

COST ANALYSIS:

BOND CREEK, SITE 79-1

HEAVY EQUIPMENT PHASE

February 20, 1980

COST SUMMARY

Includes all costs to complete the equipment phase of site rehabilitation; removal of the L-1-5 Road, and work performed above the L-1-5 Road.

L-1-5 Road Costs:

Transportation	\$ 918.45
Salvage and debris removal	\$ 2,252.45
Road maintenance	\$ 741.30
L-1-5 Road removal	\$35,286.00
Stream crossings #1 - #4	\$ 5,269.60

Hillslope above L-1-5 Road Costs:

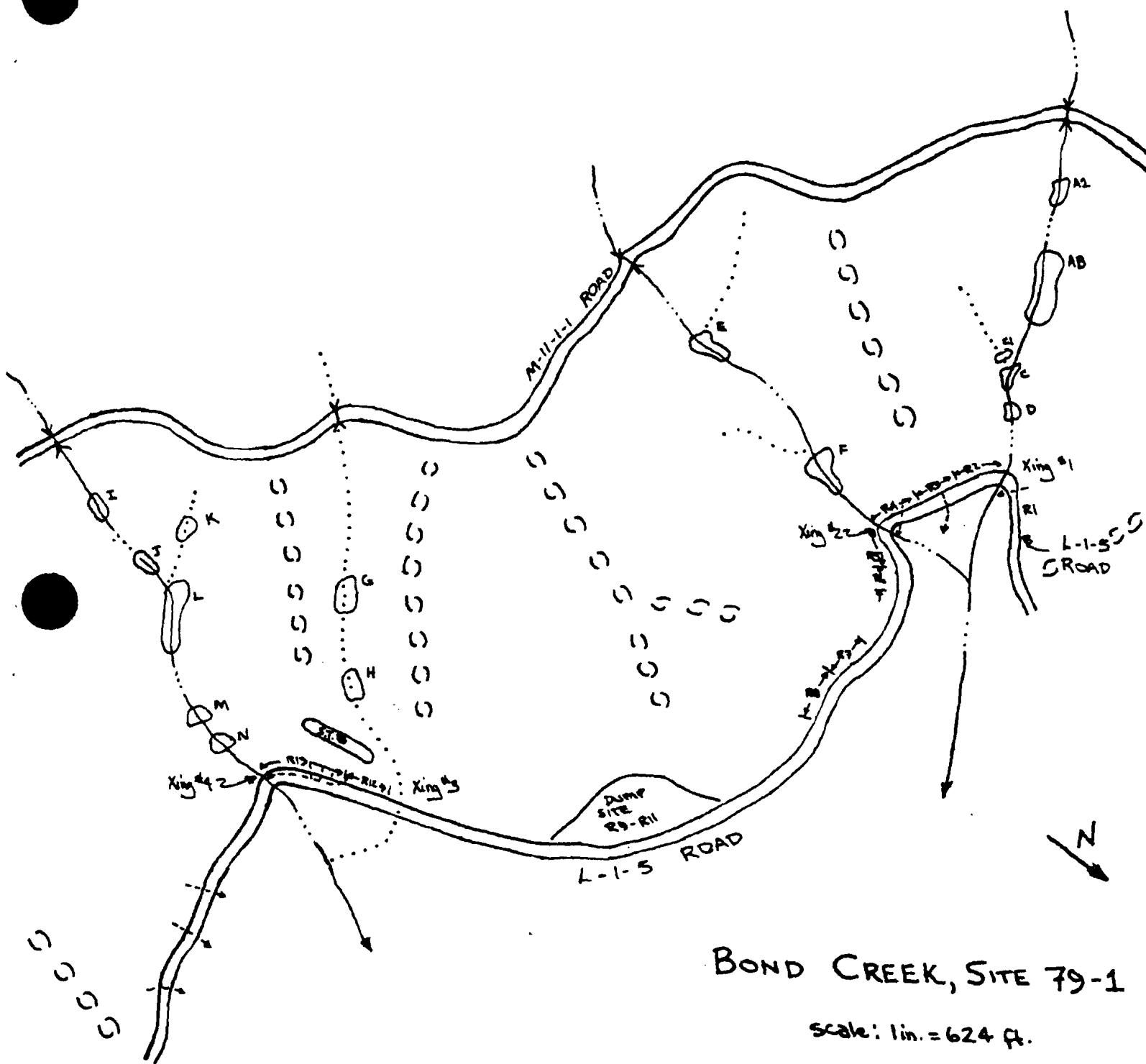
Stream crossings A1 - N	\$ 6,420.00
Miscellaneous	\$ 1,332.50

<u>Total Equipment Costs</u>	<u>\$52,220.30</u>
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EQUIPMENT LIST

CONTRACTOR	EQUIPMENT DESCRIPTION	COST/HOUR
Carl Kjer	22B Series 11 Bucyrus Erie Crane, track mounted plus oiler-mechanic and operator.	\$85.00
Diamond R Logging Company, David Renner	CAT. crawler tractor, D6, plus operator.	\$54.30
	950 CAT loader with log forks and 3 yard bucket plus operator.	\$47.80
	Model 12 CAT road grader.	\$35.30*
	10 yard dump truck (dump #1)	\$29.80*
Nichol's Trucking (Marvin McGaughey)	10 yard dump truck with operator. (dump #2)	\$29.80
Keith Parker	580 B Case extendahoe plus operator.	\$32.50
	10 yard dump truck (dump #3).	\$29.80*
Slick M. Warlick	580 B Case extendahoe plus operator.	\$40.00
Hal Reardon (Clyde Redl)	CAT crawler tractor, D5, plus operator.	\$45.00

* paid engine time only



BOND CREEK, SITE 79-1

scale: 1 in. = 624 ft.

- perennial stream
- intermittent stream
- - - cross road drain
- o o o o ridge line
- X culvert

INTRODUCTION

This cost analysis is based on information contained in Table 1 and Table 5. Both tables are a compilation of field notes and memory. Table 1 contains equipment information pertaining to the removal of the L-1-5 Road. Equipment work performed on the hillslopes above the L-1-5 Road is presented in Table 5. Standby costs are computed in Table 3, and are included in the cost to remove the L-1-5 Road.

TABLE 1: L-1-5 ROAD REMOVAL: DAILY EQUIPMENT HOURS RECORDED FOR PAYMENT

DATE, 1979	CRANE	LOADER	TRACTOR D6	DUMP #1	GRADER	DUMP #2	DUMP #3	EXTEND-A- HOE	TRACTOR D5	REMARKS-PROGRESS
July 17		9½	9½							Salvage and debris removal.
18		6	6							Dump no show - no work.
19	10	9	9			11				~7 loads/hr, end haul between crossings #1 and #2.
20	10	10	10	3½	5	10	10			~8½ loads/hr, just crossed crossing #2; end hauling.
23	10	10	10	9	3	10		10	9½	End hauling crossing #2 to R5, R6
24	10	10	10	10		10			9½	End hauling R7, R8.
25	10	10	10	6		10		10	9½	Finished R7, R8; finished ~1300' to the end of the road.
26	10	10	10	8		10		10	9½	Finished ridge south of crossing #4.
27	10	10	10	6		10		10	9½	Finished crossing #4 ~7 hrs; hauling R13, R12.
30	10	10	10	8		10		10	9½	R13, R12, almost to crossing #3.
31	10	10	10	10		10		10	9½	Crossing #3 partially excavated; many logs.
Aug. 1	10	10	10	4		10		10		Crossing #3 finished (~7 hrs); nearing dump site.
2	10	10	10			10		10		Up to R7, R8; final sweep.
3	10	10	10		8	10		10		Stopped ~60' s. of crossing #2.
6	10	10	10	1	5	10		10		Crossing #2 finished (~5 hrs); 70' north of crossing #2.
7	10	10	10	3		10		10		Finished to crossing #1.
8	8	8	8	1		8		8		Finished crossing #1 (~5 hrs) and north.
Totals, hour	148	162.5	162.5	69.5	21	149	10	118	66.5	
Cost/hour	85.00	47.80	54.30	29.80	35.30	29.80	29.80	32.50	45.00	
Total cost/ equipment	12,580.00	7767.50	8823.75	2071.10	741.30	4440.20	298.00	3835.00	2992.50	

Total = \$43,549.35

COST BREAKDOWN: L-1-5 ROAD

Transportation Costs - transporting of heavy equipment from Arcata-Eureka area to rehabilitation unit.

Crane	1½ trips @ \$150.00 each	= \$225.00
Tractor, D6	1½ trips @ \$150.00 each	= \$225.00
Grader	1½ trips @ \$150.00 each	= \$225.00
Loader	1 trip @ \$150.00 each	= \$150.00
Extendahoe	1½ hours @ \$ 32.50/hour	= \$ 48.75
Dump #2	1½ hours @ \$ 29.80/hour	= <u>\$ 44.70</u>
Total		= <u>\$918.45</u>

Salvage and Debris Removal Costs - preliminary work to remove and salvage logs from the outer edge of the road prism and below stream crossings on the L-1-5 Road.

Tractor	9½ hours @ \$ 54.30/hour	= \$515.85
Loader	9½ hours @ \$ 47.80/hour	= \$454.10
Tractor (D5)	28½ hours @ \$ 45.00/hour	= <u>\$1282.50</u>
Total		= <u>\$2252.45</u>

Road Maintenance Costs - use of a grader (on engine time only) to upgrade road surface when end-hauling to dump site.

Grader	21 hours @ \$ 35.30/hour	= \$741.30
Total		= <u>\$741.30</u>

COST BREAKDOWN: L-1-5 ROAD (cont'd.)

L-1-5 Road Removal Costs - Includes ripping of road surface, end-hauling sidecast material to dump site, excavating road prism, removal of debris exposed during excavation, outslping road surface, construction of cross-road drains, one French drain, and standby costs.

