

M-2-1-1 Road
Rehabilitation Project

Unit 88-6

Louise E. Johnson

December 1989

TABLE OF CONTENTS

	<u>Page</u>
List of Maps and Tables.....	ii
Introduction.....	1
Rehabilitation Unit Summary.....	2
Location Description	
Geology/Geomorphic Description	
Soil Description	
Logging History	
Erosion Features	
Rehabilitation Work Summary	
Rehabilitation Work.....	4
Evaluation Phase.....	4
Heavy Equipment Phase.....	4
Deep Drain Excavations.....	5
Export Outsloping.....	6
Contour Outsloping.....	6
Cross Road Drains and Ripping.....	7
Other Heavy Equipment Costs.....	7
Labor Intensive Phase.....	7
Documentation Phase.....	7
Discussion.....	7
Appendix (Materials on file at South Operations Center)	
Contract Package and Survey Data	
Photo Points and Descriptions	
Geomorphic Blue Line Maps	

LIST OF MAPS AND TABLES

	<u>Page</u>
Map A: Unit Location Map.....	19
Map B: Topographic Map.....	20
Map C: Logging History Map.....	21
Map D: Rehabilitation Treatment Map.....	22
Table 1: Rehabilitation Work Cost Summary.....	9
Table 2: Summary of Average Cost of Heavy Equipment Rehabilitation Treatments.....	11
Table 3: Deep Drain Excavation Costs.....	12
Table 4: Exported (Blade Endhauling) Outslope Road Excavation Costs.....	13
Table 5: Contour Outslope Road Excavation Costs.....	15
Table 6: Cross Road Drain Costs.....	17
Table 7: Haul Road Ripping Costs.....	17
Table 8: Other Rehabilitation Work Costs for Heavy Equipment.....	18
Abstract of Bids for IFB 8480-88-03.....	23

INTRODUCTION

Public Law 95-250 (March 27, 1978) directed that a rehabilitation program be developed for some 48,000 acres in the Redwood Creek basin of Redwood National Park. Before these lands were added to the park in 1978, timber harvesting and related road construction had adversely influenced erosion rates, sediment deposition, and water quality within the entire basin. It is these problems that are being addressed in the rehabilitation program. The purpose of the rehabilitation program is to minimize man-induced erosion within Redwood National Park and to encourage the return of a natural pattern of vegetation. Ultimately the efforts should result in the restoration of natural ecosystems to a condition similar to what would have existed without disturbance by man. (Redwood National Park, Watershed Rehabilitation Plan, April 1981.)

REHABILITATION UNIT 88-6 SUMMARY

UNIT NAME: M-2-1-1 Road

LOCATION DESCRIPTION: Northeast side of Bridge Creek Ridge
T9N R2E S 17, 20, 21, 28, and 33 on the Bald Hills
7.5 minute topographic series map (Map A, pg 6)

TOTAL UNIT ACREAGE: 285 MILES OF ROAD TREATED: 4.7

TOTAL REHABILITATION PROJECT COST: \$ 62,891.60 (Table 1, pg 4)

GEOLOGIC DESCRIPTION: The area is underlain by Redwood Creek schist unit of Franciscan assemblage (Harden, et al, 1982).

GEOMORPHIC DESCRIPTION: Gentle, upper northeast-facing slopes of Bridge Creek Ridge, with ephemeral stream channels. Elevation range from 1500 feet to 2600 feet. The M-2-1-1 road traverses the hillslope at elevations ranging from 1750 ft. at Bridge Ridge nose to 2200 ft. in Devil's Creek drainage. Slopes are 15-45%. (Map B, pg 7)

SOIL DESCRIPTION: Soils on the M-2-1-1 road are classified by Popenoe (1985) as mostly in the Trailhead series along the gentle, upper northeast-facing side of Bridge Ridge. Devils Creek soils appear along the steeper slopes within the Devils Creek drainage, and some road segments in these areas are beginning to fail.

LOGGING HISTORY: Six tractor-yarded cut block units, logged in 1976 and 1977, totaling 75 acres. The remaining 210 acres is old growth redwood forest. (Map C, pg 8)

EROSION FEATURES: Erosion processes on the upper slopes of Bridge Creek Ridge are minimal. Fluvial processes are the dominant form of erosion which consist of concentrated runoff along skid trails and haul roads which have resulted in gullying and rilling. Mass wasting processes are nonexistent along the uppermost northeast-facing side of Bridge Ridge, though they are present in the Devils Creek drainage along the steeper slopes, where Devils Creek soils are present. (Map D, pg 22)

Rehabilitation Work Summary continued on next page.

Unit 88-6 Summary, continued

REHABILITATION WORK SUMMARY¹(pg 9):

CONTRACT Project

I. Total Heavy Equipment Cost: \$ 52,332.40² (Table 2, pg 11)

Heavy Equipment Used: CAT D8 ripper bulldozer
CAT D8 winch bulldozer
CASE 220 excavator
Twin Parks Contractor (J. Franke & W. Larkin)

#	Types of Treatment	Total Cost ²	Quantity	Unit Cost ²	Rate ³
7	Deep Drain Excavations	\$ 2,850.00	1694 yd ³	\$ 1.68/yd ³	92yd ³ /PH
	2555 ft Export Outslope (dozer)	14,282.40	16185 yd ³	.88/yd ³	133yd ³ /PH
	20522 ft Outslope	24,750.00	35627 yd ³	.69/yd ³	149yd ³ /PH
9	Cross Road Drains	460.00	461 ft.	1.00/ft.	102ft./PH
	Ripping	3,730.00	24964 ft.	.15/ft.	916ft./PH
	Misc. (Table 8)	6,260.00			

II. Total Labor Intensive Costs: \$ 131.20 (Table 1, pg 4)

Labor Intensive Work Summary:

Brushing: none

Straw Mulch: none

Other: One day grading the M-2-1-1 road using the park's front-end loader with G. Sherwood operating.

DISCUSSION¹(pg 18): Complete site restoration by utilizing outsloping where cost effective and applicable, provides a more solidly beneficial foundation morphologically, hydrologically and asthetically for landscape evolution.

¹Detailed in report text.

²Contract Bid total costs and unit costs.

³Rates are based on actual HERE hours; PH=piece hour (volume/each piece/hour).

REHABILITATION WORK

Rehabilitation work focused on restoring the land to a condition similar to what would have existed without disturbance by man. This included complete contour outsloping of the road, resulting in the road fill being shaped to mimic the surrounding natural hillslope topography above and below the road. Complete outsloping provides a more solidly beneficial foundation morphologically, hydrologically and aesthetically for landscape evolution.

Given that the erosion processes on the upper slopes of Bridge Creek Ridge are minimal, the M-2-1-1 road was a perfect road for a complete outslope treatment given the simplicity of the prescription work, and its proximity to a sizeable old growth forest and designation as a future backcountry trail. The completion of this project has provided a considerable data base for outsloping rates and future outsloping cost analysis and comparison work.

Redwood National Park's watershed rehabilitation and erosion control program is divided into four work phases: 1) Evaluation, 2) heavy equipment, 3) labor intensive, and 4) documentation.

Evaluation Phase

The evaluation phase for unit 88-6 included geomorphic and hydrologic field mapping, prescribing rehabilitation and erosion control treatments which were accomplished by using heavy equipment and labor intensive work crews, completing volumetric surveying at all proposed worksites, and preparing the Invitation For Bid contract package. Table 1 shows a detailed cost breakdown for the technical work completed in the evaluation phase.

Mapping for the unit was completed in 1985 by M. Sandeck. Personnel time records are not obtainable, therefore no costs were calculated for mapping. Only the M-2-1-1 road and the 1976 and 1977 logged cut block units were mapped. The remaining 75 percent of the unit acreage is old growth redwood forest.

Prescriptions, surveying and contract preparation work were completed between January 1988 and June 1988, and involved approximately 45 person days to complete. Work was completed by L. Johnson, J. Bartalino, D. Short and J. Wood.

Heavy Equipment Phase

The heavy equipment phase included completion of all primary rehabilitation and erosion control treatments. A total of 4.7 miles of the M-2-1-1 haul road was rehabilitated for a total heavy equipment cost of \$52,332.40. A total of 53,500 cubic yards of material was excavated from 3.9 miles of outsloping (35,627 cubic yards), 0.5 mile of export outsloping (16,185 cubic yards), and seven deep drains (1,694 cubic yards).

The heavy equipment phase of the rehabilitation work on unit 88-6 was done under a fixed price contract (#8480-8-0001). Listed below is a summary of the bids which were received: (continued next page)

Twin Parks Lumber Company	\$ 51,850.00
W. K. Construction	97,875.00
Carl M. Kjer and Sons	148,033.66
Patrick Environmental	190,437.00

The contract was awarded to the low bidder, Twin Parks Lumber Company, on May 11, 1988, and the heavy equipment work began on July 2, 1988 and ended on July 28, 1988. Heavy equipment used by the contractor consisted of a Caterpillar D8H bulldozer with rippers (operated by Wendell Larkin), a CASE 220B hydraulic excavator with a 3 cubic yard bucket (operated by Wendell Larkin), and a Caterpillar D8H bulldozer with a winch (operated by Jay Franke). The winch dozer and excavator worked together as a team, while the ripper dozer was used only to rip the road and provide back up when the winch dozer broke down.

