BE PLANTED WITH NATIVE WILLOW STAKES ON 1.8 m SPACINGS ACCORDING TO THE CONTRACT SPECIFICATIONS. MAINTENANCE AND WATERING OF TREES SHALL DE PER THE CONTRACT SPECIFICATIONS.
6. ALL CLEARING, GRADING & CONSTRUCTION OPERATIONS SHALL BE CONDUCTED BETWEEN JUNE 15 & OCT. 15.
7. ALL EXCESS SLIPWT SILT, DEBRIS & ASPHALT CONC. SHALL BE REMOVED FRM CREEK CHANNEL AND ADJACENT BANKS AFTER REPAIR IS COMPLETE. THE CREEK CHANNEL/BANKS SHALL BE RESTORED AS CLOSE AS POSSIBLE TO PRE-STORM DAMAGED CONDITION, CONFORMING TO ADJACENT CHARNEL PROFILE AND BANK SURFACES.

ROOTWAD REVETMENT ANCHORED WITH 1 TONNE ROCK



TYPICAL SECTION
N.T.S.

0W44

Plant Species List for Riparian Woodland Revegetation
Swanton Road Demonstration Project

Riparian Woodland-Understory and Overstory Plantings Area	
Scientific Name	**Common Name**
Trees	
Acer mycrophyllum	Big-leaf Maple (8)
Aesculus californica	California Buckeye (8)
Salix sp.	Willow (cuttings) (24)
Alnus rubra	Red Alder (8)
Understory	
Rubus ursinus	California Blackberry (12)
Polystechum munitum	Western Sword Fern (12)
Native Annual Erosion Control Seeding	
Bromus carinatus cucamonga	Cucamonga Brome
Vulpia microstachys	Three Weeks Fescue
Trifolium wildenovii	Tomcat Clover

PLANT LIST

0346

PLANTING IN ROCK SLOPE PROTECTION

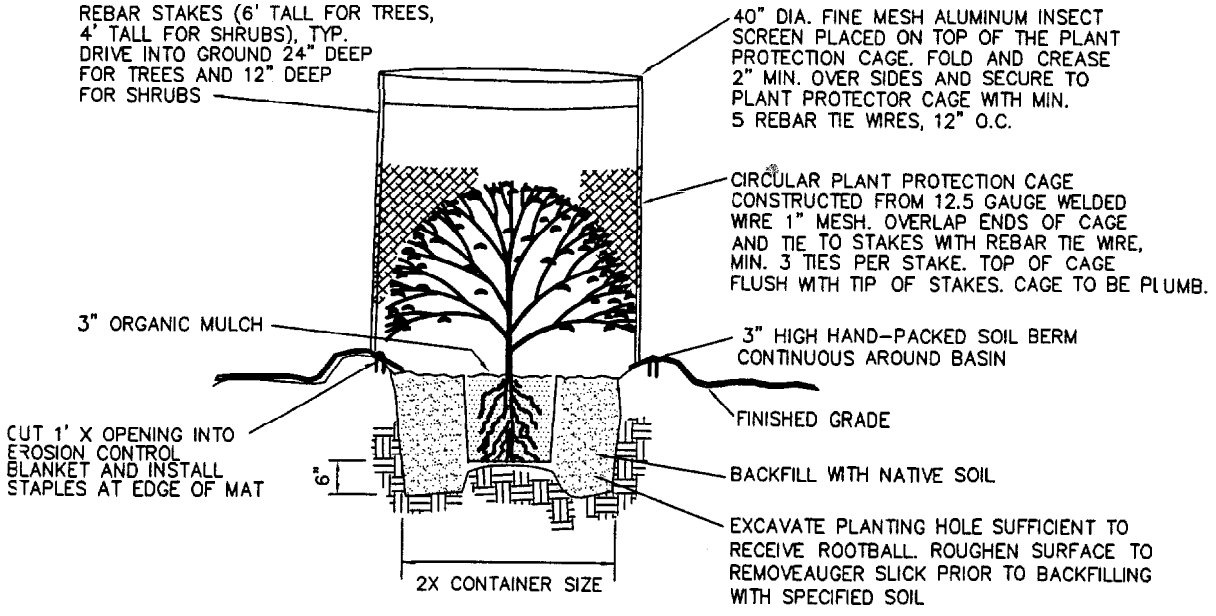
QUANITY	SIZE	BOTANICAL NAME – COMMON NAME / SPACING
(24)	Cuttings	Salix Lasioiepis – Willow / 6' o.c.

RIPARIAN WOODLAND

QUANITY	SIZE	BOTANICAL NAME – COMMON NAME / SPACING
(8)	Treepot 1	Alnus Rubra – Red Alder / 10' o.c.
(8)	Treepot 1	Acer Macrophyllum – Big Leaf Maple / 10' o.c.
(8)	Treepot 1	Aesculus californica – California Buckeye / 10' o.c.
(12)	1 Gallon	Polystechum munitum – Western Sword Fern / 6' o.c.
(12)	Deepots	Rubus Ursinus – California Blackberry / 6' o.c.

EROSION CONTROL SEED MIXTURE

30	lbs.	Bromus carinatus cucamonga – Cucamonga Brome
6	lbs.	Vulpia microstachys – Three Weeks Fescue
4	lbs.	Trifolium wildenovii -Tomcat Clover
25	lbs.	Serile Hybrid Wheatgrass



TYPICAL CONTAINER STOCK
DETAIL – IN NATURAL SOIL

N.T.S.

PLANTING NOTES.

A. MONITORING NOTES

1. THE ENGINEER SHALL CONOUCT MONITORING OF THE REVEGETATION AREAS FOR A PERIOD OF 16 MONTHS AFTER PUNTING. IN THE SUMMER AND FALL ALL INSTALLED PLANTS SHALL BE COUNTED AND MONITORED FDR SURVIVAL, HEALTH AND VIGOR.

2. THE PROJECT SHALL BE DEEMED SUCCESSFUL IF THE PROJECT ACHIEVES:
   - 80% SURVIVAL OF CONTAINER STOCK.
   - 60% SURVIVAL OF WILLOW POLE CUTTINGS.
   - NO EVIDENCE OF EROSION OR RILLING ALONG THE CREEK BANK.

3. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR ASSURING THE SURVIVAL OF A MINIMUM OF 60% Of THE CONTAINER STOCK AND 60% OF WILLOW POLE CUTTINGS WITHIN A YEAR. IF SURVIVAL RATES DROP BELOW THIS LEVE_ AT THE END OF A YEAR THE LANDSCAPE CONTRACTOR SHALL REPLANT THE FAILED PLANTINGS DURING THE FALL/WINTER OF THE FOLLOWING YEAR.

B. PLANTING OPERATIONS

1. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FOLLOWING WORK ITEMS:
   i. INSTALLATION OF CONTAINER STOCK ALONG TOP OF BANK. INCLUDING ABOVE BROWSE PROTECTION. INSTALLATION OF CONTAINER STOCK AND CUIIINGS SHALL OCCUR AFTER RAIN HAS MOISTENED THE GROUND TO A MINIMUM DEPTH OF 6" AND MORE RUN IS FORECAST (TYPICALLY NOVEMBER THROUGH JANUARY).
). INSTALLATION OF POLE CUTTINGS WITHIN THE ROCK SLOPE PROTECTION AND NATURAL SOIL AREAS. IT IS SUGGESTED THAT THE COLLECTION AND INSTALLATION OF ROLE CUTTINGS BE CONDUCTED WHEN THE PLANTS ARE DORMANT (BETWEEN DECEMBER 15 AND FEBRUARY 15). IF CUTTINGS ARE INSTALLED EARLIER, THEN THE GROUND MUST BE KEPT WET UNTIL THE WINTER RAINS BEGIN.
). IRRIGATION OF CONTAINER PLANTING STOCK (HAND WATERING) [illegible] FOLLOWING PLANTING. IRRIGATION SHALL TYPICALLY BE CONDUCTED DURING THE MONTHS OF JUNE THROUGH SEPTEMBER.