TABLE 2. EQUIPMENT HOURS, L-1-5 ROAD REMOVAL

Equipment	Hours	Cost/Hour	Costs
Crane	120	\$85.00	\$10,200.00
Loader	145	\$47.80	\$ 6,931.00
Tractor (D6)	141	\$54.30	\$ 7,656.30
Tractor (D5)	38	\$45.00	\$ 1,710.00
Extendahoe	104	\$32.50	\$ 3,380.00
Dump #1	53½	\$29.80	\$ 1,594.30
Dump #2	122	\$29.80	\$ 3,635.60
Dump #3	6	\$29.80	\$ 178.80
Total			<u>\$35,286.00</u>

COST BREAKDOWN: L-1-5 ROAD (cont'd.)

Standby Costs - Includes those costs having equipment available, but not actually working, and in this compilation, considered to be a portion of L-1-5 Road removal costs. The table below contains the actual number of hours worked for each piece of equipment on a daily basis.

TABLE 3. ACTUAL EQUIPMENT HOURS WORKED DAILY

1979	Crane	Loader	Tractor D6	Dump #1	Grader	Dump #2	Dump #3	Extendahoe	Tractor D5
July 17		9½	9½						
18									
19	10	9	5			11			
20	10	5	5	3½	5	10	10		
23	10		5	9	3	10		10	9½
24	10	1	4	10		10			9½
25	10	6	5	6		10		10	9½
26	10		5	8		10		10	7
27	10	4	5	6		10		10	6
30	10	1	3	8		10		10	5
31	10		6	10		10		10	6
Aug. 1	10		6	4		10		10	
2	10		5			10		10	
3	10	1	2		8	10		10	
6	10		3	1	5	3		10	
7	10		2	3				6	
8	8	1	2	1		4		4	
Totals	148	37½	72½	69½	21	128	10	110	52½
Standby hours	0	125	95	0	0	21	0	8	14
Standby cost	0	\$5975.00	\$4887.00	0	0	\$625.80	0	\$260.00	\$630.00

TOTAL = \$12,377.80

COST BREAKDOWN: L-1-5 ROAD (cont'd.)

Stream Crossing Removal, L-1-5 Road - Includes the removal of debris exposed during excavation, the excavation of fill material and culverts from each stream crossing, and the final grading of stream channels and sideslopes.

TABLE 4. EQUIPMENT HOURS, STREAM CROSSING #1-#4

STREAM CROSSING #1:

Equipment	Hours	Cost/Hour	Costs
Crane	7	\$85.00	\$ 595.00
Loader	3	\$47.80	\$ 143.40
Tractor (D6)	2	\$54.30	\$ 108.60
Extendahoe	3	\$32.50	\$ 97.50
Dump #1	2	\$29.80	\$ 59.60
Dump #2	7	\$29.80	\$ 208.60
Excavated fill = 760 cu. yds.			Total = <u>\$1212.70</u>

STREAM CROSSING #2:

Equipment	Hours	Cost/Hour	Costs
Crane	7	\$85.00	\$ 595.00
Loader	5	\$47.80	\$ 239.00
Tractor (D6)	3	\$54.30	\$ 162.90
Extendahoe	4	\$32.50	\$ 130.00
Dump #1	3	\$29.80	\$ 89.40
Dump #2	6	\$29.80	\$ 178.80
Dump #3	4	\$29.80	\$ 119.20
Excavated fill = 1200 cu. yds.			Total = <u>\$1514.30</u>

COST BREAKDOWN: L-1-5 ROAD (cont'd.)

Stream Crossing Removal Costs (cont'd.)

TABLE 4 (cont'd.)

STREAM CROSSING #3:

Equipment	Hours	Cost/Hour	Costs
Crane	7	\$85.00	\$ 595.00
Loader	0	\$47.80	---
Tractor (D6)	3	\$54.30	\$ 162.90
Extendahoe	3	\$32.50	\$ 97.50
Dump #1	5	\$29.80	\$ 149.00
Dump #2	7	\$29.80	\$ 208.60
Excavated fill $\approx$ 1200 cu. yds.			Total = <u>\$1213.00</u>

STREAM CROSSING #4:

Equipment	Hours	Cost/Hour	Costs
Crane	7	\$85.00	\$ 595.00
Loader	0	\$47.80	---
Tractor (D6)	4	\$54.30	\$ 217.20
Extendahoe	4	\$32.50	\$ 130.00
Dump #1	6	\$29.80	\$ 178.80
Dump #2	7	\$29.80	\$ 208.60
Excavated fill $\approx$ 1300 cu. yds.			Total = <u>\$1329.60</u>

TABLE 5. HILLSLOPE ABOVE L-1-5 ROAD: DAILY EQUIPMENT HOURS RECORDED FOR PAYMENT

Date, 1979	Extendahoe	Tractor, D5	Remarks*
July 5	9	7	Poor start, in exp. e.h. @ A1
6	-	3	e.h. no show. D5: 2 A1
9	11	8	e.h.: 10 A1. D5: 8 A1 wet, muddy
10	Rained out		
11	10	10	e.h.: 10 AB. D5: 10 AB
12	10	10	e.h.: 3 AB, 2 C1, 5 C. D5: 10C
13	9	10	e.h.: 4 WB5, 5F. D5: 10F
16	10	10	e.h.: 3 culvert, 7F. D5: 3 culvert, 7F
17	11	10	e.h.: 2½ F, 3½ E, 5I. D5: 1½ WB9, 2½ E, 3J, 3I
18	9	9	e.h.: 2½ I, 5J, 1½ culvert. D5: 7J, 1 WB4, .1 culvert.
19	8	8	e.h.: 5 ST8, 3 bel.L. D5: 2 bel.L, 6L
20	11	10	e.h.: 3N, 6L, 1WB2. D5: L-1-5
Totals	98 hours	95 hours	

* A breakdown of hours at each work site.

Key to Remarks:

Numbers preceding letters	- hours worked
Letters	- site location
WB	- water bars
Number following WB	- number of WB completed
e.h.	- extendahoe
D5	- tractor, D5

COST BREAKDOWN: HILLSLOPE ABOVE L-1-5 ROAD

Stream Crossing Removal Costs - includes transportation to work sites, removal of logs and debris from crossings, excavation of fill from crossings and tractor standby time.

TABLE 6. EQUIPMENT HOURS AT STREAM CROSSINGS

Crossing	Hours	
	Extendahoe	Tractor, D5
A1	17	11
AB	13	10
C1	2	0
C	5	10
E	3½	2½
F	14½	17
I	7½	3
J	5	10½
below L	3	2
L	6	6
N	3	0
Totals:	79.5 hours	72.0 hours

580 B Extendahoe @ \$40/hour = \$3,180.00

Tractor, D5 Cat @ \$45/hour = \$3,240.00

Total = \$6,420.00

COST BREAKDOWN: HILLSLOPE ABOVE L-1-5 ROAD (cont'd.)

MISCELLANEOUS COSTS

Removal and placement of 2 culverts:

 Extendahoe, 4½ hours @ \$40/hour = \$ 180.00

 Tractor, D5, 4 hours @ \$45/hour = \$ 180.00

Extendahoe Constructed Water Bars:

 Constructed 7 in 7 hours @ \$40/hour = \$ 280.00

Tractor, D5 Constructed Water Bars:

 Constructed 13 in 2½ hours @ \$45/hour = \$ 112.50

·Pull-Back/Outslope Crown of Slide, STB:

 Extendahoe, 5 hours @ \$40.00/hour = \$ 200.00

Transportation Costs:

 Extendahoe, 2 hours @ \$40/hour = \$ 80.00

 Tractor, D5, 2 trips @ \$150 each = \$ 300.00

Total = \$1332.50

COST ANALYSIS

Transportation Costs

These costs are necessary to transport heavy equipment from the Arcata-Eureka area to the rehabilitation unit. All costs are cost-effective.

Salvage and Debris Removal

Approximately 13,000 board-feet of timber (60% redwood, 40% Douglas-fir) was salvaged from the L-1-5 Road. In addition, a large amount (no figures available) of woody slash and debris was removed from the road prism to facilitate and expedite road and stream crossing removal. This is a cost-effective application of equipment.

Road Maintenance

The road grader was contracted on engine-time (operating time) only. The grader maintained a smooth road surface for the dump trucks to operate on. Good road conditions minimized the turn-around time for each truck. The grader also kept the dust level down (no water truck on site) which greatly enhanced the health and safety conditions of the work site. This is a cost-effective application of equipment.

L-1-5 Road Removal

The L-1-5 Road bench did not have enough storage capacity for the sidecast material retrieved from the outer edge of the fill prism. In addition, the road cut exposed groundwater sources which could not be buried, and this decreased the available storage area on the road bench. As a result, the road was removed using end-haul techniques. This method involved loading side-cast material into dump trucks and hauling it to a central dump site, R9-R11 (refer to sketch map).

Based on crane excavation and dump truck hauling rates of 70 cubic yards per truck per hour, approximately 12,000 cubic yards of sidecast material was end-hauled to the dump site. An additional 4,000 cubic yards was excavated and placed on the road bench to attain an outsloped surface. Therefore, a total of 16,000 cubic yards was excavated from the L-1-5 Road.

The total cost to remove the L-1-5 Road amounts to \$34,748.90 (refer to Table 2) at a cost of approximately \$46,000 per mile. Standby cost; i.e., the time (cost) that equipment is available on site, but not working, is included in this amount. For this phase, standby costs amount to \$12,377.80 (refer to Table 3)

COST ANALYSIS (cont'd.)

or 35% of road removal costs. The loader and D6 tractor account for 88% (48% and 40% respectively) of the total standby cost.

With the exception of the loader and D6 tractor, this is a cost-effective application of equipment. It may be necessary to contract loaders on engine time only to avoid such high, ineffective operating costs.

Stream Crossing #1-#4 (refer to Table 4)

The amount of fill excavated from stream crossings #1-#4 varied from 760 to 1300 cubic yards. The total amount of fill excavated from the four crossings is approximately 4,500 cubic yards, an average of 1,125 cubic yards per stream crossing. The total cost to excavate these crossings is \$5,269.60, an average of \$1,320 per stream crossing, or \$1.17 per cubic yard.

