

Summary of Erosion Control Work
Unit 84-2

M-7-5-4

M-7-5-5

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December 1984

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INTRODUCTION

Unit 84-2 is located approximately ten miles southeast of Orick, California, within the boundaries of the 1978 Redwood National Park expansion area (Figure 1). Two former logging haul roads, the M-7-5-4 and M-7-5-5, were rehabilitated by invitation for bid (IFB) contract, while surrounding hillslopes were addressed separately by another rehabilitation unit, 84-6, using a rental format.

Both roads traverse southeast along the northeast-facing flank of Bridge Ridge above Redwood Creek. Bridge Ridge itself is relatively broad and flat; a fault bounded, uplifted Franciscan block composed of Redwood Creek schist. Local outcrops of quartz rich schist occur as knockers throughout the area, although they are less abundant nearer the flatter, ridge top areas. Soils tend to be very deep, massive, clayey, and bright orange-red in color along secondary ridges, and somewhat thinner and browner elsewhere. Scattered, well rounded gravel to cobble sized clasts are found intact within soil horizons. The clasts are of non-redwood creek lithologies.

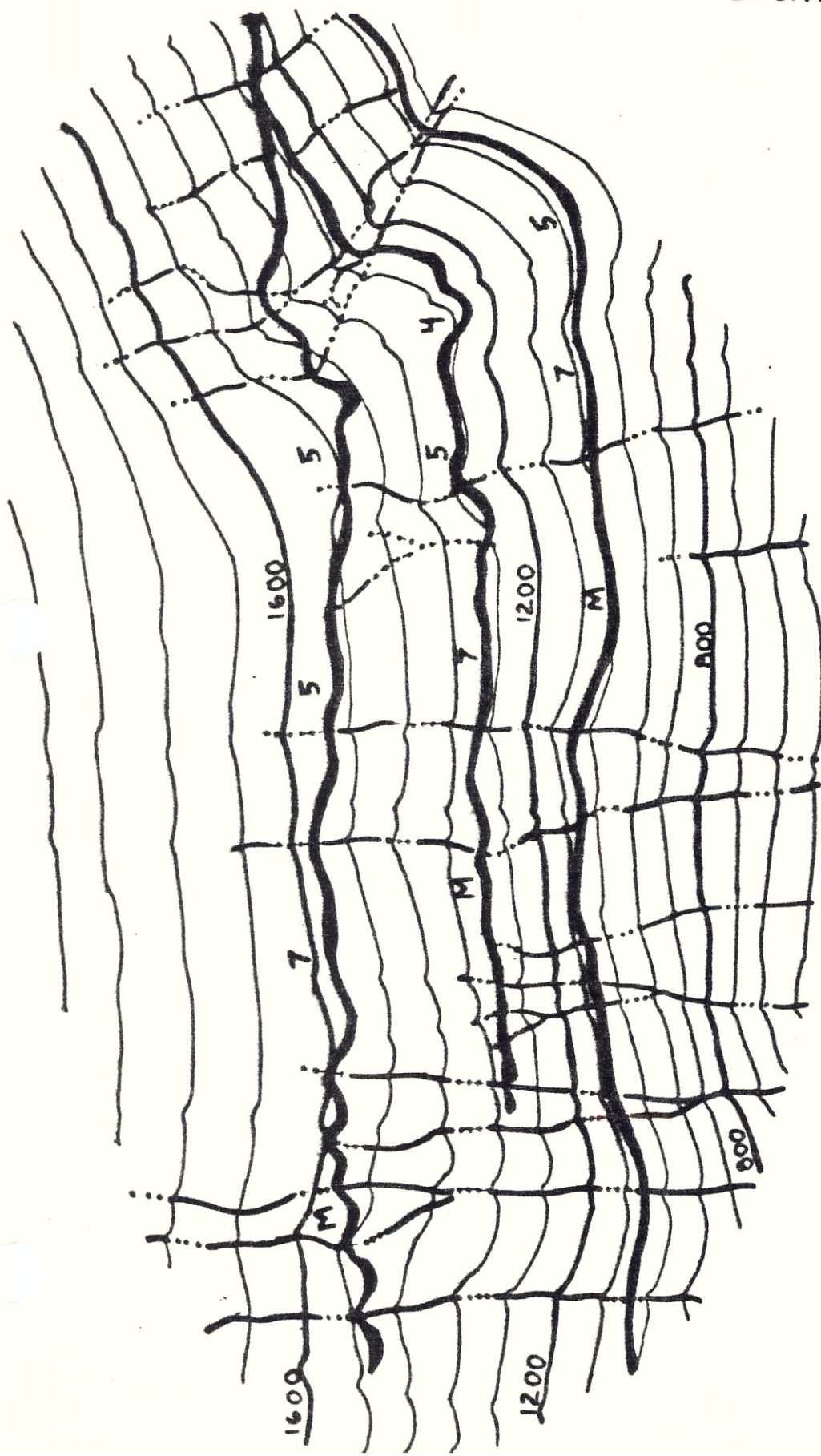
Geomorphically, the slope is controlled by mass movement predominantly, and fluvial incision, secondarily. Bedrock controls may also influence channel morphology, particularly with regard to bedrock knockers. Severe slope breaks, scarps, alternately well and poorly incised stream reaches, and discontinuous channels indicate landslide disturbance is widespread. However the age of these features and rates of movement are unknown.