2. A HYDROSEED SPECIALIST UNDER THE DIRECTION OF THE GENERAL CONTRACTOR WILL CONDUCT HYDROSEEDING OF THE SITE. THIS WORK WILL BE DONE PRIOR TO THE INSTALLATION OF THE CONTAINER STOCK. THE LANDSCAPE CONTRACTOR SHALL MINIMIZE GROUND DISTURBANCES TO HYOROSEEDED AREAS (EXCEPT FOR PLANTING LOCATIONS).

3. PLANTING OPERATIONS SHALL BE COMPLETED IN STRICT ACCORDANCE WITH SPECIFICATIONS AND DETAILS FOR SITE PREPARATION AND PLANTING.

4. THE LOCATIONS OF REVEGETATION ELEMENTS ARE FOR PLANNING PURPOSES ONLY AND MAY BE ADJUSTED IN THE FIELD AT THE DIRECTION OF THE ENGINEER PRIOR TO INSTALLATION. THE LANDSCAPE CONTRACTOR SHALL TAKE CARE TO LOCATE PLANT MATERIALS TO OPTIMUM GROWTH CONDITIONS AND MAXIMUM AESTHETICS. PLANT MATERIAL SHALL NOT BE INSTALLED SO AS TO OBSTRUCT DRAINAGE PATTERNS OR HARM EXISTING PLANT MATERIAL. THE LANDSCAPE CONTRACTOR SHALL NOTIFY THE ENGINEER SHOULD CONFLICTS OCCUR.

5. PRIOR TO SITE VORK FOR THE INSTALLATION OF THE CONTAINER STOCK, THE LANDSCAPE CONTRACTOR SHALL LAYOUT PLANT MATERIALS, WHILE STILL IN CONTAINERS OR AS FLAGGED LOCATIONS IN THE FIELD. THE ENGINEER SHALL REVIEW AND APPROVE ALL PLANTING LOCATIONS PRIOR TO SITE WORK.

6. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPLYING PLANTS OF THE SPECIES AND SIZE SPECIFIED AND DELIVERY OF THE PLANT MATERIAL TO THE SITE. THE ENGINEER SHALL RMEW AND APPROVE ALL PLANT MATERIALS, PRIOR TO THEIR INSTALLATION. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY RESPONSIBLE FOR ANY REPLACEMENT OF PLANT MATERIAL IF SAID MATERIAL IS IN POOR CONDITION AND REJECTED By THE ENGINEER.

7. THE LANDSCAPE CONTRACTOR SHALL ENSURE THAT ALL PLANTS ARE TRUE TO NAME, WITH ONE PLANT IN EACH BUNDLE OR LOT TAGGED WITH THE BOTANICAL NAME AND PLANT SIZE. IN ACCORDANCE TO THE STANDARDS OF PRACTICE RECOMMENDED BY THE AMERICAN ASSOCIATION OF NURSERYMEN.

6. ALL PLANTS SHALL BE THE GENUS AND SPECIES AND SIZES SHOWN ON THE PLANS. UNDER NO CONDITIONS WILL THERE BE ANY SUBSTITUTION OF PLANTS OR SIZES. EXCEPT WITH THE EXPRESS WRITTEN CONSENT OF THE ENGINEER.

9. EXISTING VEGETATION THAT IS NOT WITHIN THE LIMITS OF THE PROJECT AREA SHALL NO- BE CUT, REMOVED OR OTHERWISE DISTUBED, EXCEPT FOR OCCURRENCES OF INVASIVE, NON-NATIVE PLANT SPECIES.

10. DORMANT WILLOW CUTTINGS SHALL BE INSTALLED APPROXIMATELY 3' O.C. IN A ZIGZAG PATTERN ALONG SIDE SLOPE. THESE CUTTINGS SHOULD BE INSTALLED WHEN THE PLANTS ARE DORMANT (TYPICALLY BETWEEN DECEMBER 15 AND JANUARY 15). THE POLE CUTTING SHALL BE DEEPLY INSERTED INTO NATIVE SOIL. AS DEPICTED ON THE DETAIL.

11. THE WILLOW POLE CUTTINGS SHALL BE OBTAINED DURING THE DORMANT PERIOD. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE REQUIRED CUTTINGS WITHIN 24 HOURS OF PLACEMENT. THE LANDSCAPE CONTRACTOR SHALL COLLECT CUTTINGS FROM ME SURROUNDING WORK AREA (WITH APPROVAL FROM THE LANDOWNER, AS APPLICABLE) OR OTHER AREAS As DESIGNATED BY THE ENGINEER. THE LANDSCAPE CONTRACTOR SHALL MAINTAIN ALL CUTRNGS IN WATER (FULLY IMMERSED) PRIOR TO THEIR PLACEMENT AMID THE ROCK SLOPE PROTECTION AND NATURAL SOIL AREAS.

12. CONTAINER STOCK PLANTS SHALL BE INSTALLED IN AREAS DESIGNATED FOR PLANTING, AS SHOWN ON THE PLANTING PUN. PLANTS SHALL BE INSTALLED BY EXCAVATING A PLANTING HOLE LARGE ENOUGH TO RECEIVE THE ROOTBALL. ALL PLANTING HOLES SHALL BE BACKFILLED WITH NATIVE SOIL AND TAMPED. PLANTING SHALL BE WATERED IN SUCH MAT THE ROOT CROWN IS EVEN WITH THE SURROUNDING GRADE. A 3" HIGH HAND-PACKED SOIL BERM SHALL BE CONSTRUCTED AROUND THE PLANT (OR JUST ALONG THE DOWNSLOPE EDGE FOR THE CREEKBANK PLANTINGS) TO CREATE A WATERING BASIN. IF SOIL IS NOT MOIST TO 14' FROM NATURAL RAINFALL. THE PLANT SHALL BE HAND WATERED IMMEDIATELY FOLLOWING INSTALLATION. AFTER PLANTING IS COMPLETE, THE LANDSCAPE CONTRACTOR SHALL FURNISH AND SPREAD SHREDDED MULCH IN THE PLANTING BASIN, AS SHOWN ON THE DETAIL

C. SEEDING NOTES

0347

1. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE FOLLOWING WORK ITEMS:
   a. APPLICATION OF SEED, MULCH, FERTILIZER AND TACKIFIER ON ALL DISTURBED SOIL AREAS.

2. SEEDING OPERATIONS SHALL BE COMPLETED IN STRICT ACCORDANCE WITH SPECIFICATIONS AND DETAILS FOR SITE PREPARATION AND SEEDING.

3. THE LOCATIONS OF ME SEEDING AREAS ARE FOR PLANNING PURPOSES ONLY AND MAY BE ADJUSTED IN THE FIELD AT THE DIRECTION OF THE ENGINEER PRIOR TO INSTALLATION. THE GENERAL CONTRACTOR SHALL TAKE CARE TO INSTALL SEED AND RELATED MATERIALS TO PROVIDE OPTIMUM GROWTH CONDITIONS AND MAXIMUM AESTHETICS. SEEDED MATERIAL SHALL NOT BE INSTALLED SO As TO OBSTRUCT DRAINAGE PATTERNS OR HARM EXISTING PLANT MATERIAL THE GENERAL CONTRACTOR SHALL NOTIFY THE ENGINEER SHOULD CONFLICT OCCUR.

4. PRIOR TO SITE WORK, THE GENERAL CONTRACTOR SHALL FLAG THE BOUNDARIES OF THE SEEDING AREAS, DEMARCATING THE APPLICATION AREA FOR THE SPECIFIED SEED MIXES. THE ENGINEER SHALL REVIEW AND APPROVE ALL SEEDING LOCATIONS PRIOR TO SITE WORK.

5. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPLYING ALL MATERIALS FOR THE SEED APPLICATION, INCLUDING SEED, MULCH, TACKIFIER, FERTILIZER, AS SPECIFIED. AND DELIVERY OF THE MATERIALS TO THE SITE. THE ENGINEER SHALL RMEW AND APPROVE ALL MATERIALS. PRIOR TO THEIR INSTALLATION. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACEMENT OF ANY MATERIAL IF SAID MATERIAL IS NOT AS SPECIFIED AND IS REJECTEO BY ME ENGINEER.