Each bid item (worksite) was written as a Lump Sum Bid on the Bid Schedule, and bids were based on surveyed volumes and linear measurements for each item. Each bid item was paid in full upon completion to specifications of all portions of each bid item and per the Contracting Officer's Representative's (C.O.R.= L. Johnson) final approval of the work. Therefore, the final cost of the contract was the same as the initial bid, \$51,850.00, plus one additional change order totaling \$482.40, thus the contract total cost was \$52,332.40. Redwood National Park's cost estimate for completion of this contract was \$50,950.00. The actual Heavy Equipment Rental Equivalent (HERE) total cost was \$51,706.25.

Table 2 shows average and total costs for the rehabilitation and erosion control work, along with estimates of what it would have cost to do the same work by hourly equipment rental. Heavy Equipment Rental Equivalent (HERE) costs were calculated using actual equipment hours worked, and an average hourly rental price for each specific piece of equipment (based on its size category) from the hourly equipment rental list for 1988:

Caterpillar D8H ripper bulldozer	\$ 95.00 per hour
Caterpillar D8H winch bulldozer	90.00 per hour
CASE 220B excavator	120.00 per hour

The next sections will cover heavy equipment techniques and cost effectiveness for each type of rehabilitation treatment completed on unit 88-6 (e.g., deep drain excavations, export outsloping, contour outsloping, cross road drains and ripping). Tables 3 through 8 show HERE costs, rates and averages for each worksite completed on unit 88-6. The worksite locations for each rehabilitation treatment are shown on Map D.

Deep Drain Excavations

Seven deep drain (miniature haul road stream crossing) excavations were completed on unit 88-6. Table 3 shows the HERE total cost, unit cost and rate for each deep drain excavation. A deep drain is simply a miniature version of a stream crossing excavation that occurs where a haul road crosses a stream channel. These small haul road stream crossings (which average 100-400 cubic yards in size) were excavated to prevent erosion caused by culvert failure and possible gullyng of the road fill. Excavations were designed so that the finished product closely mimics the original (pre-road construction) stream channel and side bank configuration. Fill from these excavations was pushed on average 260

feet to and blended with an adjacent contour outslope road reach.

The heavy equipment excavation technique used by the contractor was no different from established cost effective and efficient methods used on past rehabilitation projects. At each crossing, up to 90 percent of the road fill was excavated by the D8 winch bulldozer, then the final stream channel and lower side bank grades were completed by the excavator.

Export Outsloping

One half mile of export outsloping was completed on unit 88-6. Table 4 shows the HERE total cost, unit cost and rates for each export outslope road reach. Two variations of export outsloping were prescribed and completed on unit 88-6: Swale and deck export outsloping. In all cases the excavated fill was blade endhauled from 100 to 250 feet to a fillsite.

In locations where the haul road crossed swales and/or seepy areas, the entire road bench was removed, and the fill was blended with an adjacent contour outslope road reach = a swale export outslope. This entire bench excavation provides for better drainage across these seepy areas and removes the chances for road fill failures that occur along seepy/swaley road reaches which can impact downstream resources. The heavy equipment excavation methods were the same as those used for deep drain excavations.

The second type of export outslope was prescribed and completed at log decks along the M-2-1-1 haul road. At these locations only the outboard edge fill material was excavated = deck export outslope. The fill material was pushed 50-100 feet to the inboard bench of each deck, and then shaped into the cutbanks and also used to fill upslope skid trail throughcuts coming down to the log deck. The final product closely mimics the surrounding natural hillslope topography above and below the road, thus reestablishing natural hillslope drainage patterns. The excavator was used to excavate 60-80 percent of the outboard edge fill volume, while the bulldozer pushed and contoured the fill into the inboard bench cutbank area.

Contour Outsloping

Almost four miles of the M-2-1-1 haul road was contour outsloped. Table 5 shows the HERE total cost, unit cost and rates for each contour outslope road reach. Contour outslope is a complete outslope of the road, where fill from the outer edge of the road was placed against and filled close to or to the top of the cutbank. The finished slope (grade) was shaped to mimic the surrounding natural hillslope topography above and below the road. As stated earlier, complete outsloping provides a more solidly beneficial foundation morphologically, hydrologically and aesthetically for landscape evolution.

The heavy equipment outsloping method implemented by the contractor was extremely efficient and cost effective. The excavator was used to "rough out" the outsloping by excavating all of the outboard edge material and placing this fill on the inboard road bench. Then the D8 winch bulldozer shaped, pushed and blended these fill piles into the cutbank undulations thus contouring the road outsloping fill to mimic the surrounding natural terrain.

Cross Road Drains and Ripping

Nine cross road drains were installed on the M-2-1-1 haul road, and the HERE total cost, unit cost and rates for each cross road drain worksite is shown in Table 6. The drains were installed with the excavator and the dozer spread the fill spoils down the road.

The entire 4.7 miles of the M-2-1-1 haul road was ripped, and the HERE total cost, unit cost and rate for this treatment is shown in Table 7.

Other Heavy Equipment Rehabilitation Costs

Other heavy equipment rehabilitation costs are shown in Table 8, and include HERE total costs for breaks, moving support equipment, and paid down time; plus the contract bid total cost for equipment move in and out and contractor record keeping.

Labor Intensive Phase

The labor intensive rehabilitation and erosion control work usually includes all secondary treatments for surface erosion which comprises the application of straw mulch to critical areas on finished rehabilitation worksites. Straw mulch was not applied on unit 88-6 for several reasons. Over 75 percent of the road is surrounded by an old growth forest canopy and the entire road was completely outslowed with gentle finished grades (10-35%). Surface erosion is anticipated to be minimal and revegetation should be excellent, therefore the application of straw was not a critical factor. Also the estimated cost to straw some 25-30 acres of disturbed ground would have cost approximately 40 percent of the total money spent on the heavy equipment rehabilitation work.

The only labor intensive work completed on the unit was one days work with the park's front-end loader which "graded" the M-2-1-1 road and removed some slide debris from a section of the M-2-1-1 in the Devils Creek drainage, costing \$131.20 (operator wages only).

Documentation Phase

The final rehabilitation phase is the documentation process which included post heavy equipment excavation volumetric surveys where needed, all photo point documentation work (pre and post heavy equipment worksite photos), cost data compilation and the watershed rehabilitation project report. Work was done by L. Johnson, D. Short, K. Griffin, and M. Kenning, and completed by January 1989.

DISCUSSION

The quality and cost effectiveness of the rehabilitation work completed on unit 88-6 by the contractor was excellent. The combination and size of heavy equipment and rehabilitation techniques implemented worked great.

The M-2-1-1 road was a perfect project for a complete outslope treatment given

its proximity to a sizeable old growth forest and designation as a future backcountry trail. The completion of this project has provided a considerable data base for outskloping rates and for future outskloping cost analysis and comparison work. Each year outskloping costs go down and production rates go up due to more efficient methods making it a more cost effective rehabilitaion treatment. And no one can dispute the fact that outskloping is the most beneficial treatment to restore the ecosystems in the park to a condition similar to what would have existed without disturbance by man (which is the Congressional mandate set forth in Public Law 95-250).

Table 1

REHABILITATION WORK COST SUMMARY
Unit 88-6: M-2-1-1 Road

Treatment	Worksite Quantity	Total Cost	Average Unit Cost Per Quantity
HEAVY EQUIPMENT WORK:			
<u>Primary Treatments</u>		Contract Bid Costs ¹	
Contour Outsloping	35,627 yd ³	\$24,750.00	\$.69/yd ³
Export Outsloping	16,185 yd ³	14,282.40	.88/yd ³
Deep Drains	1,694 yd ³	2,850.00	1.68/yd ³
Cross Road Drains	461 ft.	460.00	1.00/ft of drain
Ripping	24,964 ft.	3,730.00	.15/ft of road
<u>Miscellaneous</u> (see Table 8)		<u>6,260.00</u>	--
Total Heavy Equipment Cost =		\$52,332.40	

LABOR INTENSIVE WORK²:		\$ 131.20	

TECHNICAL WORK:			
<u>Evaluation</u>			
Mapping ³		\$ 0.00	
Prescriptions		1,812.00	
Surveying		1,727.00	
Contract Preparation		2,081.00	
<u>Supervision of Work</u>			
Heavy Equipment (COR)		2,391.00	
<u>Documentation</u>			
Photo Points		702.00	
Cost Analysis and Report		<u>1,715.00</u>	
Total Technical Work Cost =		\$ 10,428.00	

GRAND TOTAL COST =		<u>\$ 62,891.60</u>	

Footnotes on page 2 of Table 1.