Slopes tend to be gentle, 5-30%, although may steepen locally to 70% or more near stream channels and at landslide scarps. Topography is hummocky. Relief of the hillslope is about 1,900 feet, varying from about 160 ft. at Redwood Creek to about 2,100 ft. at the ridgetop. Elevation at the junction of the M-7-5-4 and M-7-5-5 roads is 1,238 ft. and ranges to 1,340 ft. and 1,600 ft. for the M-7-5-4 and M-7-5-5, respectively.

Timber harvest activity in the project area was initiated in 1971 with the extension of Louisiana Pacific Corporation's M-7-5 road across Bridge Creek. By 1973 the M-7-5 had been extended along the flank of Bridge Ridge to the Simpson Timber Company boundary (Figure 2). Hillslopes along the length of the road were tractor yarded down to the M-7-5. Spur roads, including the M-7-5-4, were developed, beginning in 1973, near the nose of Bridge Ridge. In 1975, the M-7-5-4 was extended along the upper boundary of the M-7-5 clearcuts. Several units were clearcut above the M-7-5-4 in 1975. By 1978 the M-7-5-5 was built along the boundary of these units. More units, above the M-7-5-5, were systematically clearcut by 1978.

Unit 84-2 addressed erosional problems that were associated with the M-7-5-4 and M-7-5-5 haul roads. Most of the erosion was

FIGURE 1
LOCATION AND PHYSIOGRAPHY.



CONTOUR INTERVAL = 80 FT.
SCALE APPX. 1:12,000

INTERMITTANT STREAM CHANNEL
.....
EPHEMERAL CHANNEL
.....

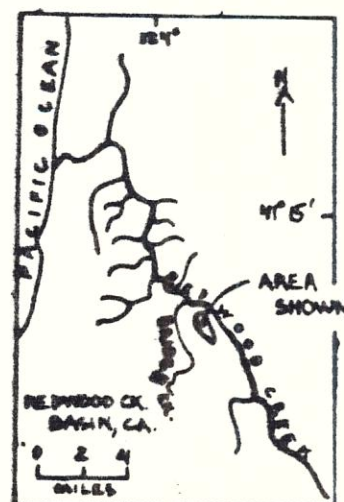
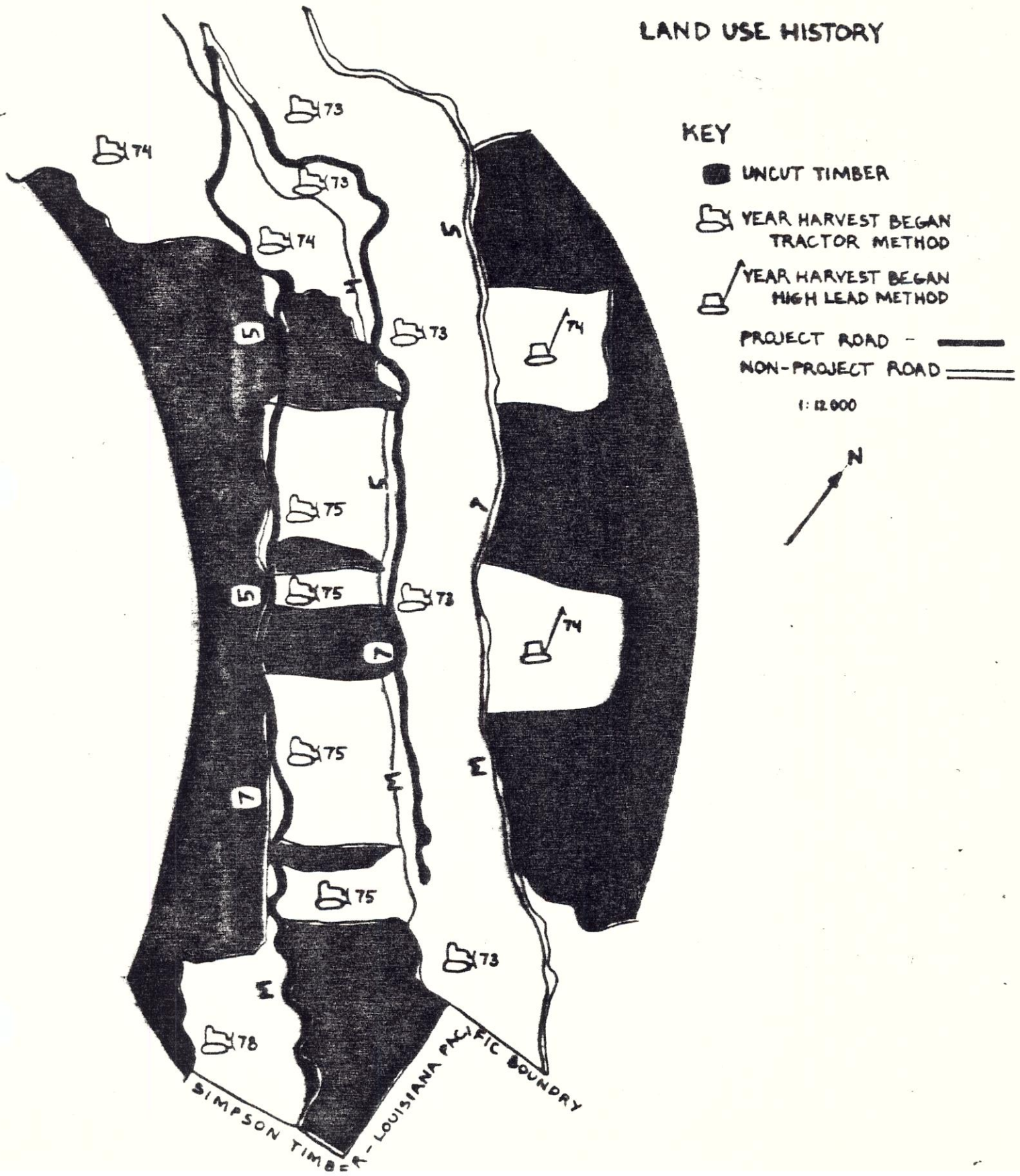