6. GENERAL CONTRACTOR SHALL ENSURE THAT ALL SEED ARE TRUE TO NAME, WITH SEED MIXES IDENTIFIED WITH THE BOTANICAL NAME, APPLICATION RATE, PURITY AND GERM, AND THAT THE SEED AND/OR SEED MIX CONTAINS NO NOXIOUS WEEDS.

7. ALL SEEDS SHALL BE THE GENUS AND SPECIES SHOWN ON THE PLANS. UNDER NO CONDITIONS WILL THERE BE ANY SUBSTITUTION OF SPECIES. EXCEPT WITH THE EXPRESS WRITTEN CONSENT OF THE ENGINEER. IF ME SPECIFIED MATERIAL IS NOT AVAILABLE. THE GENERAL CONTRACTOR SHALL SECURE SUITABLE SUBSTITUTION MATERIALS IN A TIMELY FASHION TO MEET THE PROJECT SCHEDULE.

6. SEEDING SHALL OCCUR FOLLOWING ALL SITE WORK AND WHEN THE SEEDBED HAS BEEN PREPARED. SEEDING SHALL OCCUR IN OCTOBER. PRIOR TO OCTOBER 15 AND WHEN RAIN IS FORECAST.

9. SEEDING SHALL BE APPLIED By A PROFESSIONAL HYDROSEEDER. SEED, FERTILIZER, MULCH, AND TACKIFIER WILL BE SOWN AT THE RATE SPECIFIED ON THE PLANS.

D. MAINTENANCE NOTES

1. WORK SHALL INCLUDE. BUT IS NOT LIMITED TO, WNTENANCE OF PLANT MATERIALS. PLANT BASINS, PLANT PROTECTION DEVICES, WATERING AND WEEDING NECESSARY TO KEEP ME PLANT MATERIAL IN A HEALTHY, GROWING CONDITION AND KEEP THE PLANTING AREAS NEAT THROUGHOUT THE 16 MONTHS MAINTENANCE PERIOD.

2. ALL WEEDS SHALL BE REMOVED FROM THE CONTAINER STOCK PLANTING BASINS THROUGHOUT THE 18 MONTHS MAINTENANCE PERIOD. THE WEEDS WILL BE REMOVED IN ORDER TO REDUCE COMPETITION FOR AVAILABLE NUTRIENTS. MOISTURE, AND SUNUGHT. WEEDS SHALL BE HAND-PULLED. ALL WEED CONTROL SHALL BE DONE IN A MANNER THAT PROTECTS THE INSTALLED PLANTS. WEEDS THAT GROW WITHIN THE PLANTING BASINS SHALL BE CONTROLLED WHEN THEY REACH A HEIGHT OF 4" OR COVER 20% OF THE PLANTING BASIN. WEEDING SHALL CONSIST OF BAGGING AND REMOVAL OF WEED PLANTS FROM THE PROJECT SITE. NO PRE-EMERGENT HERBICIDES SHALL BE ALLOWED.

3. IF INVASIVE, NON-NATIVE PLANT SPECIES ESTABLISH WITHIN THE REVEGETATION AREAS. CONTROLS SHALL BE IMPLEMENTED TO PREVENT THE INFESTATIONS FROM DEVELOPING AND TO FURTHER ENHANCE SURVIVAL OF THE PLANTED SPECIES. HAND REMOVAL S-HALL BE UTILIZED TO REMOVE AND CONTROL THE OCCURRENCE OF THESE SPECIES FROM THE PROJECT WORK ARE4 INVASIVE, NON-NATIVE SPECIES SHALL BE REMOVED THROUGH HAND HOEING AND HAND PULLING, WITH ALL PLANT MATERIAL BAGGED AND REMOVED FROM THE SITE. HAND HOEING SHALL SEVER THE ROOT A MINIMUM OF 4 INCHES BELOW THE GROUND SURFACE HAND PULLING SHALL REMOVE THE ROOT OF THE PLANT. SITE MAINTENANCE VISITS SHALL BE CONDUCTED IN SPRING (MARCH THROUGH MAY) AND SUMMER (JUNE THROUGH AUGUST) OF EACH MAINTENANCE YEAR WHEREIN NON-NATIVE PLANT SPECIES SHALL BE REMOVED. THE GOAL OF THE MAINTENANCE ACTIONS WILL BE TO REMOVE ALL INVASIVE PLANT SPECIES FROM THE PROJECT AREA PRIOR TO THEIR DEVELOPMENT OF FLOWERING HEAOS AND /OR SPREADING INTO THE REVEGETATION AREA.

4. THE LANDSCAPE CONTRACTOR SHALL MAINTAIN THE PLANT PROTECTION DEVICES IN FUNCTIONAL AND SECURE ORDER THROUGHOUT THE MAINTENANCE PERIOD. PLANT PROTECTION DEVICES SHALL BE REMOVED By ME CONTRACTOR AND DISPOSED OFF SITE EITHER AT 1) FOLLOWING THE PRESENCE OF LEAVES OR BRANCHES OF THE PLANT MATERIALS AND AT LEAST 1' THROUGH THE FENCING, OR 2) AT THE END OF THE CONTRACT PERIOD, UNDER DIRECTION OF THE ENGINEER.

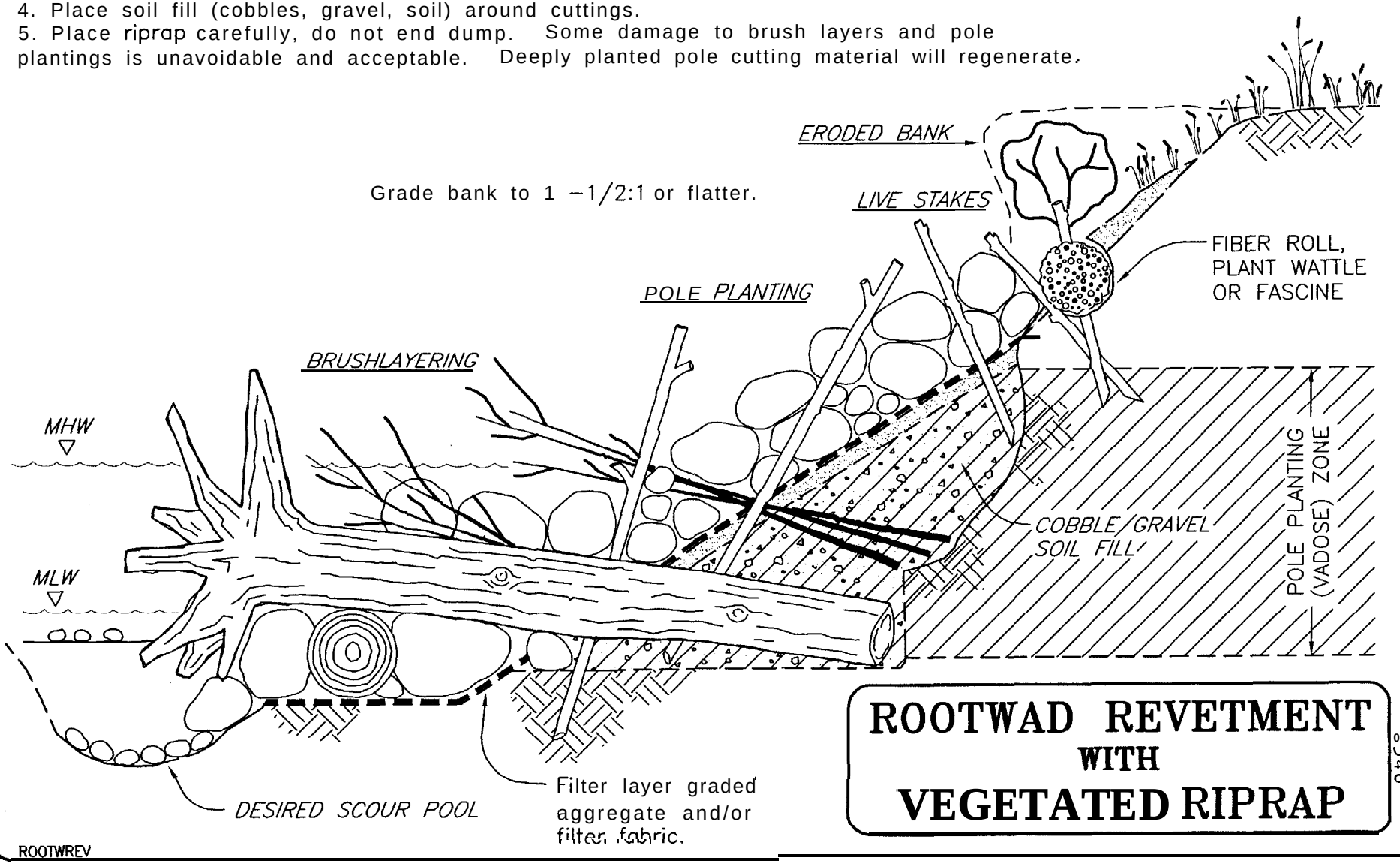
5. SUPPLEMENTAL WATERING SHALL BE IMPLEMENTED FOR ME CONTAINER STOCK PLANTINGS. PLANTS SHALL BE HAND-WATERED NO LESS THAN THREE TIMES A MONTH DURING JUNE, JULY, AUGUST AND SEPTEMBER. APPROXIMATELY 5 GALLONS OF WATER SHALL BE APPLIED TO EACH CONTAINER STOCK PLANTING AT EACH WATERING EVENT. EACH WATERING SHALL BE OF SUCH A QUANTITY AS TO PROVIDE OPTIMUM GROWTH CONDITIONS. THIS WORK SHALL INCLUDE WATERING BY HAND FROM WATER TRUCK. IF DROUGHT STRESS OR CHLOROSIS IS NOTED ON ANY OF THE PLANTINGS, THE QUANTITY AND INTERVAL OF WATERING WILL BE INCREASED.