Table 1, page 2

REHABILITATION WORK COST SUMMARY
Unit 88-6: M-2-1-1 Road

FOOTNOTES

- ¹ Table 2 shows a comparison between the contract bid costs and the actual hourly costs (HERE) and unit costs.
- ² Labor intensive work cost is for one day of grading the M-2-1-1 road with a Redwood National Park operator using the park's loader. Straw mulch was not used on unit 88-6; reasons for not using straw are explained in the text.
- ³ Mapping for the unit was completed in 1985, and personnel time records are not obtainable, therefore no costs were calculated.

Table 2

SUMMARY OF AVERAGE COSTS OF HEAVY EQUIPMENT REHABILITATION TREATMENTS
Unit 88-6: M-2-1-1 Road

Treatment	Number of Worksites (Bid Items)	TOTALS			AVERAGES		
		Total Quantity	Contract Total Cost	HERE ¹ Total Cost	Government Savings(+) or Losses(-)	HERE ¹ Cost Per Quantity	Ave. Bid Cost Per Quantity
Contour Outsloping	28	35,627 yd ³	\$24,750.00	\$25,427.50	\$ + 677.50	\$.71/yd ³	\$.69/yd ³
Export Outsloping	19	16,185 yd ³	14,282.40	12,582.50	-1,699.90	.77/yd ³	.88/yd ³
Deep Drains	7	1,694 yd ³	2,850.00	1,917.50	- 932.50	1.13/yd ³	1.68/yd ³
Cross Road Drains	2	461 ft.	460.00	465.00	+ 5.00	1.01/ft. of drain	1.00/ft. of drain
Ripping	1	24,964 ft.	3,730.00	2,588.75	-1,141.25	.10/ft. of road	.15/ft. of road
Miscellaneous (Bid Items 1,2,4,5)	--	see Table 8	6,260.00	8,725.00	+2,465.00	--	--
TOTALS =	--	--	\$52,332.40	\$51,706.25	\$ -626.15	--	--

¹ HERE - Heavy Equipment Rental Equivalent - actual hours spent for each task; using hourly rental rates of \$90.00/hour for a D8 winch bulldozer, \$95.00/hour for a D8 ripper bulldozer, and \$120.00/hour for a CASE 220B excavator.

Table 3

DEEP DRAIN (DD) EXCAVATION COSTS
Unit 88-6: M-2-1-1 Road

Worksite	Equipment Hours		HERE ¹ Total Cost	Volume Cubic Yards	Unit Cost Per Cubic Yard	Rate: Cubic Yards Per Hour	Ave. Push Dist. to ³ Fill site (ft)
	D8W	D8R					
105+27	0.50	0.75	\$ 325.00	196	\$1.66	60	150
109+18	0.50	0.75	135.00	178	.76	142	150
121+00	0.50	1.25	242.50	161	1.51	72	300
127+15	0.25	2.50	370.00	273	1.36	84	400
138+10	--	0.50	321.25	396	.81	122	200
207+54	0.25	1.50	226.25	141	1.60	71	350
221+55	2.25	--	297.50	349	.85	107	250
TOTALS	4.25	7.25	\$1,917.50²	1,694	\$1.13 (ave.)	92 (ave.)	260 (ave.)
Total Equipment Hours = 18.5							

¹ HERE rates are D8W \$90.00/hour, 220 Excavator \$120.00/hour, and D8R \$95.00/hour.

² Contract bid total for Deep Drains was \$2,850.00 with an average unit cost of \$1.68/yd³.

³ Pushes were along a relatively level road grade.

Table 4

EXPORTED (BLADE ENDHAULED) OUTSLOPE (EOS) ROAD EXCAVATION COSTS
Unit 88-6: M-2-1-1 Road

Worksite ³	Equipment Hours		HERE ¹ Total Cost	Quantity: Cubic Yards	Unit Cost Per Cubic Yard	Rate: Cubic Yards Per Hour	Ave. Push Distance to Fillsite (feet)	Linear Feet of Road	Cubic Yards/ Foot of Road
	D8W	220							
6+65 DK	5.50	1.00	\$ 615.00	1,190	\$.52	183	100	201	5.9
37+67 DK	3.00	2.00	510.00	622	.82	124	100	133	4.7
81+69 SW	0.50	1.00	165.00	343	.48	229	150	41	8.4
93+12 DK	5.75	4.50	1,556.25	2,212	.70	143	100	218	10.4
101+79 SW	--	.25	220.00	181	1.22	80	200	41	4.4
115+85 SW	0.50	0.75	135.00	310	.44	248	150	56	5.5
132+74 SW	0.75	1.75	372.50	518	.72	148	250	126	4.1
142+47 DK	4.50	1.75	923.75	1,373	.67	145	100	183	7.5
150+42 SW	--	0.50	155.00	181	.86	121	150	28	6.5
152+66 DK	3.00	2.50	760.00	397	1.91	53	100	112	3.5
169+80 DK	0.75	2.50	367.50	443	.83	136	100	135	2.8
180+64 DK	0.50	4.75	757.50	1,224	.62	181	100	236	5.2
183+61 SW	3.50	--	338.75	500	.68	133	200	100	5.0
190+25 DK	1.50	1.00	540.00	996	.54	181	100	195	5.1
197+85 SW	0.50	0.75	135.00	205	.66	164	250	51	4.0
203+90 DK	5.75	6.00	1,237.50	1,690	.73	144	100	177	9.6
212+55 DK	4.25	7.00	1,222.50	1,043	1.17	93	100	219	4.8
235+58 DK	4.00	5.75	1,050.00	1,454	.72	149	100	121	7.8
247+28 SW	4.75	5.75	1,521.25	1,303	1.17	88	225	182	7.2
TOTALS	49.00	49.50	\$12,582.50 ²	16,185	\$.77 (ave.)	133 (ave.)	140 (ave.)	2,555 (.5 mile)	6.2 (ave.)

Total Equipment
Hours = 122

Footnotes on page 2 of Table 4.

Table 4, page 2

EXPORTED (BLADE ENDHAULED) OUTSLOPE (EOS) ROAD EXCAVATION COSTS
Unit 88-6: M-2-1-1 Road

FOOTNOTES

¹ HERE rates are D8W \$90.00/hour, 220 Excavator \$120.00/hour, and D8R \$95.00/hour.

² Contract bid total for Export Outsloping was \$13,800.00 with an average unit cost of \$.88/yd³.

³ Export Outslope Worksites:

			Ave:	Ave:	
11 Decks (DK)	92.25 hours	\$9,540.00	12,644 yd ³	\$.75/yd ³	137 yd ³ /hr Local bench fillsites
8 Swales (SW)	29.75 hours	3,042.50	3,541 yd ³	.86/yd ³	119 yd ³ /hr Push distances of 150-250 feet.

Table 5
CONTOUR OUTSLOPE (COS) ROAD EXCAVATION COSTS
Unit 88-6: M-2-1-1 Road

Worksite	Equipment Hours		HERE ¹ Total Cost	Quantity: Cubic Yards	Unit Cost Per Cubic Yard	Rate: Cubic Yards Per Hour	Linear ³ Feet of Road	Cubic Yards per Foot of Road
	D8W	220						
0+53	2.00	1.00	\$ 300.00	537	\$.56	179	612	0.9
9+00	10.50	16.00	2,865.00	3,544	.81	134	2,867	1.2
39+00	--	7.00	840.00	1,140	.74	163	750	1.5
51+43	3.00	2.50	570.00	632	.90	115	732	0.9
64+96	9.00	8.75	1,860.00	2,291	.81	129	1,673	1.4
82+10	8.00	7.25	1,590.00	1,963	.81	129	1,102	1.8
95+30	1.75	4.00	637.50	1,063	.60	185	649	1.6
102+20	1.00	0.50	150.00	253	.59	169	269	0.9
105+72	1.25	3.00	472.50	616	.77	145	306	2.0
109+59	2.50	3.75	675.00	1,023	.66	164	626	1.6
116+41	1.50	3.00	495.00	547	.90	122	416	1.3
121+18	0.50	--	140.00	167	.84	111	149	1.1
124+00	1.00	1.00	305.00	369	.83	123	290	1.3
127+57	2.25	3.25	592.50	580	1.02	105	517	1.1
134+00	1.75	2.00	397.50	579	.69	154	375	1.5
138+46	2.25	3.75	652.50	895	.73	149	401	2.2
144+30	3.50	2.75	645.00	625	1.03	100	612	1.0
150+70	1.00	1.75	300.00	272	1.10	99	196	1.4
153+78	9.00	3.50	1,776.25	2,583	.69	142	1,602	1.6
171+15	5.00	5.00	1,050.00	1,782	.59	178	949	1.9
184+00	4.00	4.00	840.00	1,219	.69	152	625	2.0
192+20	3.75	3.00	697.50	1,193	.58	177	565	2.1
198+36	3.00	4.25	780.00	1,339	.58	185	554	2.4
205+33	1.00	0.75	203.75	364	.56	182	167	2.2
207+78	3.00	4.00	750.00	936	.80	134	477	2.0
214+74	3.25	5.50	952.50	1,104	.86	126	652	1.7
222+18	7.75	9.50	1,837.50	3,300	.56	191	1,340	2.5
236+79	11.25	17.00	3,052.50	4,711	.65	167	1,049	4.5
TOTALS	103.75	127.75	8.00 \$25,427.50²	35,627	\$.71 (ave.)	149 (ave.)	20,522 feet (3.9 miles)	1.7 (ave.)