FIGURE 2
LAND USE HISTORY



incipient. Lack of erosional features may be attributed to an absence of major storm events since construction, relatively small contributing hydrologic areas to channels crossed by the roads, relatively gentle hillslopes, and use of extensive numbers of culverted water crossings in road building.

Drainage areas for stream channels ranged from about five to 57 acres and an average size drainage is typically about 30 acres. Typical basins are long and linear, apparently structurally controlled, but may be disrupted and change direction abruptly across low gradient reaches. Many channels on the M-7-5-5 road had poorly developed thalwegs, or no thalweg development (e.g. M 20+40, M 43+25, M 51+80 M 59+74) but were recognizable as swales. Further downslope at the M-7-5-4, these channels displayed well developed thalwegs. Also on the M-7-5-4, a number of point sources of groundwater discharge mark the headwater regions of developing channels (e.g. L 5+36, L 7+73, L 11+86).

One unusual drainage, at L 38+00, is a pronounced valley at the M-7-5-4 road, this incision has no thalweg development, and the incision fades a few tens of feet downslope. Upslope, the incision branches. One of these branches supports a reach with a developed thalweg. The reach is about 300' in length, well incised, and travels diagonally across slope.

Unusual drainage patterns, combined with old growth canopy cover, make hydrologic boundaries difficult to evaluate. In fact, 1976 topographic sheets are often inaccurate with regard to drainage patterns, and in application of the "blue line creek" designation.

Only a section, from L 55+00 to the (future) M-7-5-5 junction, of the M-7-5-4 was built by 1974. Road construction combined channels at L 64+40 with L 63+61, and in the winter of 1974 the crossing failed. Many of the stream crossings built in 1975 show small scarps (e.g. L 2+07, L 16+77, L 24+54, L 63+61). A few stream crossings built in 1978 show signs of incipient failure (e.g. M 9+24, M 74+41).

All channels and many developing channels or swales were fitted with culvert pipes ranging from 18 to 36 inches in diameter. Two exceptions were the combination of a 47 and a 36 acre drainage at L 63+61 and combination of two developing channels, each less than ten acres in area, at L 7+73.

Erosion Control Work

Preparation of Unit 84-2 began in July of 1983, while heavy equipment treatments were completed between August 29 and October 1, 1984 (see Table 1). Much of the preparation work was completed as time allowed. Detailed mapping, for instance, was initiated during the summer months, checked during the rainy season, and finalized into blue line maps during the slack months between the contract mail out date and start up date.

TABLE 1 SIGNIFICANT DATES

7/20/83	Station layout
7/27/83	Begin detail mapping phase
12/15/83	Show me (peer review)
3/21/84	Sample documents made available to C.O.
4/09/84	Site is brushed
4/24/84	Contract offered to public
5/03/84	Show me (for contractors)
6/01/84	Contract low bid award
7/12/84	Initial straw bale distribution
7/22/84	Contract start up date
8/29/84	Heavy equipment move-in, begin work
9/04/84	Begin straw application, volume (payment) surveys
9/07/84	Major breakdown of excavator
9/13/84	Remaining equipment shuts down -
9/17/84	Contractor files for extension
9/20/84	Heavy equipment work resumes
10/01/84	Heavy equipment work complete, move-out
10/03/84	Straw application complete, volume (payment) surveys complete
10/09/84	C.O.R. receives payment invoices
10/10/84	Final C.O.R. evaluation, volumes submitted to C.O.

Preparation time is listed in Table 2. Virtually all time is technician hours.

Primary treatments entailed removal of road fills at 26 locations, outslipping landings adjacent to stream crossings at seven locations, installation of 70 crossroad drains, and disaggregation of three miles of compacted (unsurfaced) roadway and deck areas (Fig. 3). Culvert pipes were hauled to the M-7-5-5, M-7-5-4 junction by the contractor and later, to the G-line deck by Redwood National Park personnel.