6. IF AN UNUSUAL DROUGHT OCCURS IN OTHER MONTHS (Le.. LESS THAN 70% OF NORMAL RAINFALL BETWEEN OCTOBER AND MAY) SUCH THAT SOIL MOISTURE DROPS TO A LEVEL WHERE PLANT SURVIVAL IS COMPROMISE. SUPPLEMENTAL IRRIGATION SHALL BE INITIATED. SUPPLEMENTAL IRRIGATION SHALL BE CONTINUED UNTIL SUCH TIME As NATURAL RAINFALL LEVELS REPLENISH SOIL MOISTURE.

7. THE LANDSCAPE CONTRACTOR SHALL RECORD AU MAINTENANCE ACTIVITIES AND OBSERVATIONS IN A MONTHLY MAINTENANCE LOGBOOK.

NOTES:

1. Pole planting and brushlayering shall be installed during bank grading and riprap placement to ensure good contact with 'native ground' and soil fill.
2. Poles and brush layers shall extend down into expected soil moisture zones (vadose).
3. Cut small holes or slits in filter fabric as necessary.
4. Place soil fill (cobbles, gravel, soil) around cuttings.
5. Place riprap carefully, do not end dump. Some damage to brush layers and pole plantings is unavoidable and acceptable. Deeply planted pole cutting material will regenerate.



ROOTWAD REVETMENT WITH VEGETATED RIPRAP

348

© 1999 JOHN McCULLAH

ROOTWREV

LIVE STAKING

Construction Specifications:

Harvesting:

– Stakes shall be harvested and planted when the willows, or other chosen species, are dormant. This period is generally from late fall to early spring, or before the buds start to break.

– When harvesting cuttings, select healthy, live wood that is reasonably straight.

– Use live wood at least 1 year old or older. Avoid suckers of current years growth as they lack sufficient stored energy reserves to sprout consistently. The best wood is 2-5 years old with smooth bark that is not deeply furrowed.

– Make clean cuts with unsplit ends. Trim branches from cutting as close as possible. The butt end of the cutting shall be pointed or angled and the top end shall be cut square.

– Identification of the top and bottom of cutting as accomplished by angle cutting the butt end. The top, square cut, can be painted and sealed by dipping the top l-2 inches (25-51 mm) into a 50-50 mix of light colored latex paint and water. Sealing the top of stake will reduce the possibility of desiccation and disease caused mortality, assure the stakes are planted with the top up, and makes the stakes more visible for subsequent planting evaluations.

Diameter:

– Cuttings should generally be 3/4 inch (19 mm) or larger depending on the species. Highest survival rates are obtained from using cuttings 2-3 inches (51-76 mm) in diameter. Larger diameter cuttings are needed for planting into rock riprap.

Length:

– Cuttings of small diameter (up to 1 1/2 inches (38 mm)) shall be 18 inches (0.5 m) long minimum. Thicker cuttings should be longer.

– Cuttings should be long enough to reach into the mid-summer water table, if possible.

– No less than 1/2 total length must be into the ground.

– Stakes should be cut so that a terminal bud scar is within l-4 inches (25-101 mm) of the top. At least 2 buds and/or bud scars shall be above the ground after planting.

Installation:

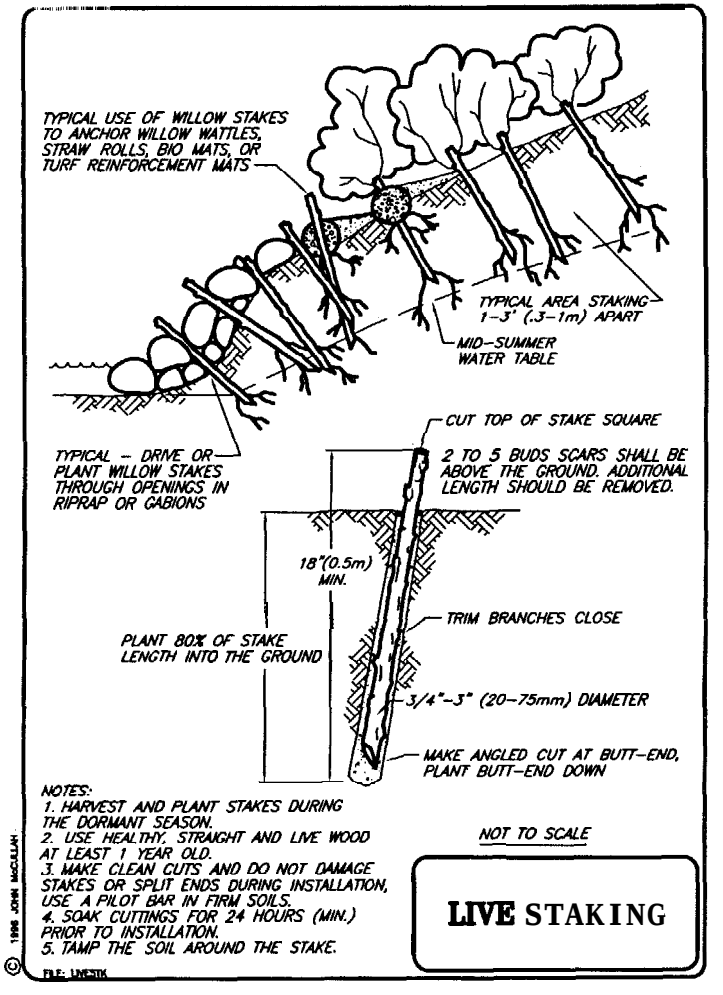
– Stakes must be planted with butt-ends into the ground. Leaf bud scars or emerging buds should always point up.

– Stakes must not be allowed to dry out. All cuttings should be soaked in water for a minimum of 24 hours. Soaking significantly increases the survival rate of the cuttings, however they may be planted the same day they are harvested.

– Plant stakes l-3 feet (0.3-l m) apart.

– Set the stake as deep as possible into the soil, preferably with 80 percent of its length into the soil and in contact with mid-summer water table.