Footnotes on page 2 of Table 5.

Table 5, page 2

CONTOUR OUTSLOPE (COS) ROAD EXCAVATION COSTS
Unit 88-6: M-2-1-1 Road

FOOTNOTES

- 1 HERE rates are D8W \$90.00/hour, 220 Excavator \$120.00/hour, and D8R \$95.00/hour.
- 2 Contract bid total for Contour Outsloping was \$24,750.00 with an average unit cost of \$.69/yd³.
- 3 Average 30-foot wide road with an average 8-foot cut depth overall.

Table 6

CROSS ROAD DRAIN (XRD) COSTS

Unit 88-6: M-2-1-1 Road

Worksite	Equipment Hours		HERE ¹	Quantity:	Cost Per	Rate: Ft.
	D8W	220	Total Cost	No. of Drains/ Ft. of Drain	Foot of Drain	or Drain Per Hour
46+50	1.50	1.00	\$255.00	5/237	\$1.08	95
58+75	1.00	1.00	210.00	4/224	.94	112
TOTALS =	2.50	2.00	<u>\$465.00</u> ²	9/461	\$1.01 (ave.)	102 (ave.)

¹HERE rates are D8W \$90.00/hour and 220 excavator \$120.00/hour.

²Contract bid for cross road drains was \$460.00 with an average unit cost of \$1.00/foot of drain.

Table 7

HAUL ROAD RIPPING COSTS

Unit 88-6: M-2-1-1 Road

Equipment Hours:	HERE ¹	Linear Feet	Cost Per	Rate:
D8 Ripper	Total Cost	of Road	Linear Foot	Linear Feet Per Hour
27.25	<u>\$2,588.75</u> ²	24,964	\$.10	916

¹HERE rate is \$95.00/hour for a D8 Ripper bulldozer.

²Contract bid for ripping was \$3,730.00 with an average unit cost of \$.15 per linear foot of road.

Table 8

OTHER REHABILITATION WORK COSTS FOR HEAVY EQUIPMENT
Unit 88-6: M-2-1-1 Road

Category	Equipment Hours			HERE ¹ Total Cost
	D8W	220	D8R	
Paid Breaks	16.00	18.00	--	\$3,600.00
Moving Support Equipment ²	4.00	6.00	--	1,080.00
Paid Down Time (first half hour)	0.50	2.00	--	285.00
Down Time Not Paid	[19.50]	[16.00]	--	0.00
Standby due to Down Time (not Paid)	[12.00]	--	--	0.00
TOTALS =	20.50	26.00	--	\$4,965.00³
<u>PLUS:</u>				
Move In and Out	--	--	--	3,660.00
Record Keeping	--	--	--	<u>100.00</u>
				\$3,760.00⁴
GRAND TOTAL =				<u>\$8,725.00</u>

¹ HERE rates are D8W \$90.00/hour, 220 excavator \$120.00/hour, D8R \$95.00/hour.

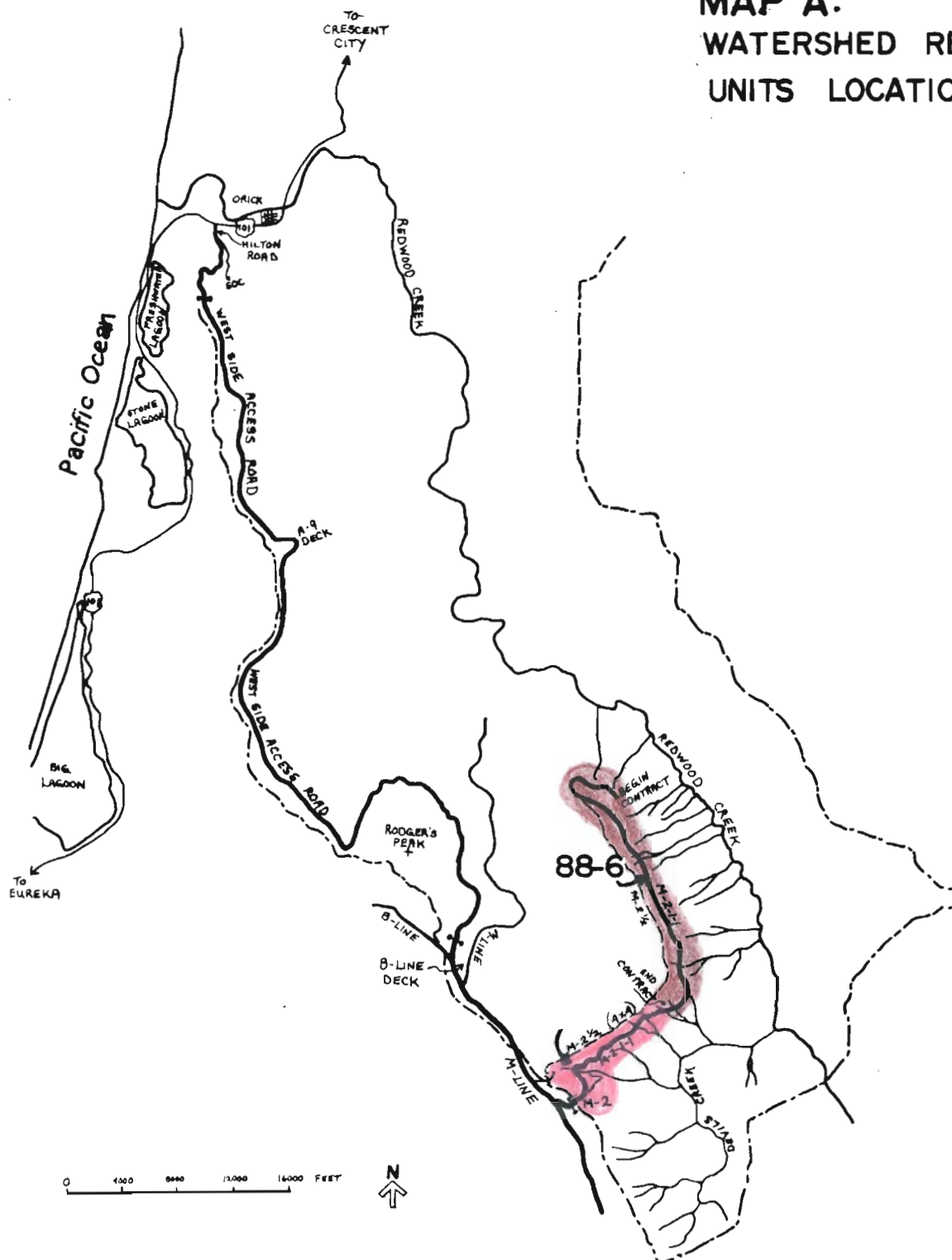
² Moving support equipment included fuel trailers, compressor, welder, pickup trucks, etc.

³ Contract bid for miscellaneous costs was \$2,500.00.

⁴ This cost is the contract bid amount for these bid items.