Secondary treatments entailed placement of straw mulch on crossing excavation sidebanks and labor was provided in house, with the aid of a Y.C.C. crew. Two hundred eighteen bales were applied at a rate of 5,000 lbs per acre.

Summary costs are found in Table 3 and average unit costs in Table 4. In many of the tables, average unit costs, derived from contract bids, are compared to equivalent rental costs. The cost of an "equivalent" rental site is the hourly rate for identical equipment multiplied by the number of hours that were actually spent working on the site by the contractor. The recording of these hours was a bid item and was spot checked for accuracy by the C.O.R. In the comparisons, equipment types and rates are intended to represent equipment that might have been used had the site been completed by rental agreement. A list of equipment actually used by the contractor on the site and its equivalent is presented in Table 5.

Overall, the rental equivalent cost for the site is \$28,752.40. This is 25% greater than the actual contract cost, which totaled \$23,077.62. However, when examining accumulated equipment hours, there are three factors present that inflated the contractor's time on the site which normally would not have been introduced.

The most important factor is the time incurred while major repairs were done on the excavator. I feel that some of the work done during this time was unnecessary, or at least could have been done more efficiently. Since the contractor began the site just weeks before the completion deadline, I believe the contractor was attempting to show good faith in meeting the deadline, as well as to finish the unit and move to a new job. Production efficiency became second in importance.

The second factor is that much time was spent exacting the dimensions outlined in the contract specifications, largely because payment was based on those criteria. On a rental site, conversely, efforts focus exclusively on installing a working configuration.

Finally, the unit was completed after the more demanding 84-1 unit as both units were completed by IFB, and both by the same contractor. The site was viewed as an opportunity to more-or-less relax after the "tougher" G-line contract completion.

TABLE 2 PERSON HOURS INVOLVED IN UNIT 84-2

<u>Task</u>	<u>Time Spent</u>
Mapping.....	467 hours
Other Evaluation (erosion potentials, Q estimates, cost, estimate, peer review*).....	180 hours
Staking, surveying (pre and post H.E.), site layout.....	362 hours
Contract Document Preparation (plansheets, technical specs.).....	169 hours
Drafting (pre and post surveys).....	115 hours
C.O.R. (time on site) during H.E.....	125 hours
TOTAL	1,418 hours

* includes some non-technician hours

	SALARIES					Contract (Bid) Costs	% of Total Cost	Total Cost
	PST ^{*1}	Laborer	YCC	Materials				
Mapping, Erosion Potentials	\$4,900.00							
Site Preparation	2,662.00						28.8	\$10,888.00
Contract Document Preparation	2,213.00							
C.O.R.	963.00							
Recordkeeping ^{*2}					\$150.00			
Brushing		\$ 984.00						
Move-In Move-out					\$2,600.00		9.5	\$ 3,584.00
Crossings					\$12,808.89			
XRD's					4,750.44		51.9	\$19,604.49
Outslope					2,045.16			
Straw		\$2,068.00	\$ 63.00	\$632.20			7.3	\$ 2,763.20
Haul CMP's		\$ 484.00						
Special Tools					\$ 450.00		2.5	\$ 934.00
Total			\$14,337.00	\$632.20	\$22,804.49		100	\$37,773.69

*1 Includes show-me time for non-P.S.T.'s.

*2 Does not include photo point documentation or report writing.

Table 4 Summary of Average Unit Costs/Equivalent Rental Cost *1

Treatment	# of	Total Quantity	Total Cost		Average Cost Per Site		Average Cost Per Quantity		Range in Cost	
			Contract Bid	Equivalent Rental	Contract Bid	Equivalent Rental	Contract Bid	Equivalent Rental	Contract Bid	Equivalent Rental
Road Crossings	26	10,417yd ³	\$12,808.89	\$20,328.89	\$ 492.65	\$ 781.88	\$1.23/yd ³	\$1.95/yd ³	\$1.17-1.36/yd ³	\$.34-2.75/yd ³
Outsloping	488	1,748yd ³	2,045.16	2,014.70	22,127.96 mile	21,798.39 mile	1.17/yd ³	1.15/yd ³	*4	.55-3.80/yd ³
Cross Road Drain	1.90 mi of road	3,965 ft of drain (70 drains)	4,750.44	4,308.80	2,500.23 mile	2,267.79 mile	1.20/ft of drain	1.09 ft of drain	32.43-104.30 drain	29.00-197.96 drain
Straw Mulch	*2 3.05 acres	218 bales (70#)	\$2,763.20		\$905.96/acre		\$12.68/bale			*5
Misc. *3			3,050.00	2,100.00						

Total Primary Treatments	\$19,604.49
Total Secondary Treatments	2,763.20
Miscellaneous	3,050.00
Grand Total	\$25,417.69

*1 Equivalent costs based on actual equipment hours spent by contractor, computed with rates as follows: D-8, \$99/hr; 1450, \$75/hr; 980, \$89/hr. See text for discussion.

*2 Includes purchase price of bales (\$2.90/bale). Work was done in-house.

*3 Includes move-in, move-out, cost of special tools (bid item), does not include brushing costs or costs of hauling culverts to G-line deck.

*4 No range, all outslowing costs reflect bid cost of \$1.17 per yd³.