Sufficient storage areas were not available at each stream crossing, therefore, end-hauling techniques were utilized to transport excavated fill to the central dump site. Two methods were used to load dump trucks. At crossing #3 and #4, the crane excavated fill and loaded dump trucks, while at crossing #2 the crane focused only on excavating fill and allowed the loader to load dump trucks. These crossings contained approximately the same amount of fill, and the overall excavation rate per crossing remained the same. In other words, the loader did not decrease the crane's cycle time.

With the exception of the loader, equipment application for the removal of stream crossings #1-#4 is cost-effective. Once again, an alternative to loader rental agreements must be explored.

Stream Crossings A1-N (refer to Tables 5 & 6)

Eleven tractor-constructed stream crossings were excavated at a total cost of \$6,420.00, or \$584.00 per crossing. No estimates are available regarding the amount of fill removed from each crossing.

The extendahoe - D5 tractor combination is an extremely cost-effective combination of equipment when performing work of this nature. However, standby time is very high for the D5 tractor and may approach 50% of its total work time. The reason and justification for the standby time is that many logs are encountered during the excavation process, and the tractor must be available to winch logs and debris from the stream crossings as the excavation progresses.

Water Bars

Both extendahoe and D5 tractor constructed water bars on the hillslope above the L-1-5 Road. Extendahoe water bars averaged \$40.00 per water bar, whereas the D5 averaged \$8.65 per water bar. The extendahoe constructed water bars in areas with limited access; approximately 65% of the water bar's unit cost is attributable to relocation time from one site to the next.

CONCLUSION

The L-1-5 Road is constructed across steep terrain with slopes of 20% to 75%. Cutbanks are very high (10-50 feet) and a large amount of hillside material was sidecast along the outer edge of the road. In many cases, fill-slopes approached 75 feet in length. In addition, 65% of this road segment is constructed in close proximity to 2nd and 3rd-order perennial stream channels. Based upon these findings, it was necessary to retrieve sidecast material and outslope road reaches immediately above stream channels.

The loader was the least cost-effective piece of equipment used for road and stream crossing removal. It is, however, a desirable piece of equipment to have available on site for this type of work. Unless more consistent work can be guaranteed for a loader, it should be contracted on engine time only or brought in to perform preliminary work; e.g., quarry and transport rock supplies to work areas. In other words, it may be desirable to overlay or sequence equipment throughout a project.

The D6 tractor was the next least cost-effective piece of equipment. It was extremely effective in removing large logs exposed during excavation, but it also experienced a large amount of standby time. It is quite possible that a large hydraulic excavator may be capable of performing stream crossing excavations and have enough power to remove logs as they are encountered. A crane does not have that ability and, in the future, may be used only to perform preliminary excavation of stream crossings and retrieval of sidecast material. Final excavations and outslowing could be left for the excavator. Once again, the overlay of equipment is made more feasible.

End-hauling is very expensive and, yet, cost-effective. This technique will be necessary on road segments which do not have adequate road bench areas capable of storing retrieved sidecast material. The same applies to stream crossings which have a disproportionate amount of fill relative to available storage area.

Site 79-1 is approximately 60 acres in size; however, the total acreage affected by rehabilitation equals approximately 130 acres (hydrologic divide to the main channel of Bond Creek).

Gregory J. Bundros

INTRODUCTION

1. Attachments. The following attachments form part of this solicitation and any resultant contract:
 - A. Technical specifications for IFB 8480-0-02
 - B. Worksheets for Rehabilitation Contracts
2. Location and accessibility. The general location of this rehabilitation unit is shown on the accompanying map on page 2 (scale = 1:55,000). The site is located in the Bond Creek basin on the L-1-5 Road, a rocked former logging haul road. The site is 15 miles from Louisiana-Pacific's Big Lagoon gate, on Highway 101 (13 miles south of Orick). Driving time to the site from Orick is approximately 50 minutes. Redwood National Park will arrange for gate passes with Louisiana-Pacific for the successful offeror. Travel across Louisiana-Pacific's land shall be restricted to the designated access route (see highlighted road on map, page 2). No other trespass shall be permitted. Visitors are subject to prosecution by Louisiana-Pacific.
3. General description of area and site conditions. The rehabilitation unit consists of approximately 100 acres of tractor-logged hillslopes along with approximately 0.7 miles of logging haul road. Slopes range from 5% to 100%, and average 40%. Site elevation ranges from 750 feet to 1250 feet. Though contract work will be scattered throughout the unit, it will primarily be concentrated on 4.0 acres. Heavy equipment has out-sloped ("pulled") this portion of the L-1-5 Road and excavated earth-filled stream crossings to a close facsimile of original channel conditions. Labor intensive work covered in this contract will focus on: (1) stabilizing excavated stream channels, (2) revegetating areas disturbed by heavy equipment and (3) establishing drainage control (waterbars, ditches) on the logged slope above the road.
4. Pre-bid site inspection. There will be a field inspection of the Bond Creek rehabilitation unit, site 79-1 on October 29, 1979. All those desiring to participate must meet at 8:30 a.m. at the Orick Ranger Station, Orick, California. All offerors will be held to have the same information about the unit as those attending the site inspection. It will be the only assured opportunity for discussing the project on site with the Contracting Officer's Representative (C.O.R.) prior to the submission of bids.

An employee of Redwood National Park (NOT the C.O.R.) will be available at 8:30 a.m. October 30 - November 2, 1979, only to escort interested offerors to and from the rehabilitation unit. The purpose is to provide additional time for interested offerors to inspect the unit. Those desiring to participate must meet at 8:30 a.m. at the Orick Ranger Station, Orick, California. At no time shall the parking of privately owned vehicles at the Big Lagoon gate be allowed.

PACIFIC OCEAN

ORICK

WILLOW SOURCE

Hoyes Cr.

FRESH-WATER LAGOON

STONE LAGOON

Alder Transplant Source

REHABILITATION UNIT

SCALE: 1 inch = 1.3 miles

DESIGNATED ACCESS ROUTE

ALDER SOURCE

LOUISIANA PACIFIC GATE

5. Camping. On-site or near-site camping will be permitted. The National Park Service must approve the campsite. A complete camp plan and proposed location should be submitted with the bid. The campsite and plan will not influence the government's choice of a contractor, and a new near-by campsite can be negotiated after the contract award, if necessary. The Government reserves the right to change the location of a campsite should conditions arise which warrant it. A complete camp plan should include, as a minimum, the following considerations:

- A. Location
- B. Approximate number of workers
- C. Approximate number of non-workers on site (children, spouses)
- D. Number of pack animals, if any; and plans for feeding and containment of pack animals
- E. Cooking and water heating plans
- F. Water system
- G. Grey water disposal plans
- H. Solid waste disposal plans

A fire control plan should be submitted along with the camp plan. A procedure for notification of NPS and CDF should be established in the event of fire. The contractor shall provide fire tools and equipment at the campsite. They shall meet applicable Forest Service standards for spark arrestors and fire tools. Fire extinguishers should be of the type and size set forth in the California Resources Code, Section 4431 and the California Administrative Code Section 1234 of Title 14. In case of extreme fire hazard conditions, operations may be shut down at the request of the Government. Park regulations also prohibit hunting, trapping, pets, fishing, or the possession of loaded or assembled firearms on park lands.

6. Safety. The contractor shall comply with the applicable requirements of the Occupational Safety and Health Act, (Section 29 CFR-1910 and Section 29 CFR-1920) and other Federal, State and local safety, health, and sanitation codes, statutes, and standards during the life of this contract. The contractor is required to contact the COR or the delegated representative regarding any on-the-job accidents that should occur. Notification must be immediate.
7. Archeological Findings. The Contractor is required to contact the Project Supervisor regarding any suspected archeological finding(s) during the rehabilitation work before proceeding with work in the area. If a determination is made of a suspected archeological finding(s), a Work Stop Order will be initiated and work will be stopped until resumption time can be determined. A Resume Work Order will then be initiated to the Contractor. No archeological findings may be removed from the contract site.
8. Timber. All downed timber on the contract work site, whether severed by hand or felled by wind, may be used for split products; however, wind-felled

timber within uncut forested tracts shall not be disturbed. If there is not sufficient downed timber on site, downed timber on adjacent sites may be utilized upon approval of the C.O.R. or the delegated representative. No split products or other wood products may be removed from the Park or Louisiana-Pacific's land.

9. Restrictions regarding erosion monitoring equipment. Erosion monitoring equipment shall be identified on the rehabilitation unit by the C.O.R. This equipment shall not be disturbed. Any accidental disturbances shall be immediately reported to the C.O.R..
10. How contract work is presented. The different types of work to be performed in this contract are described in the Technical Specifications. The Statement of Work (S.O.W.) begins on page 8 , listing site specific instructions for each work site. The S.O.W. is divided into three parts:
 - I. L-1-5 Road
 - II. Stream Crossings above L-1-5 Road
 - III. Skid Trails

Within each part , work sites are identified and tasks are described. Where specific/unique jobs require special instructions beyond or in addition to those in the Technical Specifications, these jobs are listed specifically within the S.O.W.. A photo map is included which shows the locations of each work site. On the ground, colored flagging delineates each work site location (see Special Notes, page 6). The Bid Schedule lists all work tasks for the purpose of listing unit and job prices.

11. Special Considerations. Special considerations supersede Technical Specifications when applicable.
 - A. Willow source. Source of willow for stem-cuttings and wattles will be on National Park property in the Orick area at the beginning of Bald Hill Road (see map page 2).
 - B. Alder source. Alder for wattles will be taken from along the G6 Road approximately 10 miles from the work site. Alder transplants shall be obtained from the A-9-2 log deck, approximately 5 miles from the work site (see map, page 2).
 - C. Materials to be provided by the Park. Grass seed, fertilizer, straw, and redwood boards for erosion control structures will be provided. Redwood boards will have to be transported to some work sites, and may have to be cut to size in order to transport. See photo map for locations of redwood boards and straw.