UNITS 88-6
M-2-I-I and M-2-I ROADS and SLOPES
REDWOOD CREEK, REDWOOD NATIONAL PARK

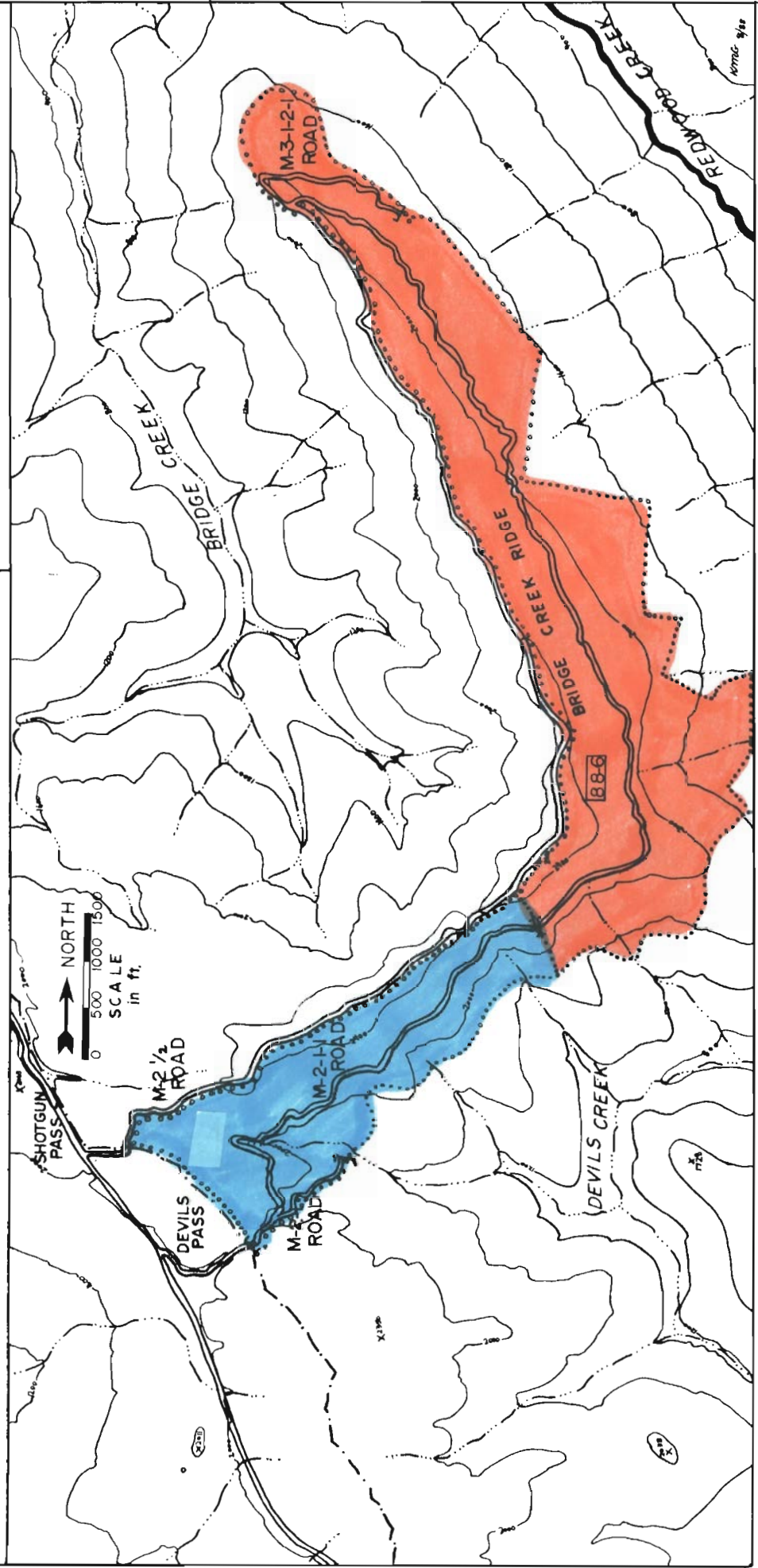
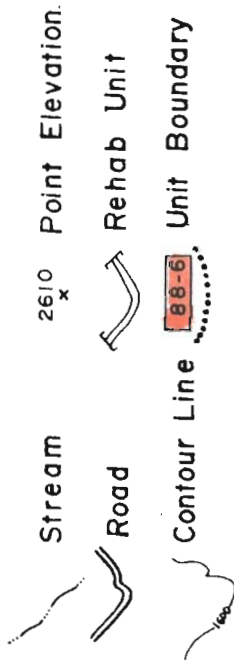
MAP A:
WATERSHED REHABILITATION
UNITS LOCATION MAP



BRIDGE RIDGE ROADS
SITES 88-6

MAP B: TOPOGRAPHIC MAP

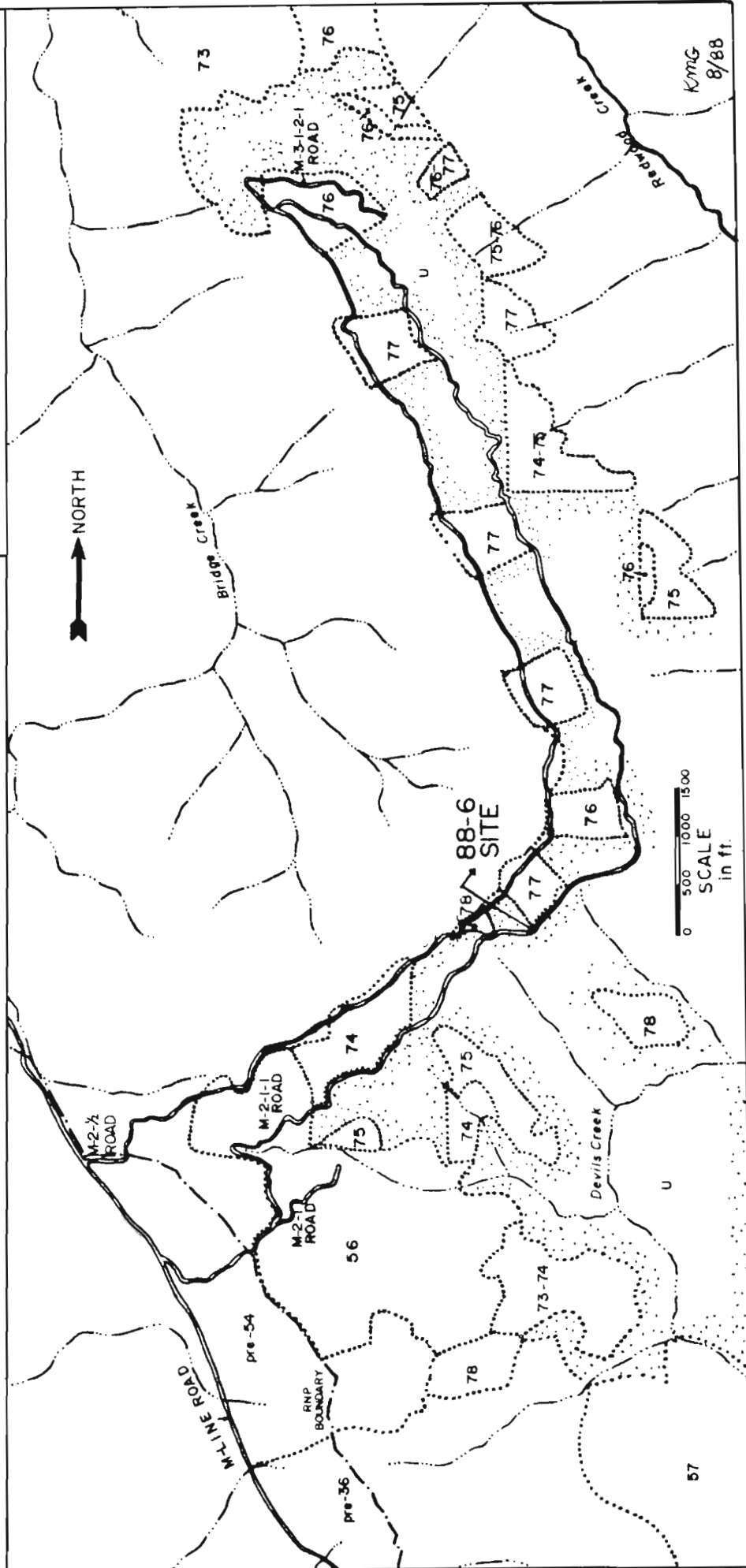
LEGEND



MAP C: BRIDGE RIDGE ROADS SITE 88-6

LOGGING HISTORY MAP

LEGEND



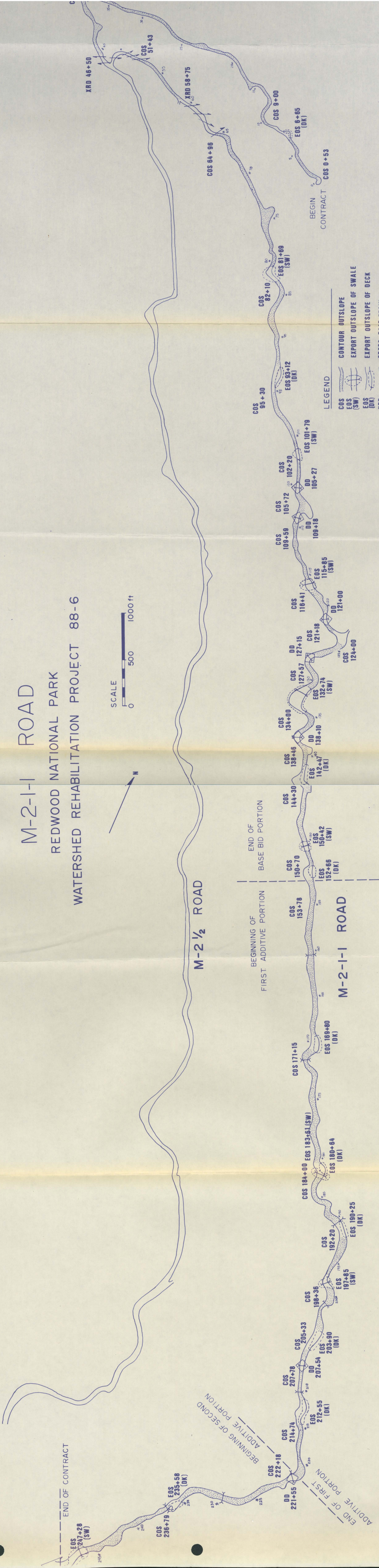
MAP D: REHABILITATION

TREATMENT MAP

M-2-I-1 ROAD

REDWOOD NATIONAL PARK

WATERSHED REHABILITATION PROJECT 88-6



BEGIN CONTRACT

CONTRACT

LEGEND

COS

EOS (SW)