*5 All straw distribution and spreading costs are averaged.

Table 5 Equipment

<u>Type Actually Used</u>	<u>Owner/Operator</u>	<u>Equivalent Equipment</u>	<u>Owner</u>	<u>Rental Rate</u>
Case 980B Excavator	H.O. Brown/ E. Chambers	Case 980B Excavator	H.O. Brown	\$89/hr
Cat D8H Dozer w/rippers	H.O. Brown/ W. Chambers	Cat D8H w/rippers	Twin Parks	\$99/hr
Case 1450 Dozer w/winch	H.O. Brown/ Ellis or Boyd	Case 1450 Dozer w/winch	H.O. Brown	\$75/hr

A total of four bids were received for the unit. They were for \$23,356.99, \$37,788.00, \$61,459.81, and \$62,356.99. Only the low bid was comparable to the in-house estimate. This was for \$31,220 but included 140 hours of dumptruck time, largely for culvert hauling. Without this expense, which may or may not have incurred had rental equipment been used on the unit, the estimate is \$26,320.

Actual payments to the contractor amounted to \$22,804.49, and include move-in, recordkeeping, and special tools purchase. This is 2% less than the original bid, and results from the payment method for crossing (deep dish) excavations. All deep dishes were paid on the basis of excavated volume, with 10% of the estimated volume withheld at each worksite until a final survey is completed. Actual, achieved configurations always vary from the ideal, planned format. Table 6 shows variations at all worksites. These changes may either cancel out or build on one another and have the potential to alter the final price of a contract significantly. One consequence of this variation is in budgeting of rehabilitation funds.

Loss of survey bench marks during equipment work is usually not a problem, but does occur (e.g. Table 6, M 43+25). In future work, small worksites (like the example) should be done by the job, and time-consuming surveying would be avoided. Changes in design that lead to removal of either end point (bench mark), or alteration of the excavation centerline, may significantly affect survey accuracy. This, in turn, alters payment accuracy.

Placement and distribution of straw mulch was done primarily with in-house labor, but also used the YCC. A total of \$2,763.20 was spent applying 218 bales at a cost of \$12.68 per bale. Most of this cost was incurred during distribution of the bales, which were relocated several times.

Other tables presented in this report are average costs for stream crossing and outslope excavations listed by size (Tables 7 and 8) and detailed tables listing equipment hours and unit costs for crossroad drains (Table 9), stream crossing excavations (Table 10), and outslipping worksites (Table 11).

Technical specifications and the bid schedule from the contract document are found in Appendix I and II, respectively. Plansheets for the worksites may be found in the Orick field office and the Arcata office.

Detailed erosional mapping (1"=100') is on file in the Orick and Arcata offices. Photopoint documentation may also be found in the Orick and Arcata offices.

Table 6 Planned vs. Actual Excavation Volumes

<u>Site</u>	<u>Planned Vol(yd³)</u>	<u>Actual Vol(yd³)</u>
L 2+07	719	950
L 5+36A	75	158
L 5+36	221	256
L 7+73	345	316
L 9+47	224	276
L11+86	170	189
L16+77	1,196	1,061
L23+07	201	182
L24+54	1,329	1,049
L38+00	488	505
L41+64	391	304
L63+61	588	546
L64+94	450	443
M 3+92	557	483
M 9+24	898	477
M12+98	590	504
M15+92	137	219
M20+40	169	279
M35+82	430	364
M43+25	170	170
M51+80	211	172
M59+74	475	408
M68+84	327	267
M74+41	410	351
M76+00	381	347
M86+00	181	141
Total	11,333	10,417

Table 7 Average Costs of Stream Crossing Excavations

Type	# Sites	Volume Range	Equipment Type	Range Hours	Avg. Cost(\$ Per Site Equivalent*		Avg. Cost(\$ Per yd ³ Equivalent Rental		Cost(\$ per yd ³ Range Equivalent Rental	
					Contract	Rental	Contract	Rental	Contract	Rental
Small 0-400yd ³	16	141-364yd ³	D-8	0-4.4	\$ 315.47	\$ 400.21	\$1.26	\$1.60	\$1.17-1.36	\$.34-2.75
			980	0-3.3						
			1450	0-3.6						
Medium 4-800yd ³	7	408-546yd ³	D-8		585.75	991.99	1.22	2.06	1.17-1.24	1.08-2.48
			980							
			1450							
Large 8-1,200yd ³	3	950-1,061yd ³	D-8	4-8.7	1,220.40	1,711.60	1.20	1.53	1.20	.92-2.20
			980	2-9.5						
			1450	4-8.0						

* Rental costs, computed from real hours worked, do not include miscellaneous equipment hours - see table 10, stream crossing excavations.