D. Check dams and submerged spillways.

- 1) Offeror shall submit separate unit prices for check dams or submerged spillways based upon the location of redwood boards: (1) where boards are provided at work site, (2) where boards must be transported to work site (see Bid Schedule, page 5-7). Spillway areas will vary and will be specified for each work site in the S.O.W. However, for bidding purposes, all spillway areas shall be considered the same.
- 2) Average effective height of check dams within a reach of check dams (see definition in Technical Specifications) shall be 12 inches.
- 3) All check dams and submerged spillways shall be constructed from single boards.

SPECIAL NOTES

A. Abbreviations and Symbols.

1. C.O.R. : Contracting Officers Representative
2. S.O.W. : Statement of Work
3. T. : Must transport redwood boards to work site from supply areas shown on photo map.
4. * : Refer to Technical Specifications
5. $\geq$: Greater than or equal to.
6. $\leq$: Less than or equal to.
7. ∇ Q : Streamflow, arrow shows direction of flow.
8. ∇ WB : Water bar, arrow shows direction of drain.
9. ∇ : Water surface in stream channel.

B. Terminology.

1. Dimensions: unless otherwise specified, all dimensions (lengths, areas, and spacings) are slope and/or channel dimensions, rather than horizontal dimensions.
2. Left/right channel bank: determined by viewing downstream.
3. Reach: a length of stream channel.
4. Fill: soil used to provide a seal around in-channel structures which is clear of large rocks and woody debris.

C. Work site identification. Work sites are identified on the rehabilitation unit by colored flagging as follows:

1. Channel Work - yellow flags mark the "reach" of channel work; e.g. check dams (yellow reach) means check dams shall be installed between the two yellow flags. Yellow flags mark the upper and lower limits of the channel to be treated. If there are more than 2 yellow flags, numbers are assigned to them with yellow #1 being the most downstream flag.
2. Channel Bank work - blue flags delineate work sites on channel banks. They are identified by upper or lower, left or right bank followed by the color of flagging delineating the area - blue; e.g. planter boxes (lower left bank blue) means planter boxes shall be installed on the lower portion of the left channel bank outlined in blue flagging.

C. Work site identification (cont'd)

3. Skid Trail and Road Work - blue flagging identifies "areas" to be treated; e.g. blue areas.
4. Ditch Construction - blue flags are used to mark upper and lower limits of a "blue line" which is the course the ditch shall follow.
5. Wet Areas adjacent to streams or on hillslopes - red flagging delineates these "areas" to be treated.
6. Water Bars - red flags mark upper and lower limits of water bar work.

D. List of Plant Species - Scientific and common names.

<u>Alnus oregana</u>	red alder
<u>Baccharis pilularis</u> var. <u>consanguinea</u>	coyote brush
<u>Blechnum spicatum</u>	deer fern
<u>Gaultheria shallon</u>	salal
<u>Juncus bolanderi</u>	rush
<u>Juncus effusus</u>	rush
<u>myrica californica</u>	wax-myrtle
<u>Polystichum munitum</u>	sword fern
<u>Rhododendron macrophyllum</u>	rhododendron
<u>Salix sitchensis</u>	willow
<u>Whipplea modesta</u>	yerba de selva

STATEMENT OF WORK - PART I; L-1-5 ROAD
(To be read in conjunction with photo map)

Item #

1. Site R1

A. Physical treatment.

- 1) wooded terraces* (blue area north of redwood stump): construct 540 linear feet; contours spaced 3 feet vertically. (average slope = 53%)

B. Vegetal treatment - none.

2. Cross-Road Drain, S1

A. Physical treatment.

- 1) rock channel (yellow reach): cover drain surface completely with one layer of rock $\geq$ 6 inches in diameter. Rock shall cover a drain width of 3 feet. (96 sq. ft)

B. Vegetal treatment - none.

3. Cross-Road Drain, S3

A. Physical treatment.

- 1) manual excavation (yellow #1 - #2): extend drain to the fallen redwoods at base of slope. Drain shall be at least 10 inches deep, 1.5 feet wide at bottom, with sideslopes $\leq$ 1:1. (1.5 person - hours)
- 2) rock and stake channel (yellow #1 - #3): cover channel surface completely with one layer of rock. Rock shall be $\geq$ 6 inches in diameter and shall cover a channel width of three feet. Anchor rocks with redwood stakes (see figure 1, page 9). Stakes shall be driven across the channel in a curved line, and spaced 3 inches apart. Stakes shall be 3/4 inch thick, 2-3 inches wide, and 20 inches in length. Drive stakes to a firm hold at least 12 inches deep. Rows of stakes shall be spaced 4 feet apart. (114 sq. ft.)

B. Vegetal treatment

1) transplants:

- a. yellow #2 - #3 - 11 rush (Juncus effusus) "plugs" in zig-zag pattern, 3 foot spacing, 1 foot offset. Source for Juncus: area immediately around Cross-Road Drain S3.

ROCK AND STAKE CHANNEL - SCHEMATIC DRAWING

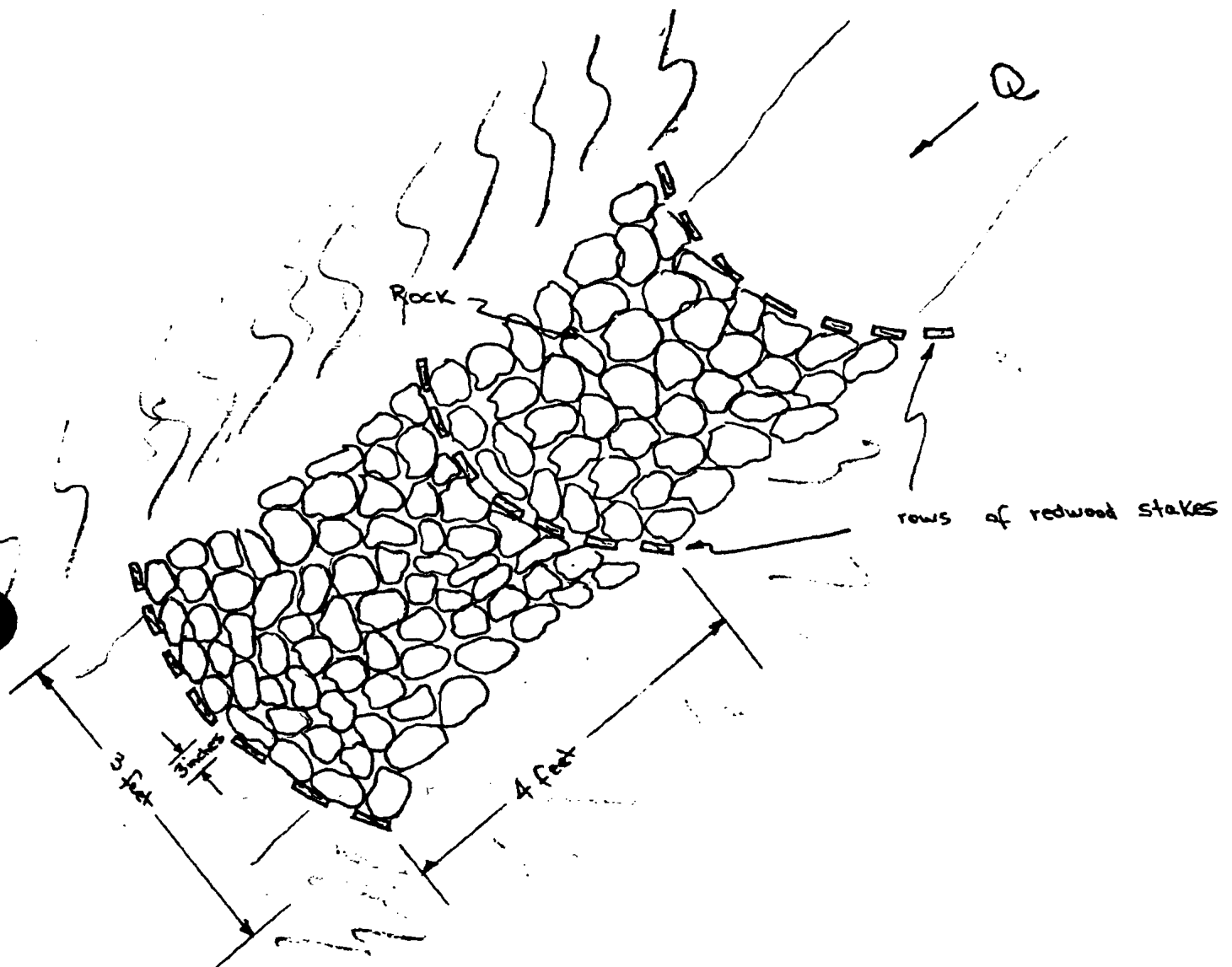


Figure 1

Item #

3. Cross-Road Drain, S3 (cont'd)

B. Vegetal treatment

1) transplants:

- a. yellow #2 - #3 - 11 rush (Juncus effusus) "plugs" in zig-zag pattern, 3 foot spacing, 1 foot offset. Source for Juncus: area immediately around Cross-Road Drain S3.
- b. red area - 7 alder transplants, 3 foot spacing.

4. Site S4

A. Physical treatment - none.

B. Vegetal treatment

1) transplants:

- a. red area - 3 alder transplants, 3 foot spacing.

5. Cross-Road Drain, S5

A. Physical treatment.

- 1) manual excavation (yellow reach): pull back side-slopes of drain to $\leq$ 1:1 slope. (1.5 person-hours)
- 2) rock channel (yellow #1 - #2): cover channel surface completely with one layer of rock. Rock shall be $\geq$ 6 inches in diameter and cover a channel width of 3 feet. (120 sq. ft.)

B. Vegetal treatment.

1) transplants:

- a. yellow #1 - 3 - 18 alder transplants in zig-zag pattern in channel between rocks, 3 foot spacing, two foot offset.
- b. red area - 3 alder transplants, 3 foot spacing.