EOS (OK)

XRD

DD

CONTOUR OUTSLOPE

EXPORT OUTSLOPE OF SWALE

EXPORT OUTSLOPE OF DECK

CROSS ROAD DRAIN

STATION NUMBER (IN HUNDREDS OF FEET)

DEEP DRAIN

2. DATE ISSUED	3. DATE OPENED	PAGE OF
April 4, 1988	May 5, 1988	1 5

DATE SIGNED _____

5. PROJECT TITLE	6. OFFICE

8. GOVERNMENT ESTIMATE (Check A, B or C and complete D, E and F.)	
A. OFFER	NO. 1
A. OFFER	NO. 2

A. HIRED LABOR	P. O. Box 187	P. O. Drawer 1091

B. REASONABLE CONTRACT (Without Profit)	B. BID SECURITY (Type and amount)	B. BID SECURITY (Type and Amount)
--	-----------------------------------	-----------------------------------

C. REASONABLE CONTRACT (Including Profit)	C. ADDENDA ACKNOWLEDGED	C. ADDENDA ACKNOWLEDGED
--	-------------------------	-------------------------

C. ADDENDA ACKNOWLEDGED	C. ADDENDA ACKNOWLEDGED
-------------------------	-------------------------

D. UNIT PRICE	E. UNIT PRICE	F. ESTIMATED AMOUNT	D. UNIT PRICE	E. ESTIMATED AMOUNT	D. UNIT PRICE	E. ESTIMATED AMOUNT
---------------	---------------	---------------------	---------------	---------------------	---------------	---------------------

ST	\$ 1 500 00	\$ 2 000 00	\$ 1 250 00

15	1 500 00	2 000 00	1 250 00
----	----------	----------	----------

LS	2.300.00	2.175.00	2.143.68
----	----------	----------	----------

LS	1,000.00	975.00	960.96
----	----------	--------	--------

LS	450.00	375.00	369.60
----	--------	--------	--------

LS	100.00	75.00	50.00
----	--------	-------	-------

LS	2,500.00	300.00	1,000.00
----	----------	--------	----------

LS	350.00	924.00	1,417.68
----	--------	--------	----------

LS	1,175.00	1,892.00	3,141.60
----	----------	----------	----------

LS	2.300.00	6.096.00	9.356.16
----	----------	----------	----------

LS	625.00	989.00	1,642.08
----	--------	--------	----------

LS	750.00	1,961.00	3,009.60
LS			

LS	200.00	377.00	246.68
LS	200.00		

LS	425.00	1,087.00	1,668.48
----	--------	----------	----------

NSN 7540-01-150-0981

1419-101

STANDARD FORM 1419 (10-83)
Prescribed by GSA
FAR (48 CFR) 53.236-1(c)

9. OFFERS (Continued)

STANDARD FORM 1419 BACK (10-83)

ABSTRACT OF OFFERS - CONSTRUCTION			1. SOLICITATION NUMBER IFB 8480-88-03		2. DATE ISSUED April 4, 1988		3. DATE OPENED May 5, 1988		PAGE OF 2 5 PAGES	
4. ISSUING OFFICE National Park Service Redwood National Park 1111 Second Street Crescent City, California 95531			I CERTIFY that I have opened, read, and recorded on this abstract all offers received in response to this solicitation.							
5. PROJECT TITLE Erosion control/watershed rehabilitation of M-2-1-1 Road			8. GOVERNMENT ESTIMATE (Check A, B or C and complete D, E and F.)		NO. 1		NO. 2		9. OFFERS	
			A. HIRED LABOR		A. OFFEROR K. Construction P. O. Box 187 Miranda, CA 95553		A. OFFEROR Carl M. Kjer & Sons P O Drawer 1091 Arcata, CA. 95521			
			B. REASONABLE CONTRACT (Without Profit)		B. BID SECURITY (Type and amount)		B. BID SECURITY (Type and amount)		DATE SIGNED	
			C. REASONABLE CONTRACT (Including Profit)		C. ADDENDA ACKNOWLEDGED		C. ADDENDA ACKNOWLEDGED			
7A. ITEM NO.	7B. DESCRIPTION OF OFFERED ITEM	7C. EST. QUANTITY	D. UNIT	E. UNIT PRICE	F. ESTIMATED AMOUNT	D. UNIT PRICE	E. ESTIMATED AMOUNT	D. UNIT PRICE	E. ESTIMATED AMOUNT	
13.	58+75 - 64+96 XRD	224ft.	LS		\$ 200.00		\$ 356.00		\$ 219.70	
14.	64+96 - 81+69 COS	2,291cy	LS		1,500.00		3,941.00		6,048.24	
15.	81+69 - 82+10 EOS	343cy	LS		350.00		545.00		905.52	
16.	82+10 - 93+12 COS	1,963cy	LS		1,275.00		3,376.00		5,182.32	
17.	93+12 - 95+30 EOS	2,212cy	LS		2,200.00		3,517.00		5,839.68	
18.	95+30 - 101+79 COS	1,063cy	LS		700.00		1,828.00		2,806.32	
19.	101+79 - 102+20 EOS	181cy	LS		200.00		288.00		477.84	
20.	102+20 - 104+89 COS	253cy	LS		175.00		435.00		667.92	
21.	105+27 DO	196cy	LS		225.00		304.00		517.44	
22.	105+72 - 108+78 COS	616cy	LS		400.00		1,060.00		1,626.24	
23.	109+18 DO	178cy	LS		200.00		276.00		469.92	
24.	109+59 - 115+85 COS	1,023cy	LS		675.00		1,760.00		2,700.72	
25.	115+85 - 116+41 EOS	310cy	LS		325.00		493.00		818.40	
26.	116+41 - 120+57 COS	547cy	LS		350.00		941.00		1,444.08	

9. OFFERS (continued)

	NO. 3	NO. 4	NO. 5	NO. 6	NO. 7
A. OFFEROR Twin Parks Lumber Co. P.O. Box 1192 Arcata, CA. 95521	A. OFFEROR Patrick Environmental 1600 North 28th Springfield, OR. 97478	A. OFFEROR	A. OFFEROR	A. OFFEROR	A. OFFEROR
B. BID SECURITY (Type and Amount)	B. BID SECURITY (Type and Amount)	B. BID SECURITY (Type and Amount)	B. BID SECURITY (Type and Amount)	B. BID SECURITY (Type and Amount)	B. BID SECURITY (Type and Amount)
C. ADDENDA ACKNOWLEDGED	C. ADDENDA ACKNOWLEDGED	C. ADDENDA ACKNOWLEDGED	C. ADDENDA ACKNOWLEDGED	C. ADDENDA ACKNOWLEDGED	C. ADDENDA ACKNOWLEDGED
D. UNIT PRICE	E. ESTIMATED AMOUNT	D. UNIT PRICE	E. ESTIMATED AMOUNT	D. UNIT PRICE	E. ESTIMATED AMOUNT
13.	\$ 230.00	\$ 2,450.00			
14.	1,500.00	6,886.00			
15.	300.00	1,252.00			
16.	1,000.00	5,008.00			
17.	1,500.00	6,573.00			
18.	700.00	3,130.00			
19.	100.00	939.00			
20.	300.00	939.00			
21.	200.00	1,252.00			
22.	300.00	1,920.00			
23.	300.00	1,272.00			
24.	1,000.00	2,504.00			
25.	300.00	1,280.00			
26.	400.00	1,878.00			

ABSTRACT OF OFFERS - CONSTRUCTION

1. SOLICITATION NUMBER
IFB 8480-88-03

2. DATE ISSUED
April 4, 1988

3. DATE OPENED
May 5, 1988

PAGE OF
3 | 5 PAGES

4. ISSUING OFFICE

National Park Service
Redwood National Park Service
1111 Second Street
Crescent City, California 95531

5. PROJECT TITLE

Erosion control/watershed rehabilitation
of M-2-1-1 Road

I CERTIFY that I have opened, read, and recorded on this abstract all
offers received in response to this solicitation.