Table 8 Average Costs of Outsloping

Type	# of Sites	Volume Range	Equipment Type	Range in Hours	Avg. Cost(\$)		Per Site		Avg. Cost(\$)		Per Yd ³		Cost(\$)		Per Yd ³		Range	
					Contract	Equivalent Rental	Contract	Equivalent Rental	Contract	Equivalent Rental	Contract	Equivalent Rental	Contract*	Equivalent Rental	Contract	Equivalent Rental	Contract*	Equivalent Rental
Small 0-400yd ³	5	96-234yd ³	D-8 980 1450	0.5-1.8 0.5-2.1 0-1.0	\$186.03	\$237.00	\$1.17	\$1.49	NA	\$.91-3.80								
Medium 400-800yd ³	2	404-549yd ³	D-8 980 1450	1.0-2.0 1.0-2.3 0-2.0	557.51	414.85	1.17	.87	NA	.55-1.30								

* No range in contract costs. Site was bid at \$1.17/yd³.

Table 9 Crossroad Drains and Disaggregation

Reach	Ft. of Drain	# of Drains	Lin. ft. Of Road	Equipment Hours			Reach Cost *1		Cost Per Drain Equiv.	
				D-8	980	1450	Bid	Equiv. Rental	Bid	Rental
L 3+26										
- 5+14	238	2	188	0.59		4.5	\$ 65.26	\$ 395.91	\$32.48	\$197.96
L 6+00										
- 6+85	141	2	85	1.04		1.0	64.86	177.96	32.43	88.98
L12+35										
-16+29	366	4	373	1.18		3.0	164.70	341.82	41.18	85.46
L20+35										
-22+00	88	2	165	0.09		0.8	107.36	68.91	53.68	34.46
L25+63										
-36+30	517	7	1,067	1.52		1.0	480.81	225.48	68.69	32.21
L39+25										
-40+30	45	1	105	0.55		1.0	52.50	126.45	52.50	126.45
L44+30 *2										
-62+05	574	10	1,775	2.36	3.0	2.0	664.29	700.14	66.43	70.01
L67+80 *3										
-71+38	169	4	358	3.17	1.5	1.0	191.53	522.33	47.88	130.58
M 0+00										
- 2+50	118	1	250	0.5		0.8	69.62	109.50	69.62	109.50
M 5+00										
- 7+00	149	2	200	0.8		0.5	208.60	116.70	104.30	58.35
M10+33										
-12+19	92	1	186	0.2		0.5	81.88	57.30	81.88	57.30
M17+00										
-18+23	114	2	123	0.8			175.56	79.20	87.78	39.60

(table continues)

Table 9 Crossroad Drains and Disaggregation (cont.)

Reach	Ft. of Drain	# of Drains	Lin. ft. Of Road	Equipment Hours			Reach Cost ^{*1}		Cost Per Drain	
				D-8	980	1450	Bid	Equiv. Rental	Bid	Equiv. Rental
M21+70										
-35+55	356	7	1,389	2.8		1.8	\$ 534.00	\$ 412.20	\$ 76.28	\$ 58.89
M37+00										
-43+04	155	3	604	0.6		0.6	238.70	104.40	79.57	34.80
M44+30										
-51+60	102	3	730	0.5		0.5	293.76	87.00	97.92	29.00
M54+86										
-59+47	183	4	461	0.8		0.8	333.06	139.20	83.27	34.80
M61+40										
-68+05	151	4	665	1.3		0.5	291.43	166.20	72.86	41.55
M70+00										
-73+10	98	3	310	2.6			215.60	257.40	71.87	85.80
M77+50 ^{*4}										
-85+74	258	7	824	1.0	1.0		467.45	188.00	66.78	26.86
M87+27										
-89+00	51	1	173	0.3			49.47	29.70	49.47	29.70
Total/										
Average	3,965	70	10,027	23.2	5.5	20.3	\$4,750.44	\$4,308.80	\$ 67.86	\$ 61.55

*1 Bid cost includes ripping and placement of drains.

*2 Bid cost includes removal of 2 culvert pipes (\$54).

*3 Bid cost includes removal of 1 culvert pipe (\$27).

*4 Bid cost includes removal of 1 culvert pipe(\$35.68).