6. Stream Crossing #2

A. Physical treatment.

- 1) check dams* (yellow #2 - #3): install 14 redwood check dams. (spillway area = 2.4 sq ft.)
- 2) log deflection points (yellow #1 - #2): construct 8 deflection points along right bank of stream channel. Construct from redwood logs $\geq$ 10 inches in diameter, and approximately 4 feet long (from on-site downed timber). Install logs 1.8 feet

Item #

6. Stream Crossing #2 (cont'd)

A. Physical treatment.

- 2) (cont'd) apart on a 30° angle out from downstream side of channel (see figure 2, page 12). Excavate a "bed" for each log in order to key its bottom into the channel bottom 1/2 its diameter, and the upstream end at least 12 inches into channel bank. Anchor logs to channel by driving 1 1/2 inch diameter wood stakes against the downstream side of each log 18 inches into channel bottom and spaced 12 inches apart. Nail wood stakes to redwood logs. Wood stakes shall not extend more than 3 inches above the top of each log.

B. Vegetal treatment.

- 1) transplants (red area): 11 Juncus effusus "plugs, 2 foot spacing. Source for Juncus: area immediately around stream crossing #2.
- 2) stem cuttings (yellow #2 - #3): 45 Sitka willow cuttings 0.25 to 1 inch diameter, one every 2 feet in a zig-zag line along each channel bank, one foot offset.

7. Site R5

A. Physical treatment.

- 1) contour trenches* (blue area): construct 1,000 linear feet. (average slope = 45%).

B. Vegetal treatment.

- 1) grass seed and fertilizer application (blue area): 7 lbs. grass seed, 74 lbs. fertilizer. Spread uniformly over entire area after contour trenches have been constructed.

8. Site R6

A. Physical treatment.

- 1) contour trenches (blue area): construct 1300 linear feet. (average slope = 55%).

B. Vegetal treatment - none

LOG DEFLECTION POINTS

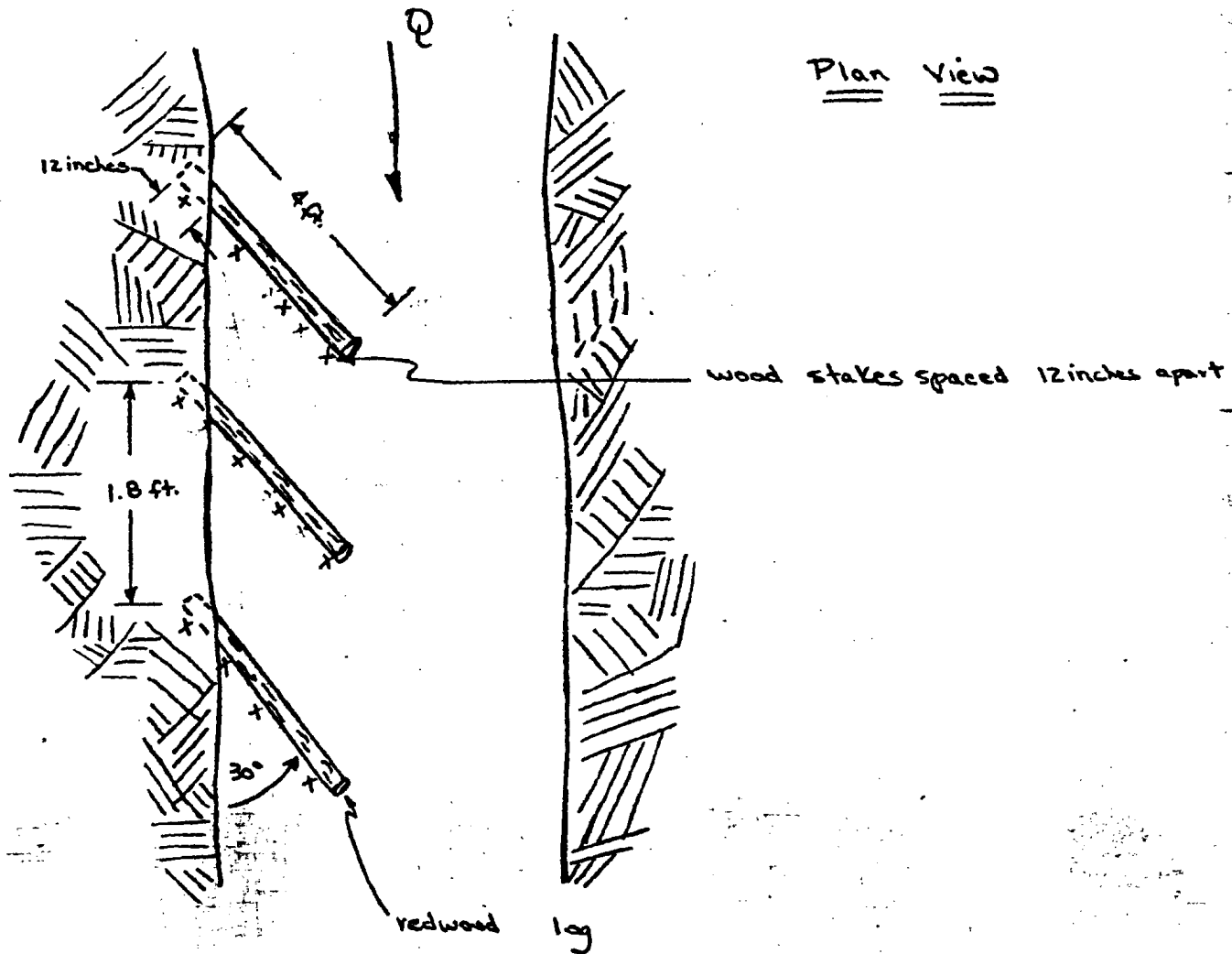


Figure 2

Item #

9. Stream Crossing #3

A. Physical treatment.

- 1) log across channel (approximately 50 ft. below yellow #4): remove a 3 ft. section from the center of log which is keyed into the channel. Remove to channel level.
- 2) check dams (yellow #3 - #4): install 45 redwood check dams (spillway area = 1.3 sq. ft.)
- 3) manual excavation (yellow #1 - #2): equipment did not complete this excavation. Remove rock and debris, and excavate a channel at least 1 foot deep, 2 feet wide at bottom with side slopes $\leq 1:1$. (6 person-hours)
- 4) rock channel (yellow #1 - #3): cover newly excavated channel completely with one layer of rock. Rock shall be ≥ 8 inches in diameter. (81 sq. ft.)

B. Vegetal treatment - none.

10. Site S8

A. Physical treatment - none.

B. Vegetal treatment.

- 1) stem cuttings (red area): 48 Sitka willow stem cuttings, 3 foot spacing.

11. Site R13

A. Physical treatment.

- 1) alder wattles* (blue area): construct 745 linear feet. (average slope = 60%)

B. Vegetal treatment.

- 1) straw mulch (blue area): 3.5 bales spread after wattle installation.

12. Stream Crossing #4

Water emerges from rocks at the downstream corner of the red area on the left bank of this crossing. It appears to be a spring; however, it is the outflow of a drain constructed along the old road. DO NOT DISTURB OR REMOVE any rock from this outflow. Travel over this area must be minimized.

Item #

12. Stream Crossing #4 (cont'd)

A. Physical treatment.

- 1) rock and wire reinforced channel (yellow #1 - #2): cover this channel reach with one layer of rock (≥ 6 inches diameter) wrapped in wire mesh as follows: drive 30 inch wood stakes on an 8 inch grid throughout the channel extending 1.5 feet up each channel bank. Stakes shall be $\geq 1\frac{1}{2}$ inches in diameter. Leave approximately 8 inches of each stake exposed. Cover this area with one layer of 2 inch mesh chicken wire and fill with one layer of rock. Place a second layer of wire over rocks and stakes. Connect both layers of chicken wire with baling wire every 8 - 10 inches forming a rock and wire quilt. Baling wire must be twisted tightly, its ends cut and turned down. (area = 30 sq. ft.)
- 2) check dams (yellow #2 - #3): install 11 redwood check dams. (spillway area = 2.3 sq. ft.)

B. Vegetal treatment.

- 1) stem cuttings:
 - a. yellow #2 - #3: 44 Sitka willow stem cuttings, 4 between each check dam, 2 along each bank.
 - b. left bank red - 111 Sitka willow stem cuttings, 2 foot spacing.
 - c. right bank blue - 40 coyote brush, 40 yerba de selva, 15 salmon berry stem cuttings, 3 foot spacing. Species shall be interspersed. Source for all species: area immediately around Stream Crossing #4.

13. Cross-Road Drain, S10

A. Physical treatment.

- 1) rock and stake channel (yellow reach): cover channel surface completely with one layer of rock. Rock shall be ≥ 6 inches in diameter and shall cover a channel width of 3 feet. Anchor rocks with redwood stakes (see figure 1, page 9). Stakes shall be driven across the channel in a curved line, and spaced 3 inches apart. Stakes shall be $\frac{3}{4}$ inch thick, 2-3 inches wide, and 20 inches in length. Drive stakes to a firm hold at least 12 inches deep. Rows of stakes shall be spaced 4 feet apart. (112 sq. ft.)

Item #

13. Cross-Road Drain, S10 (cont'd)

B. Vegetal treatment.

- 1) transplants and stem cuttings (red area): 4 Juncus bolanderi
"plugs" alternating with 4 Sitka willow stem cuttings.
Alternate species on 2 foot spacing.

STATEMENT OF WORK - PART II:

STREAM CROSSINGS ABOVE L-1-5 ROAD

(to be read in conjunction with photo map)

Item #

14. Stream Crossing A1

Channel conditions are not favorable for check dam installation. In most cases, the channel is broad with poorly defined channel banks. For this reason, submerged spillways shall be installed throughout this reach. Log obstructions keyed securely in the channel shall not be removed; instead, a submerged spillway shall be installed immediately above and below obstructions.