– It is essential to have good contact between the stake and soil for roots to sprout. Tamp the soil around the cutting.



– Use a iron stake or bar to make a pilot hole in firm soil.

– Do not damage the buds, strip the bark or split the stake during installation.

– Split or damaged stakes shall be removed and replaced.

Inspection and Maintenance:

– All temporary and permanet erosion and sediment control practices shall be maintained and repaired as needed to assure continued performance of their intended function.

– Streambanks and steep slopes are highly susceptible to erosion and damage from significant storm events. Willow stakes alone provide very little initial site protection during the establishment period.

– Periodic inspection repair and maintenance will be required during the first two years or until the vegetation is established.

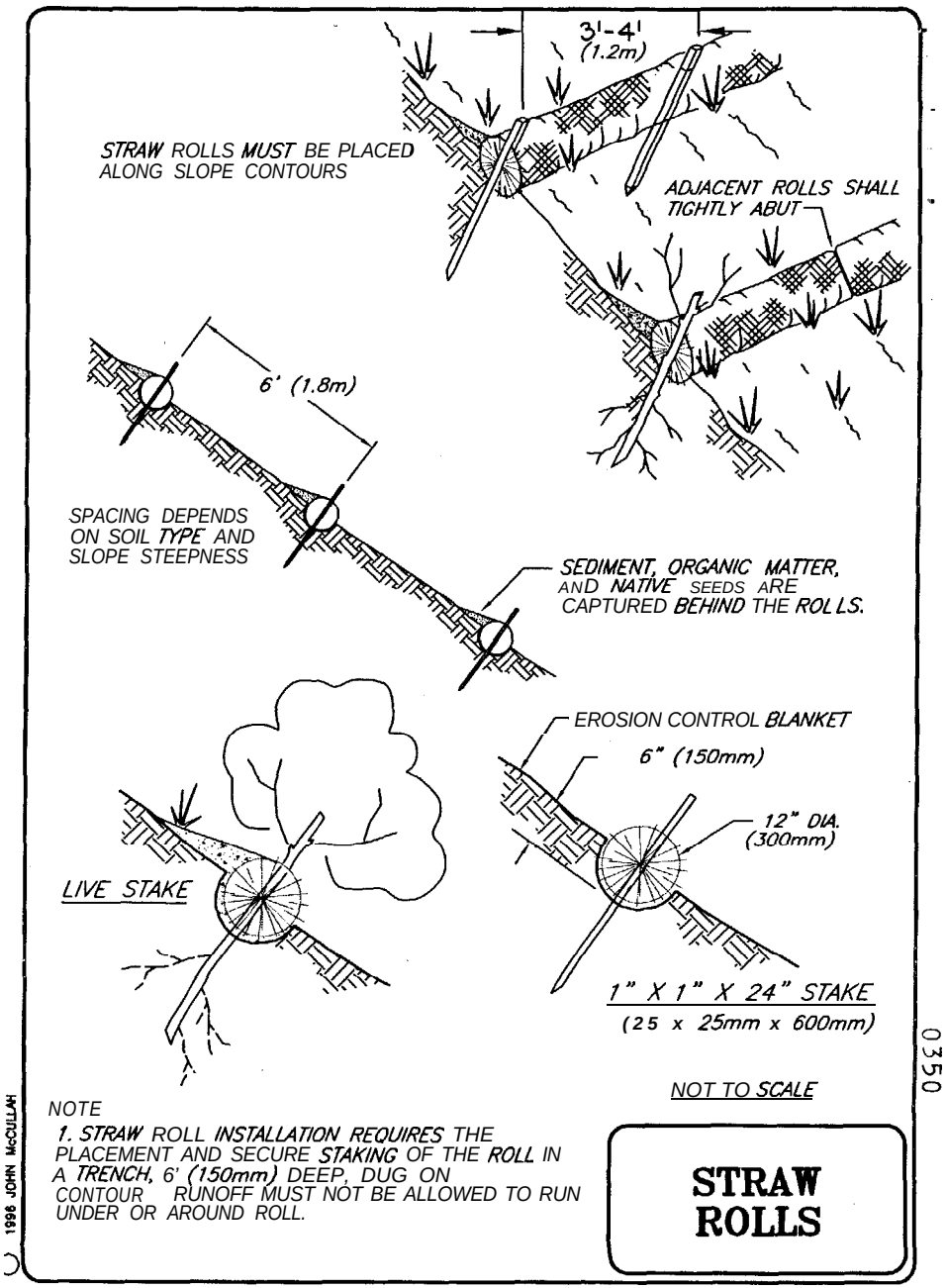
– All temporary or permanent erosion control practices shall be maintained and repaired as needed to assure continued performance of their intended function.

STRAW ROLLS

PREPARE THE SLOPE BEFORE THE INSTALLATION PROCEDURE IS STARTED. DIG 6-INCH DEEP TRENCHES ACROSS THE SLOPE ON CONTOUR TO PLACE THE ROLLS IN. START BUILDING TRENCHES FROM THE BOTTOM OF THE SLOPE AND WORK UP. CONSTRUCT TRENCHES AT CONTOUR INTERVALS OF 6 FEET (1.8m) APART DEPENDING ON STEEPNESS OF SLOPE.

MARK TRENCH LOCATION PRIOR TO HYDROSEEDING AND INSTALLATION OF EROSION CONTROL BLANKET (SEE HYDROSEEDING AND EROSION CONTROL BLANKET NOTES AND DETAIL FOR INSTALLATION METHODS).

INSTALL STRAW ROLL AFTER HYDROSEEDING AND EROSION CONTROL BLANKET ARE INSTALLED. MAKE SURE NO GAPS EXIST BETWEEN THE SOIL, EROSION CONTROL BLANKET AND THE STRAW WATTLE. USE A STRAIGHT BAR TO DRIVE HOLES THROUGH THE WATTLE AND INTO THE SOIL FOR THE POLE CUTTING OR WOODEN STAKES. DRIVE THE STAKE THROUGH PREPARED HOLE INTO THE SOIL. LEAVE ONLY I-2 INCHES (25-50mm) OF STAKE EXPOSED ABOVE ROLL. INSTALL STAKES AT LEAST EVERY 1.2m (4 FEET) APART. ALTERNATE STRAIGHT LIVE POLE CUTTING STAKES, ¾ INCH (20-mm) DIAMETER WITH WOODEN STAKES