Table 10 Stream Crossing Excavations

Location	Yds Excavated	Equipment Hours *1			Contract Bid			Rental Equivalent	
		D-8	980	1450	Site Cost (\$)	CMP Removal (\$)	Cost(\$) Incl Culvert	Cost(\$) Per Yd3 Incl Culvert	Cost(\$) Site Cost(\$) Per Yd3
L 2+07	950	4.0	2.0	4.0	\$1,111.50	\$ 27.00	\$1,138.50	\$ 1.20	\$ 874.00 \$.92
L 5+36A	158		1.0		184.86		184.86	1.17	89.00 .56
L 5+36	256	2.8	1.0		299.52		299.52	1.17	366.20 1.43
L 7+73	316	2.0	2.0	1.5	369.72	27.00	396.72	1.26	488.50 1.55
L 9+47	276	0.5	0.5		322.92	27.00	349.92	1.27	94.00 .34
L11+86	189	1.0	2.0		221.13	27.00	248.13	1.31	277.00 1.47
L16+77	1,061	8.0	8.0	6.0	1,241.37	27.00	1,268.37	1.20	1,954.00 1.84
L23+07	182	1.0	1.0		212.94	27.00	239.94	1.32	188.00 1.03
L24+54	1,049	8.7	9.5	8.0	1,227.33	27.00	1,254.33	1.20	2,306.80 2.20
L38+00	505	4.0	3.8	3.5	590.85	27.00	617.85	1.22	996.70 1.97
L41+64	304	3.2	3.3	3.0	355.68	27.00	382.68	1.26	835.50 2.75
L63+61	546	4.5	4.5	4.5	638.82	27.00	665.82	1.22	1,183.50 2.17
L64+94	443	2.5	4.5	3.5	518.31		518.31	1.17	910.50 2.06
M 3+92	483	0.8	6.4	6.4	565.11	27.00	592.11	1.23	1,128.80 2.34
M 9+24	477	7.8	1.5	1.7	558.09	27.00	585.09	1.23	1,033.20 2.17
M12+98	504	5.5	4.8	3.7	589.68	27.00	616.68	1.22	1,249.20 2.48
M15+92	219	2.3			256.23	27.00	283.23	1.28	227.70 1.04
M20+40	279	2.0		1.0	326.43	27.00	353.43	1.27	273.00 .98
M35+82	364	4.4	2.8	3.6	425.88	27.00	452.88	1.24	954.80 2.62
M43+25	170	1.8	0.7	1.1	198.90	27.00	225.90	1.33	323.00 1.90
M51+80	172	2.0	0.5	1.5	201.24	27.00	228.24	1.33	355.00 2.06
M59+74	408	2.5	0.5	2.0	477.36	27.00	504.36	1.24	442.00 1.08

(table continues)

Table 10 Stream Crossing Excavations (cont.)

Location	Yds ³ Excavated	Equipment Hours *1			Site Cost (\$)	Contract Bid			Rental Equivalent		
		D-8	980	1450		CMP Removal (\$)	Cost(\$) Incl Culvert	Cost(\$) Per Yd ³ Incl Culvert	Site Cost(\$)	Cost(\$) Per Yd ³	
M68+89	267	1.9	2.7	0.8	\$ 312.34	\$ 27.00	\$ 339.39	\$ 1.27	\$ 488.40	\$ 1.83	
M74+41	351	4.1	2.2	1.0	410.67	27.00	437.67	1.25	676.70	1.93	
M76+00	347	2.9	2.1	0.8	405.99	27.00	432.99	1.25	534.00	1.54	
M86+00	141	1.3	0.5	0.8	164.77	27.00	191.97	1.36	233.20	1.65	
Total/											
Average	10,417	81.5	67.8	58.4	\$12,187.89	\$621.00	\$12,808.89	\$ 1.23	\$18,482.70	\$1.77	
Miscellaneous Heavy Equipment Time*2									1,846.20		
Grand Total/											
Average	10,417	81.5	67.8	58.4	\$12,187.89	\$621.00	\$12,808.89	\$ 1.23	\$20,328.90	\$1.95	

*1 Actual equipment hours recorded by the contractor. Equivalent rental costs are computed with the following rates; D-8, \$99/hr; 980, \$89/hr; 1450, \$75/hr.

*2 About half of this amount may be attributed to dragging culverts to the M-7-5-4, M-7-5-5 junction.

Table 11 Outslowing

Location	Yds ³ Per Ft. of O.S.	Total Yd ³ Removed	Linear Ft. of Outslope *2	Equipment Hours *1			Total Cost		Cost Per Yd ³		Cost Per Foot	
				Hours			Contract Bid	Equiv. Rental	Contract Bid	Equiv. Rental	Contract Bid	Equiv. Rental
				D-8	980	1450						
L 2+07	7.1	549	77	1.0	2.3		\$ 642.33	\$ 303.70	\$1.17	\$.55	\$8.34	\$3.94
L16+77	2.4	159	67	0.5	1.0	0.5	186.03	176.00	1.17	1.11	2.78	2.63
L24+54	6.2	234	38	0.5	1.0	1.0	273.78	213.50	1.17	1.15	7.20	5.62
L41+64	1.6	117	73	1.0	0.5	0.5	136.89	181.00	1.17	1.55	1.88	2.48
L64+94	3.5	404	114	2.0	1.0	2.0	472.68	526.00	1.17	1.30	4.15	4.61
M 9+24	2.5	189	75	1.8	0.8		221.13	249.40	1.17	1.32	2.95	3.33
M12+98	2.2	96	44	1.8	2.1		112.32	365.10	1.17	3.80	2.55	8.30
Average/ Total	3.6	1,748	488	8.6	8.7	4.0	\$2,045.16	\$2,014.70	\$1.17	\$1.15	\$4.19	\$4.13

*1 Actual equipment hours as recorded by the contractor, equivalent rental costs computed with the following rates: D-8, \$99/hr; 980, \$89/hr; 1450, \$75/hr.

*2 Most entires not measured along road centerline.

Appendix I
Technical Specifications

SECTION C - DESCRIPTIONS/SPECIFICATIONS

1. General

This contract entails removal of 3 miles of unsurfaced logging haul road. Plan sheets are provided to identify and detail bid items (see Section J). Technical information and specifications for each worksite are included with written explanations and diagrams. In any conflict between this Section C and the specifications contained in the plan sheets, the plan sheets will take precedence.