SIGNATURE

DATE SIGNED

9. OFFERS

NO. 1
OFFEROR
WR Construction
P O Box 187
Miranda, CA. 95553
B. BID SECURITY (Type and amount)
A. OFFEROR
Earl M. Kjer & Sons
P O Drawer 1891
Arcata, CA. 95521
B. BID SECURITY (Type and Amount)

NO. 2
OFFEROR
Earl M. Kjer & Sons
P O Drawer 1891
Arcata, CA. 95521
B. BID SECURITY (Type and Amount)

6. NUMBER OF ADDENDA ISSUED

C. ADDENDA ACKNOWLEDGED

C. ADDENDA ACKNOWLEDGED

7A. ITEM NO.	7B. DESCRIPTION OF OFFERED ITEM	7C. EST. QUANTITY	D. UNIT	8. GOVERNMENT ESTIMATE (Check A, B or C and complete D, E and F.)			F. ESTIMATED AMOUNT	D. UNIT PRICE	E. ESTIMATED AMOUNT	D. UNIT PRICE	E. ESTIMATED AMOUNT
				A. HIRED LABOR	B. REASONABLE CONTRACT (Without Profit)	C. REASONABLE CONTRACT (Including Profit)					
27.	121+00 DD	161cy	LS				\$ 200.00		\$ 250.00		425.04
28.	121+18 - 122+67 COS	167cy	LS				125.00		287.00		440.88
29.	124+00 - 126+90 COS	369cy	LS				250.00		635.00		974.16
30.	127+15 DD	273cy	LS				300.00		423.00		720.72
31.	127+57 - 132+74 COS	580cy	LS				375.00		998.00		1,531.20
32.	132+74 - 134+00 EOS	518cy	LS				525.00		824.00		1,367.52
33.	134+00 - 137+75 COS	579cy	LS				375.00		996.00		1,528.56
34.	138+10 DD	396cy	LS				450.00		614.00		1,045.44
35.	138+46 - 142+47 COS	895cy	LS				600.00		1,539.00		2,362.80
36.	142+47 - 144+30 EOS	1,373cy	LS				1,375.00		2,183.00		3,624.72
37.	144+30 - 150+42 COS	625cy	LS				425.00		1,075.00		1,650.00
38.	150+42 - 150+70 EOS	181cy	LS				200.00		288.00		477.84
39.	150+70 - 152+66 COS	272cy	LS				175.00		468.00		718.08
40.	152+66 - 153+78 EOS	397cy	LS				400.00		631.00		1,048.08

9. OFFERS (Continued)

NO. 3		NO. 4		NO. 5		NO. 6		NO. 7	
A. OFFEROR		A. OFFEROR		A. OFFEROR		A. OFFEROR		A. OFFEROR	
Twin Parks Lumber Co. P O Box 1192 Arcata, CA 95521		Patrick Environmental 1600 28th Springfield, OR 97478							
B. BID SECURITY (Type and Amount)		B. BID SECURITY (Type and Amount)		B. BID SECURITY (Type and Amount)		B. BID SECURITY (Type and Amount)		B. BID SECURITY (Type and Amount)	
C. ADDENDA ACKNOWLEDGED		C. ADDENDA ACKNOWLEDGED		C. ADDENDA ACKNOWLEDGED		C. ADDENDA ACKNOWLEDGED		C. ADDENDA ACKNOWLEDGED	
D. UNIT PRICE	E. ESTIMATED AMOUNT	D. UNIT PRICE	E. ESTIMATED AMOUNT	D. UNIT PRICE	E. ESTIMATED AMOUNT	D. UNIT PRICE	E. ESTIMATED AMOUNT	D. UNIT PRICE	E. ESTIMATED AMOUNT
7.	\$ 50.00		\$ 1,252.00						
8.	50.00		640.00						
9.	200.00		960.00						
0.	100.00		1,878.00						
1.	400.00		1,908.00						
2.	400.00		1,870.00						
3.	400.00		2,028.00						
4.	300.00		1,890.00						
5.	500.00		2,520.00						
6.	500.00		4,382.00						
7.	200.00		1,890.00						
8.	50.00		960.00						
9.	100.00		939.00						
0.	50.00		1,288.00						
SUBTOTAL									
SCHEDULE #1 \$ 30,450.00		\$107,843.00							

1. SOLICITATION NUMBER			2. DATE ISSUED		3. DATE OPENED		PAGE OF	
IFB 8480-88-03			April 4, 1988		May 5, 1988		4 5 PAGES	
4. ISSUING OFFICE			National Park Service Redwood National Park Service 1111 Second Street Crescent City, California 95531					
5. PROJECT TITLE			Erosion control/watershed rehabilitation of M-2-1-1 Road					
6. NUMBER OF ADDENDA ISSUED			8. GOVERNMENT ESTIMATE (Check A, B or C and complete D, E and F.)					
			A. HIRED LABOR		B. REASONABLE CONTRACT (Without Profit)		C. REASONABLE CONTRACT (Including Profit)	
7A. ITEM NO.	7B. DESCRIPTION OF OFFERED ITEM	7C. EST. QUANTITY	D. UNIT	E. UNIT PRICE	F. ESTIMATED AMOUNT	D. UNIT PRICE	E. ESTIMATED AMOUNT	
Additive Bid Schedule #2								
41.	153+78 - 169+80	COS 2,583cy	LS		\$ 1,700.00		\$ 4,443.00	
42.	169+80 - 171+15	EOS 443cy	LS		450.00		704.00	
43.	171+15 - 180+64	COS 1,782cy	LS		1,175.00		3,065.00	
44.	180+64 - 183+00	EOS 1,224cy	LS		1,225.00		1,946.00	
45.	183+00 - 190+25	EOS 1,449cy	LS		950.00		2,492.00	
46.	190+25 - 192+20	EOS 996cy	LS		1,000.00		1,584.00	
47.	192+20 - 197+85	COS 1,193cy	LS		775.00		2,052.00	
48.	197+85 - 198+36	EOS 205cy	LS		200.00		326.00	
49.	198+36 - 203+90	COS 1,339cy	LS		875.00		2,303.00	
50.	203+90 - 205+67	EOS 1,690cy	LS		1,675.00		2,687.00	
51.	205+67 - 207+34	COS 364cy	LS		250.00		626.00	
52.	207+34	DD 141cy	LS		175.00		219.00	
53.	207+78 - 212+55	COS 936cy	LS		625.00		1,610.00	
9. OFFERS			NO. 1		NO. 2			
			OFFEROR W.B. Construction P O Box 187 Miranda, CA. 95553		OFFEROR Carl M. Kjer & Sons P O Drawer 1091 Arcata, CA. 95521			
			B. BID SECURITY (Type and amount)		B. BID SECURITY (Type and amount)			
			C. ADDENDA ACKNOWLEDGED		C. ADDENDA ACKNOWLEDGED			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT		E. ESTIMATED AMOUNT			
			D. UNIT PRICE		D. UNIT PRICE			
			E. ESTIMATED AMOUNT					

9. OFFERS (continued)

[illegible]

9. OFFERS (Continued)

NO. 3			NO. 4			NO. 5			NO. 6			NO. 7		
A. OFFEROR			A. OFFEROR			A. OFFEROR			A. OFFEROR			A. OFFEROR		
Twin Parks Lumber P.O. Box 1192 Arcata, CA. 95521			Patterson Environmental 1600 28th Street Springfield, OR. 97478			Patterson Environmental 1600 28th Street Springfield, OR. 97478			Patterson Environmental 1600 28th Street Springfield, OR. 97478			Patterson Environmental 1600 28th Street Springfield, OR. 97478		
B. BID SECURITY (Type and Amount)			B. BID SECURITY (Type and Amount)			B. BID SECURITY (Type and Amount)			B. BID SECURITY (Type and Amount)			B. BID SECURITY (Type and Amount)		
C. ADDENDA ACKNOWLEDGED			C. ADDENDA ACKNOWLEDGED			C. ADDENDA ACKNOWLEDGED			C. ADDENDA ACKNOWLEDGED			C. ADDENDA ACKNOWLEDGED		
D. UNIT PRICE	E. ESTIMATED AMOUNT		D. UNIT PRICE	E. ESTIMATED AMOUNT		D. UNIT PRICE	E. ESTIMATED AMOUNT		D. UNIT PRICE	E. ESTIMATED AMOUNT		D. UNIT PRICE	E. ESTIMATED AMOUNT	
	\$ 1,000.00			\$ 3,040.00										
	1,100.00			3,060.00										
SUBTOTAL														
SCHEDULE #2			\$ 12,900.00			\$ 49,961.00								
ADDITIVE BID SCHEDULE # 3														
	\$ 1,700.00			1,116.00										
	1,700.00			9,486.00										
	1,700.00			4,185.40										
	1,700.00			13,940.00										
	1,700.00			3,906.00										
SUBTOTAL														
SCHEDULE #3			\$ 8,500.00			\$ 32,633.00								
GRAND TOTAL			\$ 51,850.00			\$ 190,437.00								