© 1996 JOHN McCULLAH

0350

EROSION CONTROL BLANKET

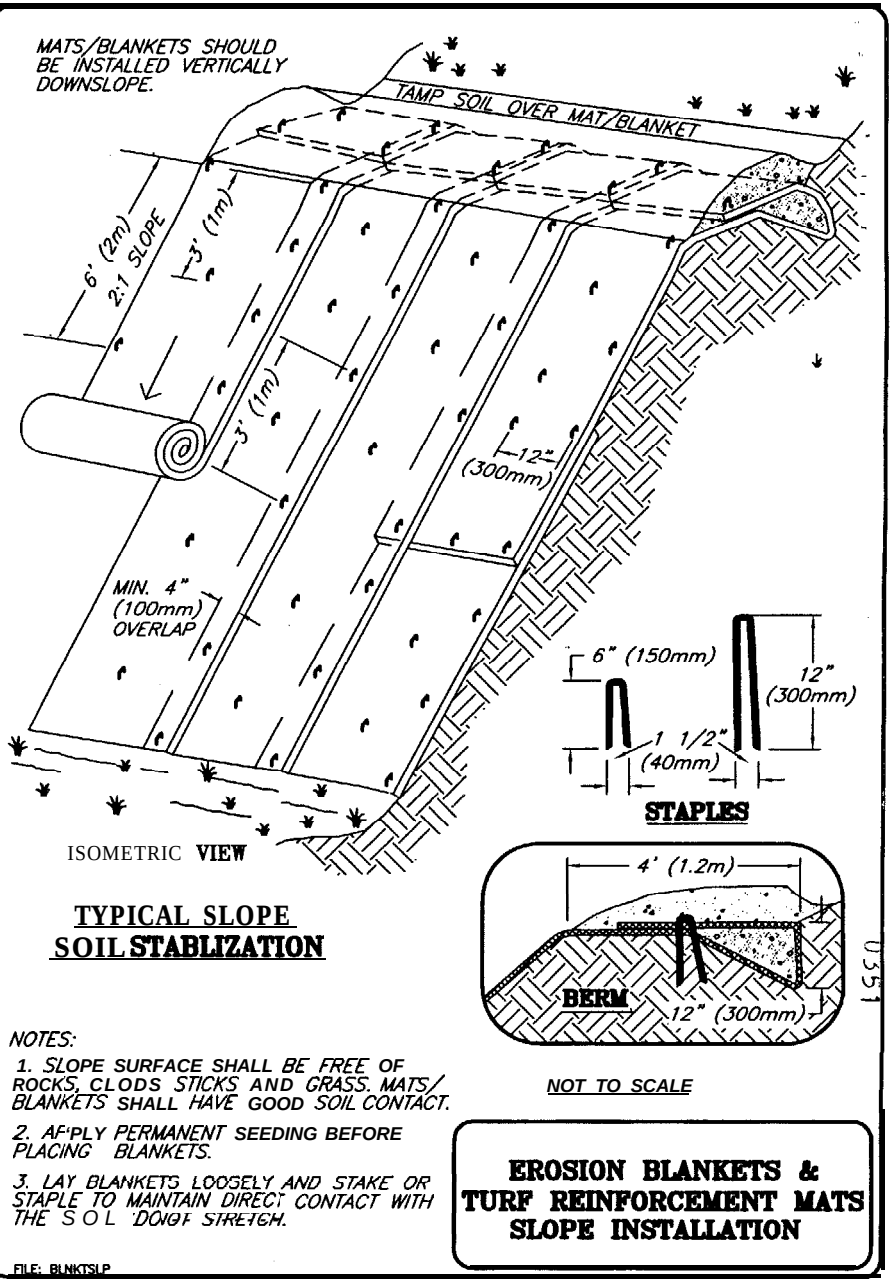
CONSTRUCTION SPECIFICATIONS:

1. SITE PREPARATION :
PROPER SITE PREPARATION IS ESSENTIAL TO ENSURE COMPLETE CONTACT OF THE PROTECTION MATTING WITH THE SOIL. GRADE AND SHAPE AREA OF INSTALLATION.
REMOVE ALL ROCKS, CLODS, VEGETATIVE OR OTHER OBSTRUCTIONS SO THAT THE INSTALLED BLANKETS, OR MATS WILL HAVE DIRECT CONTACT WITH THE SOIL. PREPARE SEEDBED BY LOOSENING 2-3 INCHES (50.8-76.2 MM) OF TOPSOIL ABOVE FINAL GRADE.
INCORPORATE AMENDMENTS, SUCH AS LIME AND FERTILIZER, INTO SOIL ACCORDING TO SOIL TEST AND THE SEEDING PLAN.

2. SEEDING:
SEED AREA BEFORE BLANKET INSTALLATION FOR EROSION CONTROL AND RE-VEGETATION. WHEN SEEDING PRIOR TO BLANKET INSTALLATION, AREAS DISTURBED DURING INSTALLATION MUST BE RESEEDED.

3. ANCHORING:
U-SHAPED WIRE STAPLES, METAL GEOTEXTILE STAKE PINS, OR TRIANGULAR WOODEN STAKES CAN BE USED TO ANCHOR MATS TO THE GROUND SURFACE. WIRE STAPLES SHOULD BE A MINIMUM OF 11 GAUGE. METAL STAKE PINS SHOULD BE 3/16 INCH (4.8 MM) DIAMETER STEEL WITH A 1 1/2 INCH (38.1 MM) STEEL WASHER AT THE HEAD OF THE PIN. WIRE STAPLES AND METAL STAKES SHOULD BE DRIVEN FLUSH TO THE SOIL SURFACE. ALL ANCHORS SHOULD BE 6-8 INCHES (0.2-0.5 M) LONG AND HAVE SUFFICIENT GROUND PENETRATION TO RESIST PULLOUT. LONGER ANCHORS MAY BE REQUIRED FOR LOOSE SOILS.

4. INSTALLATION ON SLOPES:
BEGIN AT THE TOP OF THE SLOPE AND ANCHOR ITS BLANKET IN A 6 INCH (0.2 M) DEEP X 6 INCH (0.2 M) WIDE TRENCH. BACKFILL TRENCH AND TAMP EARTH FIRMLY. UNROLL BLANKET DOWNSLOPE IN THE DIRECTION OF THE WATER FLOW. THE EDGES OF ADJACENT PARALLEL ROLLS MUST BE OVERLAPPED 2-3 INCHES (51-76 MM) AND BE STAPLED EVERY 3 FEET (0.9 M). WHEN BLANKETS MUST BE SPLICED, PLACE BLANKETS END OVER END (SHINGLE STYLE) WITH 6 INCH (0.2 M) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12 INCHES (0.3 M) APART. LAY BLANKETS LOOSELY AND MAINTAIN DIRECT CONTACT WITH THE SOIL, DO NOT STRETCH. BLANKETS SHALL BE STAPLED SUFFICIENTLY TO ANCHOR BLANKET AND MAINTAIN CONTACT WITH THE SOIL.
STAPLES SHALL BE PLACED DOWN THE CENTER AND STAGGERED WITH THE STAPLES PLACED ALONG THE EDGES.
STEEP SLOPES, 1 :1 TO 2:1, REQUIRE 2 STAPLES PER SQUARE YARD. MODERATE SLOPES, 2:1 TO 3:1, REQUIRE 1 – 2 STAPLES PER SQUARE YARD (1 STAPLE 3' O.C.).