A. Physical treatment.

- 1) manual excavation (approximately 16 feet below yellow #3): a buried log protrudes from the right bank. Water flows to the right of this log onto the right channel bank. Excavate channel to left of log. The depth of excavation will vary, and shall tie-in with the channel grade above and below the point of excavation. (3 person-hours)
- 2) submerged spillways* (yellow reach): install 40 submerged spillways spaced as follows: 2 feet spacing between yellow #1 and #2; 1.5 feet spacing between yellow #2 and #3. (spillway area - 2.0 sq. ft.; T.)
- 3) wooded terraces (left bank blue): construct 345 linear feet; contours spaced 3 feet vertically. (average slope = 55%)

B. Vegetal treatment.

1) transplants:

- a. upper center red - 11 deerfern and 10 salal transplants in alternating checkerboard fashion, 2 foot spacing. Source for both species: head of stream and along right bank.
- b. upper left bank red - 7 red alder transplants, 3 foot spacing.
- c. lower left bank red - 19 red alder transplants, 3 foot spacing.
- d. right bank red - 76 red alder transplants, 3 foot spacing.

- 2) grass seed and fertilizer application (left bank blue); 3 lbs. grass seed, 25 lbs. fertilizer; spread uniformly over entire area after wooded terraces have been constructed.

Item #

15. Stream Crossing AB

The upper reach of this crossing contains two channels (see figure 3, page 18). A steep surface channel enters from the left bank, while a second channel emerges from beneath logs which remain in the stream crossing. A yellow flagged area at the confluence of these channels delineates a rock and wire reinforced channel. Submerged spillways will be installed in the surface channel immediately above the reinforced channel (upper yellow reach,) and check dams will be installed immediately below the reinforced channel (lower yellow reach).

A. Physical treatment.

- 1) rock-and-wire reinforced channel (yellow area): drive 30 inch wood stakes on an 8 inch grid pattern throughout the channel surface extending 2 feet up each bank. Wood stakes shall be 1 1/2 inches in diameter. Leave approximately 8 inches of each stake exposed. Cover this area with 2 inch mesh chicken wire shaping it to channel and channel banks. Cover wire with one layer of rock ($\geq$ 6 inches diameter). Cover the entire area with a second layer of wire and fasten both layers of chicken wire with baling wire every 8 inches forming a rock and wire quilt. Fasten baling wire as close as possible to wooden stakes (see figure 3, page 18). (87 sq. ft.)
- 2) submerged spillways (upper yellow reach; 3 flags at bottom): install 36 submerged spillways spaced as follows: 12 inch spacing between yellow #1 and #2; 1.5 feet spacing between yellow #2 and #3. (spillway area = 2.0 sq. ft.; T.)
- 3) spill board (below lowermost submerged spillway): to prevent undercutting of the reinforced channel, install a spill board with 6 inch wing walls. Spill board must extend from the spillway of the lowermost submerged spillway over the upstream edge of the reinforced channel, and be set at a level just below the spillway level (see figure 4 , page 19). Fasten spill board securely to channel by notching and staking its sides, and nail (if necessary) to submerged spillway. There must be no gap between the submerged spillway and spill board.
- 4) check dams (lower yellow reach, 3 flags at top): install 16 check dams. (spillway area = 2.2 sq. ft.; T.)
- 5) planter boxes* (right bank blue): install 54 linear feet.(T.)
- 6) wooded terraces (left bank blue): construct 96 linear feet; contours spaced 8 feet apart. (area = 768 sq. ft.)

STREAM CROSSING AB

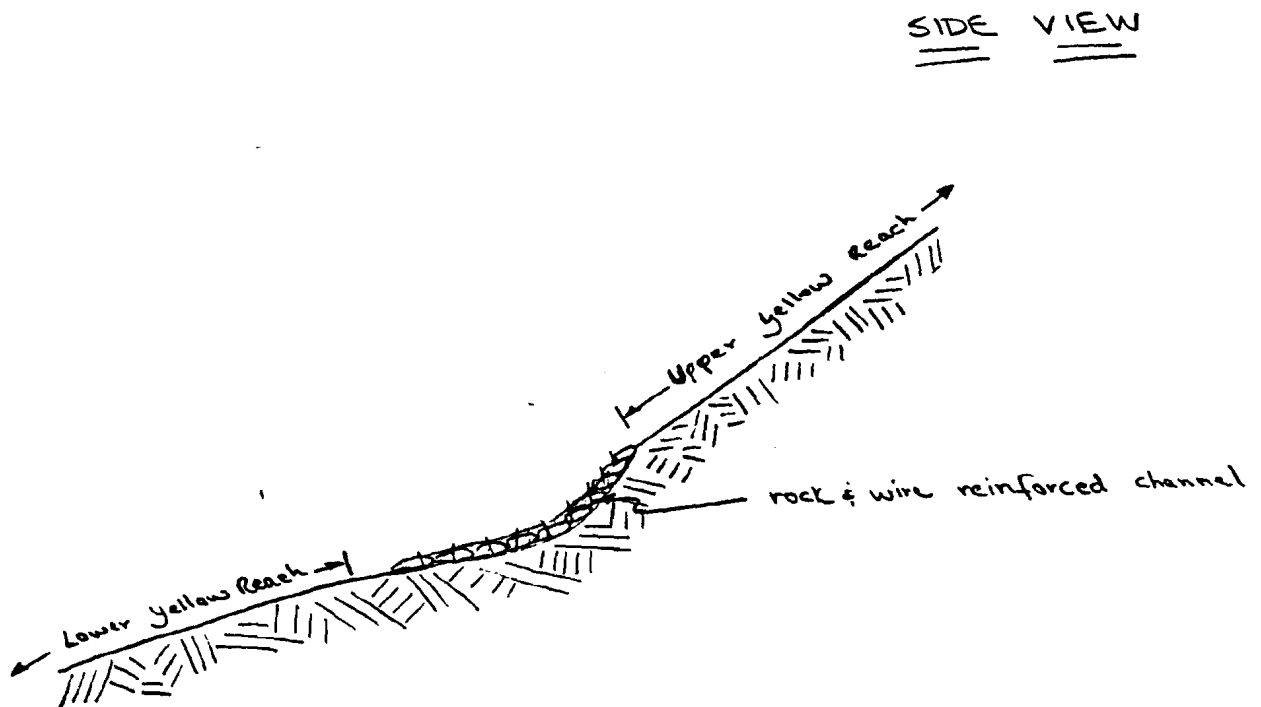
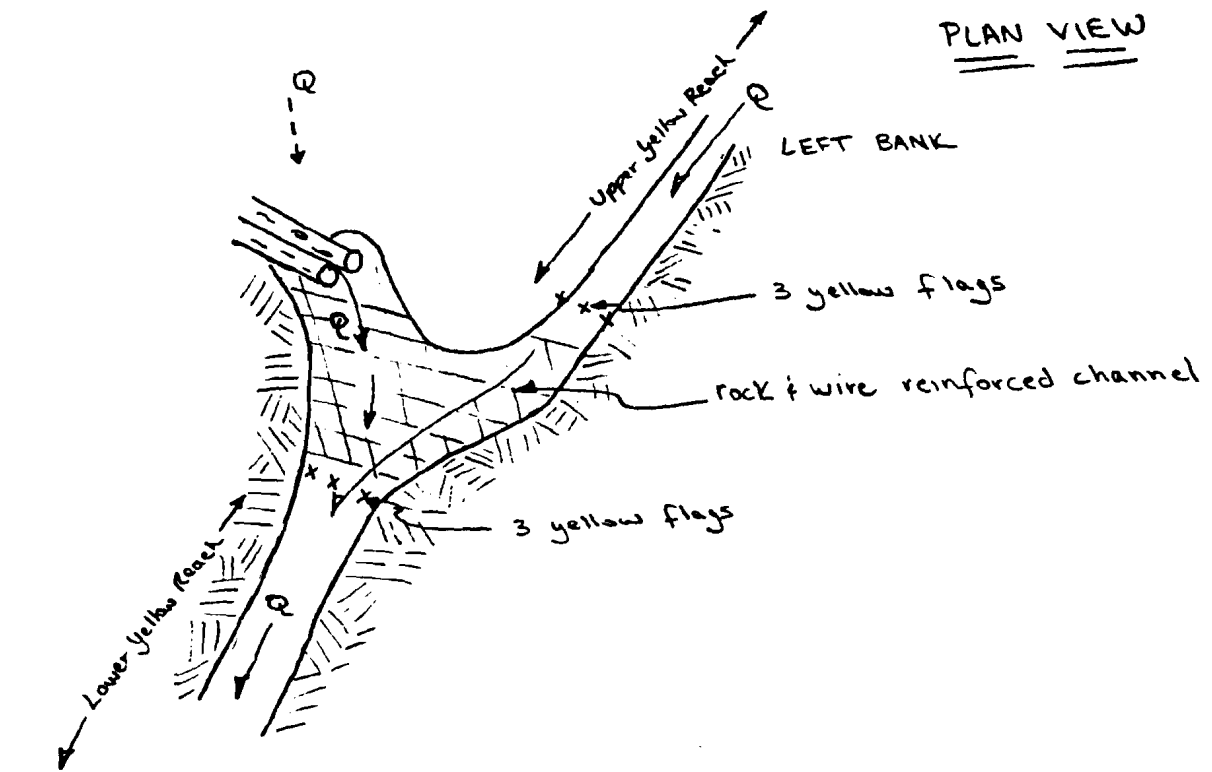