ABBREVIATIONS

CSP = Color stereo pair
 B/W = Single B/W photo
 Pre-pp: 3-29/30-88

UNIT 88-6

M-2-1-1 ROAD

PHOTO POINT LOCATION AND DESCRIPTION

PP#	LENS (mm)	LOCATION	PHOTO-POINT	DESCRIPTION
1	35	COS 0+53	B/W 400 CSP 64	FROM: 1+50, Mid road. Stake in ground at TOCB near 12" diam. Tan Oak. VIEW: upstation
2	28	EOS 6+65	B/W 400 CSP 64	FROM: 6+65, near 3' diam. Douglas-fir on OER. Stake nailed to Douglas-fir. VIEW: upstation
3	35	COS 9+00	B/W 400 CSP 64	FROM: 18+00, mid-road. Stake in RW stump sprout at OER. VIEW: upstation
4	35	COS 9+00	B/W 400 CSP 64	FROM: 36 +00, near rotten stump at OER. stake in stump. VIEW: downstation
5	35	COS 39+00 EOS 37+67	B/W 400 CSP 64	FROM: 39+00, the skid road to the north that continues out Bridge Ridge. Stake in ground at base of 3' diameter Tan Oak. VIEW: South, downstation
6A B	35	COS 39+00 EOS 37+67	B/W 400 CSP 64	FROM: 39+00, TOCB north side of TC near prescription stakes. Stake in stump on TOCB. VIEW: A: upstation B: downstation
7	35	COS 39+00	B/W 400 CSP 64	FROM: 43+50, mid road. Stake in large RW stump at IBE approx. 10' away. VIEW: downstation
8	35	COS 51+43	B/W 400 CSP 64	FROM: 51+00, mid road. Stake in hollow burnt RW stump at OER. VIEW: upstation
9	35	COS 64+96	B/W 400 CSP 64	FROM: 68+00, TOCB. Stake in ground at TOCB. VIEW: downstation

PP#	LENS (mm)	LOCATION	PHOTO-POINT	DESCRIPTION
10	35	COS 64+96	B/W 400 CSP 64	FROM: 72+50, top of stump on TOCB. Stake in stump. VIEW: downstation
11	35	COS 64+96	B/W 400 CSP 64	FROM: 75+50, TOCB. Stake in ground 5' from TOCB edge. VIEW: upstation
12	35	COS 82+10	B/W 400 CSP 64	FROM: 81+69, top of stump on TOCB. Stake in stump. VIEW: Looking downstream
13	28	EOS 93+12	B/W 400 CSP 64	FROM: 96+50, top of stump on TOCB. Stake in stump. VIEW: Looking downstation to deck
14	35H 28V	DD 105+27	B/W 400 CSP 64	FROM: 106+15, TOCB approx. 10' from edge. Stake in ground. VIEW: downstation
15	35	DD 109+18 COS 105+72	B/W 400 CSP 64	FROM: 110+00, TOCB. Stake in ground 10' from edge of TOCB. VIEW: downstation
16	35	EOS 115+85 COS 116+41	B/W 400 CSP 64	FROM: 116+00, above IBD on slope. Stake in ground. VIEW: upstation
17	35	DD 121+00	B/W 400 CSP 64	FROM: 121+00, below the road. Stake in ground. VIEW: up channel to DD crossing
18	35	DD 121+00	B/W 400 CSP 64	FROM: 121+50, TOCB from a stump. Stake in stump. VIEW: downstation
19	35	COS 124+00	B/W 400 CSP 64	FROM: 124+50, mid road. Stake nailed to RW 10' left on OER. VIEW: upstation
20	35	DD 127+15	B/W 400 CSP 64	FROM: 128+00, TOCB. Stake in ground 5' from CB edge. VIEW: downstation
21	28	EOS 132+74	B/W 400 CSP 64	FROM: 132+74, mid channel below CTH. Stake in log in channel next to large rock. VIEW: upstream to the road crossing

PP#	LENS (mm)	LOCATION	PHOTO-POINT	DESCRIPTION
22A	35	COS 134+00	B/W 400	FROM: 138+00, big RW stump at IBE road.
B	28	COS 138+46	CSP 64	Stake in stump.
				VIEW: A: downstation
				B: upstation
23	35	DD 138+10	B/W 400	FROM: 138+00, upstream. Stake in ground
			CSP 64	near burnt RW tree approx. 12' to
				left.
				VIEW: down channel to DD crossing
24	35	EOS 142+47	B/W 400	FROM: 144+00, TOCB. Stake in ground next
		COS 138+46	CSP 64	to rotten stump.
				VIEW: downstation
25	35	COS 144+30	B/W 400	FROM: 146+20, top of hollow RW stump at
		EOS 142+47	CSP 64	OER. Stake in stump.
				VIEW: downstation
26	35	EOS 150+42	B/W 400	FROM: 151+00, TOCB. Stake in ground
		COS 144+30	CSP 64	approx. 5' from edge of CB.
				VIEW: downstation
27	35	EOS 152+66	B/W 400	FROM: 155+00, top of stump on TOCB.
		COS 150+70	CSP 64	Stake in stump.
				VIEW: downstation
28A	35	COS 153+78	B/W 400	FROM: 166+10, top of stump at OER. Stake
B	35	COS 153+78	CSP 64	in stump.
				VIEW: A: downstation
				B: upstation
29	35	EOS 180+64	B/W 400	FROM: 183+90, TOCB. Stake in ground
		COS 183+00	CSP 64	approx. 6' from CB edge.
				VIEW: downstation
30	35	EOS 190+25	B/W 400	FROM: 189+40, TOCB. Stake in ground 4'
			CSP 200	from CB edge.
				VIEW: upstation
31	35	COS 183+00	B/W 400	FROM: 191+54, TOCB. Stake in ground at
			CSP 200	base of 4' diameter RW tree.
				VIEW: downstation
32	35	EOS 197+85	B/W 400	FROM: 198+50, skid trail above CB. Stake
		COS 192+20	CSP 200	in ground on skid trail approx. 25'
				from IBD.
				VIEW: downstation
33A	35	EOS 197+85	B/W 400	FROM: 200+00, RW stump number 160 on OER.
B		COS 198+36	CSP 200	Stake in stump.
				VIEW: A: downstation
				B: upstation

PP#	LENS (mm)	LOCATION	PHOTO-POINT	DESCRIPTION
34	35	DD 207+54 EOS 203+90	B/W 400 CSP 200	FROM: 208+30, TOCB. Stake in ground approx. 5' from CB edge. VIEW: downstation
35	35	COS 207+78	B/W 400 CSP 200	FROM: 211+70, TOCB. Stake in ground approx. 10' from CB edge. VIEW: downstation
36	35	EOS 212+50	B/W 400 CSP 200	FROM: 215+00, next to stump on TOCB near edge. Stake in stump. VIEW: downstation
37A	35	COS 214+74	B/W 400	FROM: 220+50, next to a large RW tree (3-4' diam.) on OER. Stake on tree.
B	35	DD 221+55	CSP 200	VIEW: A: downstation B: upstation
38	35	COS 222+18	B/W 400 CSP 200	FROM: 223+47, TOCB. Stake in ground next to 1' diameter Tak Oak. VIEW: upstation
39	35	EOS 235+58	B/W 400 CSP 200	FROM: 238+05, top of Douglas-fir stump 20' up from the TOCB edge. Stake in stump. VIEW: downstation
40	35	COS 236+79	B/W 400 CSP 200	FROM: 242+80, TOCB at the edge. Stake in ground approx. 5' upslope. VIEW: downstation
41	35	EOS 247+28 COS 236+79	B/W 400 CSP 200	FROM: 248+75, TOCB next to 4' diam. RW tree. Stake nailed to RW. VIEW: downstation
42	28	EOS 247+28	B/W 400 CSP 64	FROM: 247+80, TOCB. Stake in ground 2' from CB edge. VIEW: down on EOS-swale
43	35	EOS 247+28	B/W 400 CSP 64	FROM: 247+00, top of CB. Stake in ground approx. 5' from CB edge. VIEW: upstation



Unit: 88-6 Date: 3-29-88 EOS 93+12, M-2-1-1 Rd. PP13 PRE.



Unit: 88-6 Date: 11-29-88 EOS 93+12, M-2-1-1 Rd. PP13 Post.



Unit: 88-6 Date: 3-30-88. EOS 197+85, COS 192+20. M-2-1-1 Rd. PP32 PRE.



Unit: 88-6 Date: 11-30-88. EOS 197+85, COS 192+20. M-2-1-1 Rd. PP32 POST.



Unit: 88-6 Date: 3-30-88. COS 236+79. M-2-1-1 Rd. PP40 PRE.



Unit: 88-6 Date: 11-30-88. COS 236-79. M-2-1-1 Rd. PP40 POST.