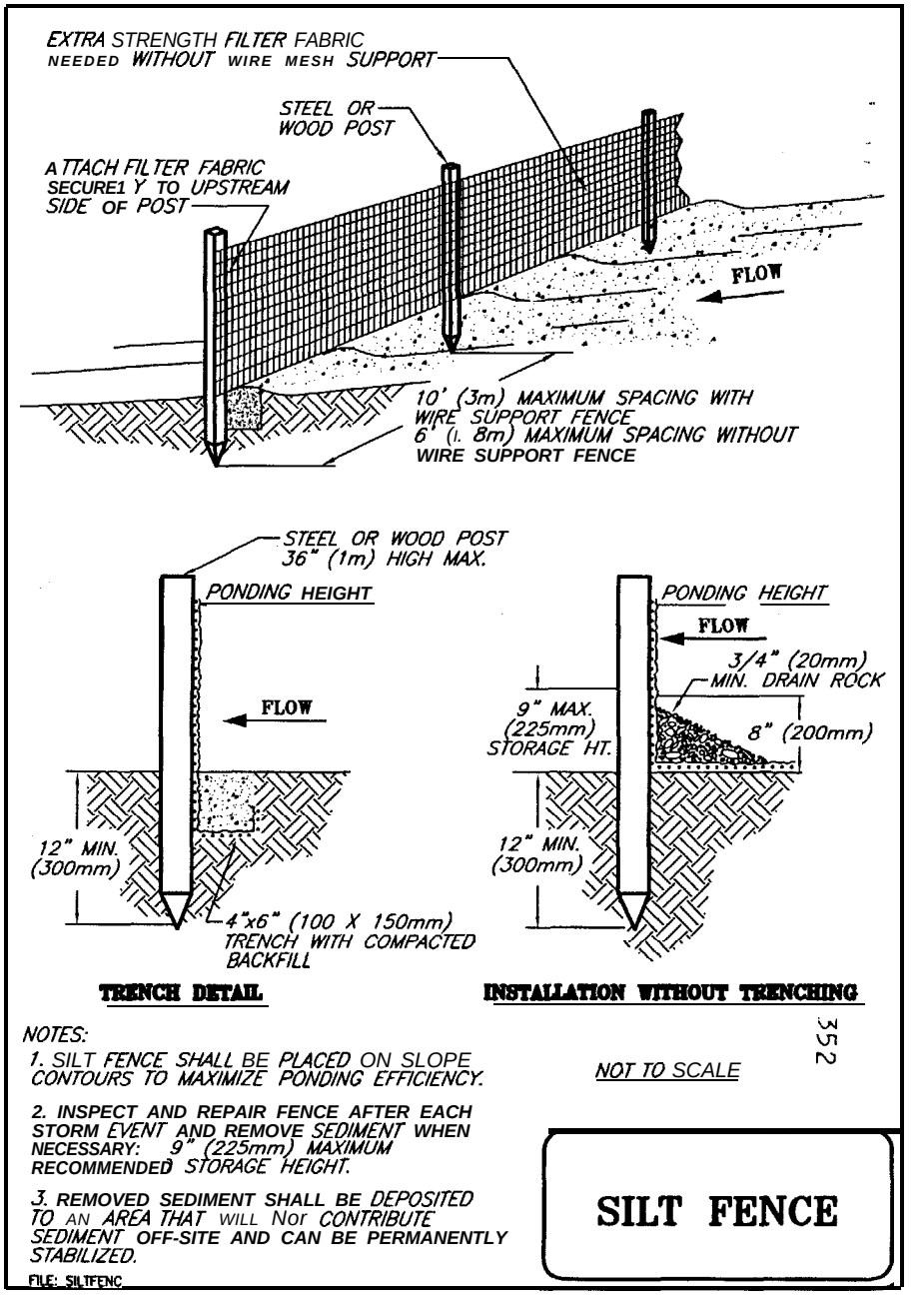
SILT FENCE INSTALLATION

CONSTRUCTION SPECIFICATIONS:

- THE HEIGHT OF A SILT FENCE SHALL NOT EXCEED 36 INCHES (0.9M).
- STORAGE HEIGHT AND PONDING HEIGHT SHALL NEVER EXCEED 18 INCHES (0.5 M).
- THE FENCE LINE SHALL FOLLOW THE CONTOUR AS CLOSELY AS POSSIBLE.
- IF POSSIBLE, THE FILTER FABRIC SHALL BE CUT FROM A CONTINUOUS ROLL TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED ONLY AT A SUPPORT POST. WITH A MINIMUM 6 INCH (0.2 M) OVERLAP AND BOTH ENDS SECURELY FASTENED TO THE POST.
- POSTS SHALL BE SPACED A MAXIMUM OF 10 FEET (3.1 M) APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 12 INCHES (0.3 M)). WHEN EXTRA-STRENGTH FABRIC IS USED WITHOUT THE WIRE SUPPORT FENCE, POST SPACING SHALL NOT EXCEED 6 FEET (1.8 M). TURN -THE ENDS OF THE FENCE UPHILL.
- A TRENCH SHALL BE EXCAVATED APPROXIMATELY 4 INCHES (101 MM) WIDE AND 6 INCHES (0.2 M) DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER. WHEN STANDARD STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY DUTY WIRE STAPLES AT LEAST I-INCH (25.4 MM) LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 2 INCHES (51 MM) AND SHALL NOT EXTEND MORE THAN 36 INCHES (0.9 M) ABOVE THE ORIGINAL GROUND SURFACE. THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 6 INCHES (0.2 M) OF THE FABRIC SHALL EXTEND INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 36 INCHES (0.9 M) ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES. WHEN EXTRA-STRENGTH FILTER FABRIC AND CLOSER POST SPACING ARE USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS. THE TRENCH SHALL BE BACKFILLED AND THE SOIL COMPACTED OVER THE TOE OF THE FILTER FABRIC. SILT FENCES PLACED AT THE TOE OF A SLOPE SHALL BE SET AT LEAST 6 FEET (1.8 M) FROM THE TOE IN ORDER TO INCREASE PONDING VOLUME.
- SILT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED AND ANY SEDIMENT STORED BEHIND THE SILT FENCE HAS BEEN REMOVED.

INSPECTION AND MAINTENANCE:

- SILT FENCES AND FILTER BARRIERS SHALL BE INSPECTED WEEKLY AFTER EACH SIGNIFICANT STORM (1 INCH (25.4 MM) IN 24 HOUR). ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY. SEDIMENT SHOULD BE REMOVED WHEN IT REACHES 1/3 HEIGHT OF THE FENCE OR 9 INCHES (0.3 M) MAXIMUM. THE REMOVED SEDIMENT SHALL CONFORM WITH THE EXISTING GRADE AND BE VEGETATED OR OTHERWISE STABILIZED.



NOTES:

1. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
2. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY: 9" (225mm) MAXIMUM RECOMMENDED STORAGE HEIGHT.
3. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.

NOT TO SCALE

FILE: SILTFENC

SILT FENCE

352

© 1994 MPCA

WATERSHED BACKGROUND SUMMARY AND OVERVIEW 0353

You are required to provide all of the following summary information that is applicable to your proposed project. Use reverse of pages as needed for descriptive answers.

1. Project Name: Swanton Road Demonstration Project -Type: HS

A. Watershed name:-Scott Creek

B. Watershed area (square miles):-30 square miles

C. Project location: T10S R3W; Latitude 37.07 ; Longitude--122.23,

D. Total length of perennial blue line streams in watershed (from topo): 53 miles

E. List known salmonid species present in watershed: Steelhead , Coho Salmon , (source(s)-Smith (1995-99), CDFG 1997

F. List known historic salmonid species found in watershed: ____, ____, ____, ____, (source(s)_____/date(s)_____).

G. List known limiting factors that are addressed by the project (source). List item numbers from the attached list (page A10): 2 3 4 6

H. List surveys or plans used to develop this proposal (include sources and dates).

Road and Landslide Sediment Source Investigation and Sediment Reduction Plan *for the* ***Scotts Creek Watershed, Santa*** *Cruz* ***County, California.*** March 2000. Prepared for Scotts Creek Watershed Council

Draft ***Strategic Plan for Restoration of the Endangered Coho Salmon South of San Francisco Bay.*** CDFG September 1998

I. List percent of the hydrologic watershed area included in the proposal: _____, and/or the length of blue line stream in affected project reach: 100 feet

J. Watershed ownership percentages: Federal: 0 State: 50- Private: 50

K. Provide the percentage of the hydrologic watershed area with landowners supportive of proposal and project: 100%

L. Attach a list and area map of landowners granting access to project area.

Project is within County easement

2. Watershed Land Use:

A. List current major land uses in the hydrologic unit where work is proposed.

Timber Preserve, Rural lands and Mountain Residential, Agriculture (row crops), Open Space

B. List planned major land uses in the hydrologic unit where work is proposed.
Timber Preserve, Mountain Residential, Agriculture (row crops), Open Space

C. Is the work in this proposal required as mitigation in a CEQA approval process, Timber Harvest Plan, or other required mitigation activity? Yes: No: X

3. Proposal Objective:

A. Briefly state the project objective, and explain how it is consistent with the declared project type.

The primary objective is to provide training, through a demonstration project, for County of Santa Cruz Public Works and consultant engineers to incorporate fish-friendly features into road repairs adjacent to salmonid streams. This project will provide training in three key areas: design, permitting and installation. These important training components will be done in conjunction with an on-site embankment protection project on Swanton Road, along a coho salmon and steelhead stream.

B. List keystone fishery problems and how they will be addressed by the project.

Excessive sediment yield: project will stabilize 100-feet of eroding embankment

Water quality: reduce sediment input, help reduce lagoon temperatures through riparian revegetation.

Riparian Dyfunction: project wiil revegetate 100-feet of riparian area to provide shade, cover and bank stability

Escape Cover: generous use of woody material in road and bank protection.

4. Project Description: SEE BELOW

The project will occur in six phases:

Phase I - Salmonid Habitat Enhancement Design Training: The final design will be distributed to Public Works engineers and consultant engineers with a description of the project. This group (estimated 30 people) will meet on-site to see the project location and discuss the final design. Permitting agency staff will meet on-site with the engineer group to review and discuss the design. At this meeting, engineers will be asked to identify constraints (e.g. computer drawings of woody material) that limit their ability to implement these ideas.