Figure 3

SPILL BOARD WITH WING WALLS

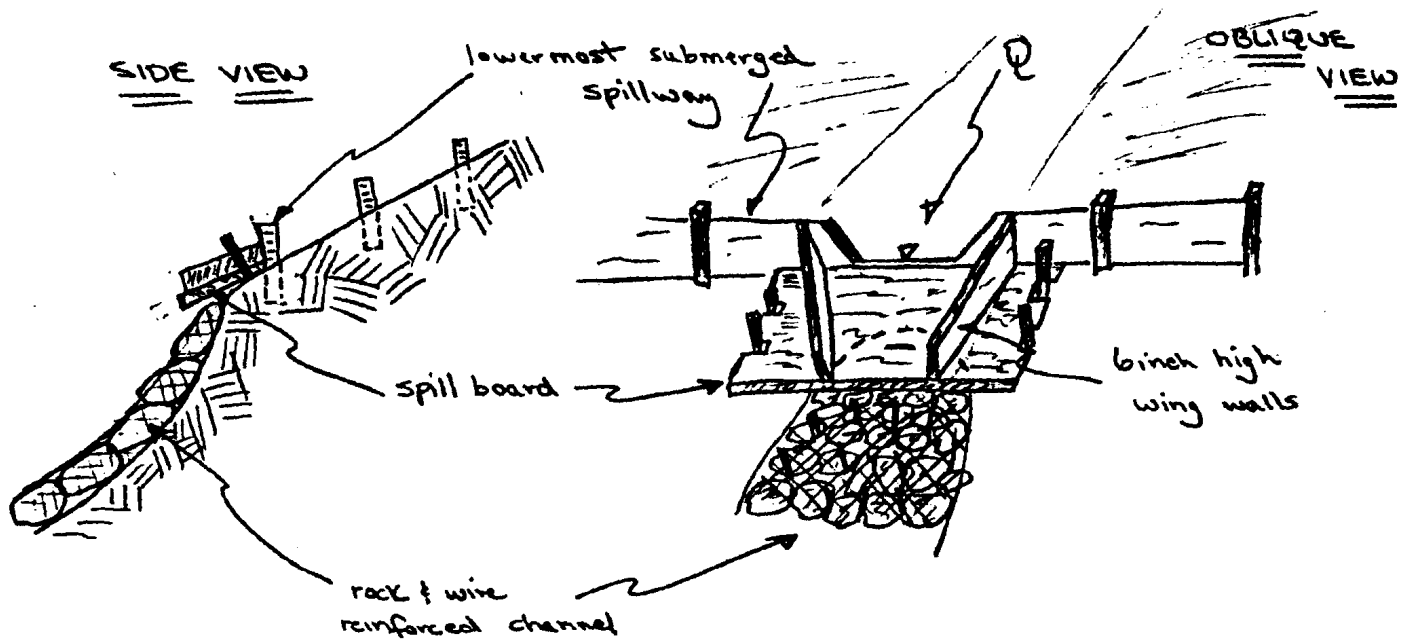


Figure 4

Item #

15. Stream Crossing AB (cont'd)

B. Vegetal treatment.

- 1) wattles (left bank red): 240 linear ft. 50% Sitka willow, 50% alder wattles, (58% slope)
- 2) stem cuttings (lower right bank blue): 63 Sitka willow stem cuttings, 2 foot spacing along banks above channel.
- 3) grass seed and fertilizer application (upper right bank blue): 0.5 lbs. grass seed, 5 lbs. fertilizer spread evenly over unit after construction of planter boxes.

16. Stream Crossing C1

A. Physical treatment - none.

B. Vegetal treatment.

- 1) transplants and stem cuttings:
 - a. left bank blue: alternate 15 red alder transplants and 15 Sitka willow stem cuttings on 3 ft. spacing.
 - b. right bank red - 3 red alder transplants, spaced evenly within triangular flagged area.

17. Stream Crossing C

A large log is in and parallel to the stream channel, and allows water to flow beneath the log seeking its original streambed. Spoil from excavating this crossing remains on top of the log and may be transported by the stream during the first winter runoff.

A. Physical treatment.

- 1) manual excavation (yellow reach): excavate spoil from the top of log, and expose stream channel left of log. Begin excavation from the bottom of channel reach. Spoil shall be carried out of the channel. (5 person-hours)
- 2) wooded terraces:
 - a. right bank blue - construct 120 linear feet; contours spaced 3 feet vertically. (average slope = 65%)
 - b. left bank blue - construct 80 linear feet; contours spaced 3 feet vertically (average slope = 70%)

Item #

17. Stream Crossing C (cont'd)

B. Vegetal treatment.

1) grass seed and fertilizer application:

- a. left bank blue - 1 lb. grass seed, 5 lbs. fertilizer spread evenly over area after construction of wooded terraces.
- b. right bank blue - 1 lb. grass seed, 10 lbs. fertilizer spread evenly over area after construction of wooded terraces.

18. Stream Crossing E

A root wad is keyed into the channel at the upstream end of the excavated reach. This root wad prevents the channel from down-cutting at this point; however, it forms a plunge pool immediately below it. A yellow area, below the root wad, delineates the construction site for a log energy dissipator.

A. Physical treatment.

- 1) submerged spillways (yellow #1 - #2): install 9 redwood submerged spillways spaced 1.2 feet apart. (spillway area = 2.0 sq. ft.; T.)
- 2) check dams (yellow #2 - #3): install 8 redwood check dams. (spillway area = 2.0 sq. ft.; T.)
- 3) log energy dissipator (yellow area): construct a log energy dissipator at the base of the root wad. The dissipator must extend at least 4 feet downstream, be approximately 9 feet wide and 14 inches high. Begin by constructing a log base from 2 8 inch diameter logs placed perpendicularly to channel. Anchor base logs by driving wood stakes at least 18 inches into the streambed and spaced two feet apart. It is necessary to stake only the downstream side of each base log. Subsequent logs (2 6 inches diameter) shall be nailed into place, securely fastened to lower logs.
- 4) planter boxes:
 - a. left bank blue - construct 21 linear feet of planter boxes (T.).
 - b. lower right bank blue - construct 35 linear feet of planter boxes. (T.).

Item #

18. Stream Crossing E (cont'd)

B. Vegetal treatment.

- 1) straw mulch (upper right bank blue): 0.5 Bale. Spread before transplanting or installation of stem cuttings to avoid damage to transplants and cuttings.
- 2) transplants:
 - a. upper left bank blue - 31 coyote brush transplants, 3 foot spacing. Source for coyote brush: area immediately around stream crossing E.
 - b. lower left bank blue - 49 coyote brush transplants, 3 foot spacing. Source for coyote brush: area immediately around stream crossing E.
- 3) stem cuttings (yellow reach): 36 Sitka willow stem cuttings, 1.0 inch diameter. Plant 2 stem cuttings on each bank immediately upstream from each submerged spillway.

19. Swale between crossings E & F

A. Physical treatment.

- 1) ditches (blue lines); construct 3 ditches. (total length = 67 ft.)

B. Vegetal treatment - none.

20. Stream Crossing F

The lowermost flag (yellow #1) marks the beginning of sill installation and a sink hole just upstream from a log keyed into the channel. The log is the base-level for this stream reach and it may be undermined should the sink hole enlarge. In order to prevent sink hole enlargement, a deflection point shall be constructed at yellow #1.

A. Physical treatment:

- 1) board deflection point (yellow #1): construct a deflection point extending from the right channel bank to the keyed log in the channel (see figure 5, page 23). Use a redwood board 1 inch - 1.5 inch thick, 16 inches wide, and approximately 8 feet long set at a 35° - 40° angle out from the right channel bank. Key the upstream end of the board approximately 12 inches into the right bank and its bottom at least 6 inches into the channel bed. Drive 30 inch wood stakes at least 20 inches into the channel bed, spaced 18 inches apart on the downstream side of the board. Nail the board to the stakes. Place rock $\geq$ 10 inches in diameter

BOARD DEFLECTION POINT

PLAN VIEW

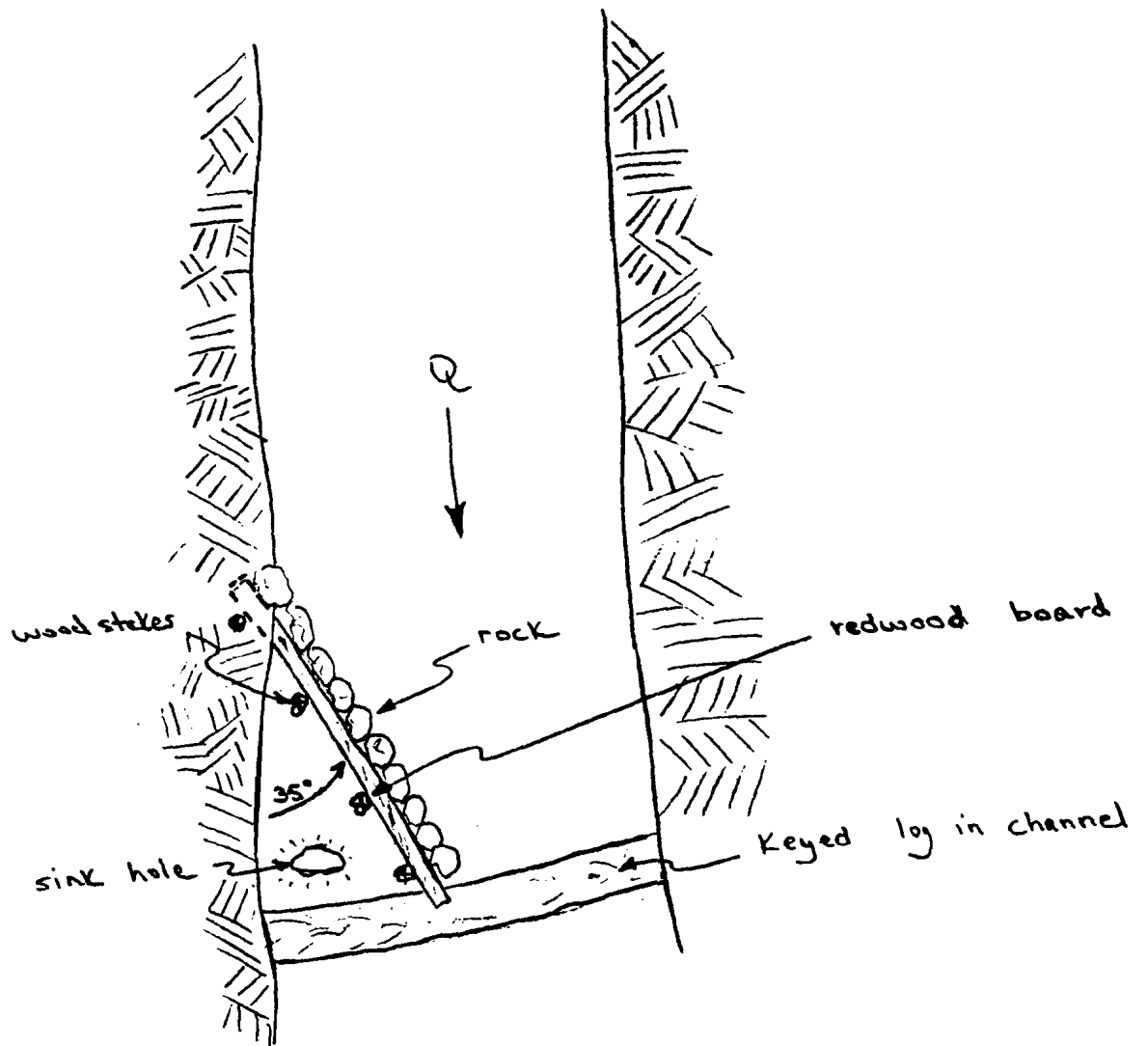


Figure 5

Item #

20. Stream Crossing F (cont'd)

A. Physical treatment.

- 1) (cont'd) along the stream side of the board and against channel bank where board is inset. (T)
- 2) submerged spillways (yellow #1 - #2): install 4 submerged spillways spaced 2 feet apart. (spillway area = 2.2 sq. ft.; T)
- 3) check dams (yellow #2 - #3): install 10 redwood board check dams. (spillway area = 2.2 sq. ft.; T.)

B. Vegetal treatment.

1) transplants:

- a. lower left bank blue - 10 deer fern, 10 sword fern, 12 Salal, 10 rhododendron transplants, 6 foot spacing. Alternate species. Source for all species: area immediately around Stream crossing F.
- b. upper left bank blue - 30 deer fern, 30 sword fern, 16 salal, 10 rhododendron transplants, 6 foot spacing. Alternate species. Source for all species: area immediately around Stream crossing F.
- c. lower right bank blue - 24 deer fern, 25 sword fern, 28 salal, 8 rhododendron transplants, 6 foot spacing. Alternate species. Source for all species: area immediately around Stream crossing F.
- d. right bank red - 22 red alder transplants, 6 foot spacing.

21. Stream Crossing I

A. Physical treatment - none.

B. Vegetal treatment.

1) grass seed and fertilizer application:

- a. left bank blue - 2 lbs. grass seed, 20 lbs. fertilizer.
- b. right bank blue - 0.5 lbs. barley seed, 5 lbs. fertilizer.

22. Stream Crossing J

A. Physical treatment.

- 1) alder wattles (left bank blue): construct 65 linear feet. (slope = 60%)

Item #

22. Stream Crossing J (cont'd)

A. Physical treatment (cont'd)

- 2) ditch (right bank blue/red line): 38 feet long.

B. Vegetal treatment.

- 1) transplants and stem cuttings:

- a. right bank blue/red line - 10 Juncus effusus "plugs" and 9 red alder transplants alternating along the line. 2 foot spacing. Source for Juncus: area immediately around Crossing J.
- b. right bank red - 25 sword fern transplants alternating with 25 wax myrtle stem cuttings. Source for both species: area immediately around Stream crossing J.

23. Stream Crossing L

A. Physical treatment.

- 1) log retaining wall (left bank yellow/red); construct a log retaining wall approximately 15 feet long, 2 feet high from $\geq$ 8 inch diameter logs. The upstream end of the wall shall begin at the hemlock buried in the left channel bank. Excavate a "bed" with a slight downstream gradient for the bottom log. The bed must be deep enough to bury the bottom log 2/3 its diameter. Drive 2 inch x 2 inch x 5 foot wood stakes (or rebar stakes) against both sides of the log 30 inches into the channel bed, spaced 2 feet apart. Tightly strap opposing stakes with 2 strands of baling wire before each new log is added. Strap the final log in place, and back-fill the wall with clean fill (i.e. no organic debris.)

B. Vegetal treatment.

- 1) wattles: (lower left bank blue): 54 linear ft. coyote brush wattles. (65% slope)
- 2) transplants and stem cuttings:
 - a. upper left bank red - alternate 7 Juncus effusus "plugs" and 7 red alder transplants, 3 foot spacing. Source for Juncus: area immediately around Stream crossing L.
 - b. upper left bank yellow/red - 10 salal transplants alternating with 10 Sitka willow stem cuttings, all in backfill behind log retaining wall.

Item #

24. Below Stream Crossing L

A. Physical treatment - none.

B. Vegetal treatment.

- 1) wattles (right bank blue): 44 linear feet of coyote brush wattles, (58% slope)

25. Stream Crossing N

A. Physical treatment

- 1) manual excavation (upstream side of windfall, yellow area); excavate the bed material from channel at the upstream end of the windfall to allow water to flow under windfall. Excavate bed material below windfall at the point where this flow emerges. Excavated material shall be carried out of the stream channel. (4 person-hours)
- 2) rock channel (yellow area): cover the channel completely with one layer of rock $\geq$ 12 inches in diameter (104 sq. ft).
- 3) manual excavation (yellow reach): widen channel to 4 feet. (3 person - hours)
- 4) submerged spillways (yellow reach): install 14 submerged spillways spaced 2.5 feet apart. (spillway area = 2.0 sq. ft.; T)
- 5) planter boxes (left bank blue): install 45 linear feet. (slope = 85%; T.)
- 6) ditch (right bank blue line): 10 feet

B. Vegetal treatment - none.

STATEMENT OF WORK - PART III:

SKID TRAILS

(to be read in conjunction with photo map)

Item#:

26. Site ST1

A. Physical treatment - none.

B. Vegetal treatment.

- 1) grass seed and fertilizer application (blue area): 2 lbs.
grass seed, 17 lbs. fertilizer.

27. Site ST2

A. Physical treatment - none.

B. Vegetal treatment.

- 1) grass seed and fertilizer application (blue area): 1 lb.
grass seed, 13.5 lbs. fertilizer

28. Site ST3

A. Physical treatment - none.

B. Vegetal treatment.

- 1) grass seed and fertilizer application (blue area): 1 lb.
grass seed, 10 lbs. fertilizer. Do not rake in seed and fertilizer.

29. Site ST4

A. Physical treatment - none.

B. Vegetal treatment.

- 1) grass seed and fertilizer application (blue area): 2 lb.
grass seed, 17 lbs. fertilizer. Do not rake in seed and fertilizer.

30. Site ST5

A. Physical treatment - none.

B. Vegetal treatment.

- 1) grass seed and fertilizer application (blue area): 1 lb.
grass seed, 13 lbs. fertilizer.

Item #:

31. Site ST6

A. Physical treatment - none.

B. Vegetal treatment.

- 1) grass seed and fertilizer application (blue area):
2 lb. grass seed, 20 lbs. fertilizer.

32. Site ST7

A. Physical treatment.

- 1) wooded terraces (blue area): construct 212 linear feet;
contours spaced 8 feet apart. (slope = 45%)

B. Vegetal treatment - none.

33. Site ST8A

A. Physical treatment.

- 1) wooded terraces (blue area): construct 300 linear feet;
contours spaced 3 feet vertically. (slope = 60%)

B. Vegetal treatment - none.

34. Site ST8B

A. Physical treatment - none.

B. Vegetal treatment.

- 1) wattles (blue area): 220 linear feet 50% Sitka willow,
50% red alder wattles. (slope = 68%)

35. Site ST8C

A. Physical treatment - none.

B. Vegetal treatment.

- 1) wattles (blue area): 128 linear feet coyote brush wattles.
Source of coyote brush: area immediately around Site ST8.
(slope = 58%)

Item #:

36. Site ST9

A. Physical treatment.

- 1) wooded terraces (blue area): construct 170 linear feet; contours spaced 8 feet apart. (slope = 35%)

B. Vegetal treatment - none.

37. Site ST10

A. Physical treatment.

- 1) wooded terraces (blue area): construct 100 linear feet; contours spaced 10 feet apart. (slope = 35%)

B. Vegetal treatment - none.

38. Site ST11

A. Physical treatment.

- 1) wooded terraces (blue area): construct 90 linear feet; contours spaced 8 feet apart. (slope = 35%)

B. Vegetal treatment - none.

39. Water Bars (red flags)

WB 1: clean out existing water bar (23 ft.)

WB 2: new construction (26 ft.)

WB 3: new construction (28 ft.)

WB 4: new construction (21 ft.)

WB 5: clean out existing water bar (56 ft.)

WB 6: clean out existing water bar (28 ft.)

WB 7: new construction (32 ft.)

WB 8: new construction (32 ft.)

WB 9: new construction (15 ft.)

Item #:

39. Water Bars (red flags) (cont'd)

WB 10: clean out existing water bar (20 ft.)
WB 11: new construction (25 ft.)
WB 12: clean out existing water bar (23 ft.)
WB 13: new construction (22 ft.)
WB 14: new construction (10 ft.)
WB 15: new construction (36 ft.)
WB 16: new construction (40 ft.)
WB 17: new construction (15 ft.)
WB 18: new construction (27 ft.)
WB 19: new construction (15 ft.)



Unit: 79-1 Date: 6-14-1979, PP5



Unit: 79-1 Date: 9-20-1979, PP5



Unit: 79-1 Date: 2-6-1980, PP5



Unit: 79-1 Date: 6-14-1979, PP17



Unit: 79-1 Date: 9-20-1979, PP17



Unit: 79-1 Date: 8-3-1982, PP17



Unit: 79-1 Date: 2-8-1980, PP18E



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