Phase II - Permitting. Final design will be routed through the permit process, incorporating additional suggestions from permitting agencies. Permitting documents will be distributed to engineers to serve as an example.

Phase III -Project implementation:

The project will consist of vegetated slope protection at the upper slope and rootwad revetment at the toe. Woody material, willows and anchoring rocks will be installed adjacent to the low-flow channel. Project will tie into the existing rootwad at the toe of the slope. A planting bench at the mean high-flow level will be constructed to accomodate greater flow capacity and an existing horse trail. A culvert at the upstream end of the project site, that drains that portion of the road, will be upgraded from 8" to 18" culvert.

Phase IV - Revegetation. Revegetation will be installed under a separate, consultant contract.. Upper slope will be planted with native vegetation, including alder, buckeye, big-leaf maple, California blackberry and sword fern. Salvaged sword fern clumps will be integrated into the project.

Phase V - Post-project meeting. Engineers, consultant engineers and will meet on-site to discuss project implementation.

Phase VI - Maintenance and Monitoring, Plants will be watered twice a month with a water truck during the months of May through September. Additional willow stakes will be installed in late winter as needed. Up to twenty plants will be replaced as necessary.

Cross sections of the project will be taken following installation and one-year later.

A. List DFG acceptable protocols that were used in proposal development or will be used in project implementation (document in the text of the proposal how these protocols were/will be used). List the applicable alpha-numerics from the attached list (page Al 1): 3A , _____

B. If other than DFG acceptable protocols, list and explain why they are being used.

C. List the methods and tasks, with a time line, the project will utilize.

D. List the specific contract products to be delivered by the project (e.g., number of road stream crossings to be treated and how, feet of stream bank stabilized, number of students involved in an education proposal, etc.).

Embankment protection incorporating woody material and revegetation at Swanton Rd, PM 3.55
One on-site meeting involving Dept. Of Public Works engineers and contractor engineers to discuss final design and permitting review
List of limitations, both knowledge and computer, to implementing fish-friendly road repairs
One post-project site meeting to discuss project implementation

E. Attach photos of your project site if useful for proposal evaluation.

See attached

5. Permits:

A. List all permits required to complete the project. See Part VI of the *California Salmonid Stream Habitat Restoration Manual:* __CDFG Streambed Alteration Agreement ; County of Santa Cruz Riparian Exception; County of Santa Cruz Grading Permit; Army Corps of Engineers, Regional Water Quality Control Board

6. Scheduling:

A. Desired start date: -August 1, 2002_____

B. Estimated duration of the project: _6 weeks, including construction and revegetation-

7. Cost: (Information for this category must be obtained from budget page in your proposal)

A. Match: amount and percent of total budget $ 71,494 55%

B. Request:amount and percent of total budget $ 66.971 45%

C. Total Budget: $130,415 100%

D. Indicate source and type of match (cash, materials, labor, etc.):

County of Santa Cruz: project management and coordination, copies, photographs
County of Santa Cruz Public Works: funds for match on project, maintenance of revegetation, staff time to attend permiting and post-project meetings.
County of Santa Cruz Planning Dept: staff time to lead permitting workshop
County of Santa Cruz: hydrologist to review design and assist with permitting
Local contracting engineers: time to attend permitting and post-project meetings
Woody material, unknown, possibly University of California Santa Cruz

8. Location:

A. Attach 8.5" x 11" black and white maps of the project site, surrounding hydrologic area, and regional location. Indicate scale of projection(s).

See attached

B. Provide clear directions of the route used to access the watershed or stream, and the project site.

From Santa Cruz, take Highway 1 north, past the town of Davenport, and turn right on Swanton Road. Follow Swanton Road 3.55 miles to the site. Project site is between Big and Mill creeks. To park, drive past the site, turn around, and then park off the road just downstream of the project site.

Summary prepared by: Kristen Schroeder, Fisheries Resource Planner, County of Santa Cruz
Biotechnical and Revegetation Plan by: Connie Silva, Landscape Architect, County of Santa Cruz
Engineering by: Valeria Epperson and Eileen Streller, County of Santa Cruz

Environmental Project Questionnaire

Proposer must complete and submit this form with proposal or proposal will be rejected. *If explanation exceeds space provided please provide additional explanations on separate paper.*

	Yes	Maybe/ Uncertain	No	Please explain if you responded "yes" or "maybe/uncertain"
1. Will the project or activity involve work on the bank of a river, stream, lake, or on slopes immediately adjacent to a river, stream or lake?	X			Install road protection/bank stabilzation project with woody material and revegetation
2. If you answered "yes" to #1, will the project or activity involve any of the following:				
a. Removal of any vegetation?	X			Sword ferns will be salvaged for reveg; non-native vinca will be removed. A few small trees may be removed for installation
b. Excavation of the bank?			X	
c. Removal or storage of fill material from roads or stream crossings?			X	
d. Placement of bank protection or stabilization structures or materials (e.g., gabions, riprap, concrete slurry/sacks)?	X			Install woody material, anchoring rock and revegetation at toe of slope. Install vegetation above rootwad revetment
3. Will the project or activity take place in, adjacent to, or near a river that has been designated as "wild and scenic" under state or Federal law?			X	
4. Will the project or activity involve work in the bed, or channel of a river, stream, or lake?	X			See #1
5. Will the project or activity involve the placement of any permanent or temporary structure in a river, stream, or lake?	X			

	Yes	Maybe/ Uncertain	No	Please explain if you responded "yes" or "maybe/uncertain"
6. If you answered "yes" to #5, describe the types of structures to be placed in a river, stream, or lake:				Rootwad revetment will be adjacent to low-flow channel
7. Will the project involve the use of material from a streambed?			X	
8. Will the project or activity result in the disposal or deposition of debris, waste, sediment or other material in a river, stream, or lake?			X	
a. If you answered "yes" to #8, describe the material that will be disposed of or deposited in the river stream, or, lake:				
9. Will any type of construction equipment be used?	X			
a. If you answered "yes" to #9, describe the type of equipment that will be used:				
b. Will it be used in a river, stream, or lake?		X		Plan to restrict equipment to banks
c. Will it be used on slopes greater than 30%?			X	
10. Does the project or activity area flood or periodically become inundated with water?	X			
11. Will water need to be diverted from a river, stream, or lake for the project or activity?		X		Will avoid use of temporary diversion.
12. If you answered "yes" to # 11, please answer the following:				
a. Will this be a temporary diversion?	X			
b. Will the water be diverted by means of a dam, reservoir, or other water impoundment structure?	X			Will need to impound water to get it into diversion

	Yes	Maybe/ No Uncertain		Please explain if you responded "yes" or "maybe/uncertain"
13. Will water quality be affected by the deposition of silt, an increase in water temperature, a change in the pH level, or in some other way?		X		May be temporary impacts from sediment
14. Will the project or activity be done pursuant to a water right application or permit?			X	
15. Will the project or activity affect fish, amphibians, insects, or other aquatic resources?		X		Steelhead/coho may need to be removed from the project area
16. Will the project or activity affect terrestrial wildlife?		X		May be red-legged frogs in project area
17. Are any endangered or rare plant species thought or known to occur in the area where the proposed project or activity will take place?		X		Slide area vegetation could be checked for endangered or rare plants.
18. Are any endangered or threatened fish, bird, or animal species thought or known to occur in the area where the proposed project or activity will take place?	X			Federally listed steelhead and coho salmon occur in Scotts Creek.
19. Have you contacted any other local, State, or federal agency regarding the project or activity?	X			
a. If you answered "yes" to # 19, please list the names of the agencies you have contacted:	California Dept of Fish and Game			
20. Have you applied for or obtained any permit, agreement, or other authorization for your project or activity from any government agency?			X	
If you answered "yes" to #20, please list the names or describe the permit, agreement, or authorization you have applied for or obtained:				
21. Have any environmental documents pertaining to your project or activity been prepared?			X	