Heavy equipment work includes ripping roads and landings, excavation of road fills at stream crossings (DEEP DISH), outsloping (OUTSLOPE), cross road drain construction (XRD), and hauling culvert pipes (CMP). All work at fillsites is attributed to the adjacent DEEP DISH excavation.

Fill from DEEP DISH and OUTSLOPE worksites must be placed in fill areas (fillsites) designated, usually adjacent to the worksites. It is the responsibility of the contractor to access these areas and disperse spoil to them. Endhaul distances are therefore determined by fillsite utilization.

Culvert pipes and half rounds are to be stockpiled on the deck at Station L 79+00 at the terminus of the worksite, or at the junction of the L road with the M-7-5 road (Station L 98+00). The C.O.R. will identify these areas to the contractor.

2. Stations

All work is laid out using the standard engineering "station" method. A station is a 100-foot interval. Station laths are installed every 100 feet along the road, starting at the beginning of each road (M and L), and labeled with their station number. Thus the point on the 'L' road that is 800 feet from the beginning has a lath on the cutbank labeled "L8+00". Locations between station laths are labeled as follows: "L8+33" is a point 33 feet beyond (upstation) the L8+00 lath, or 833 feet from the beginning of the road.

Work is presented on the plan sheets so that one proceeds toward higher station numbers.

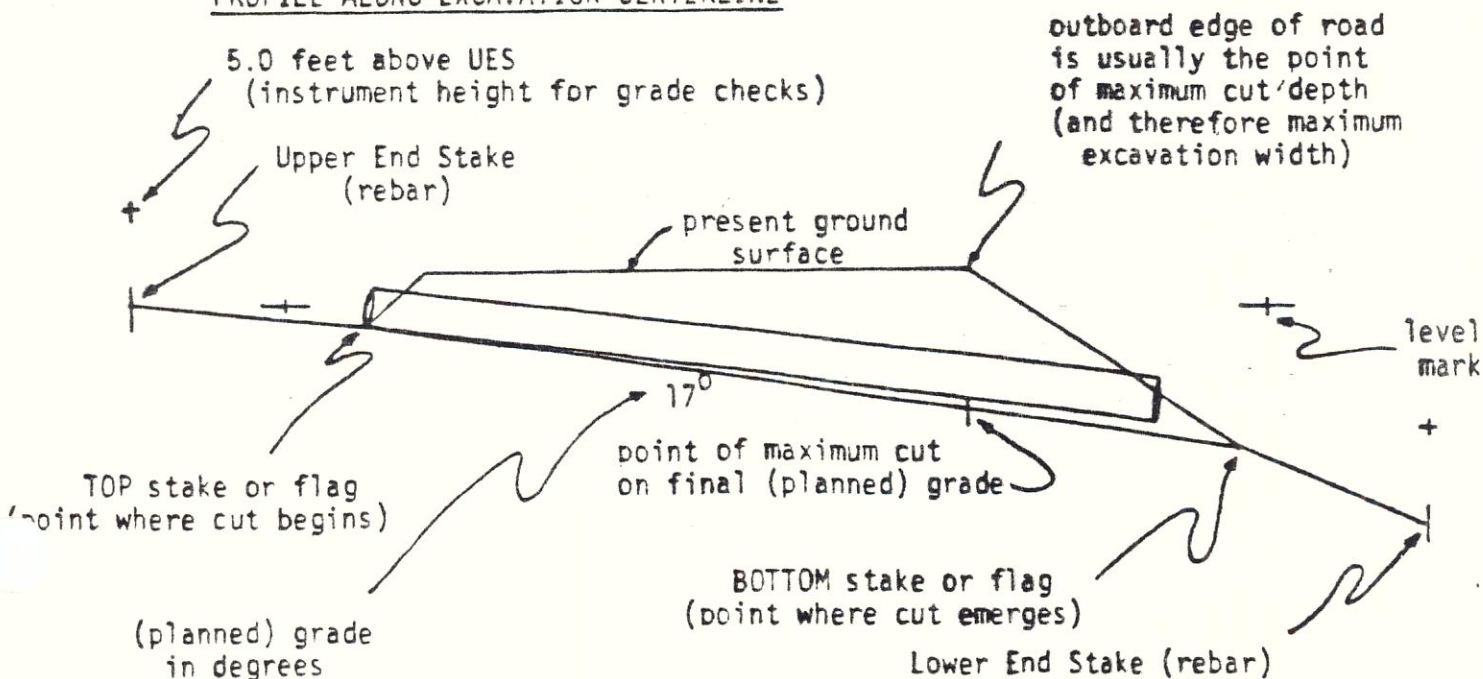
3. Plan Sheets

Plan sheets are provided and organized in a station sequential order, by road. Bid items associated with a particular station are printed in bold type and requirements at each locality detailed. Cross sections or longitudinal profiles are provided for OUTSLOPE and DEEP DISH excavations. Culvert sizes, volume estimates, drain lengths, grade checks, fillsite locations, and special instructions are also listed in station sequential order, as they apply.

Illustrations below and on the following page describe information presented in the diagrams in the plan sheets.

DEEP DISH

PROFILE ALONG EXCAVATION CENTERLINE



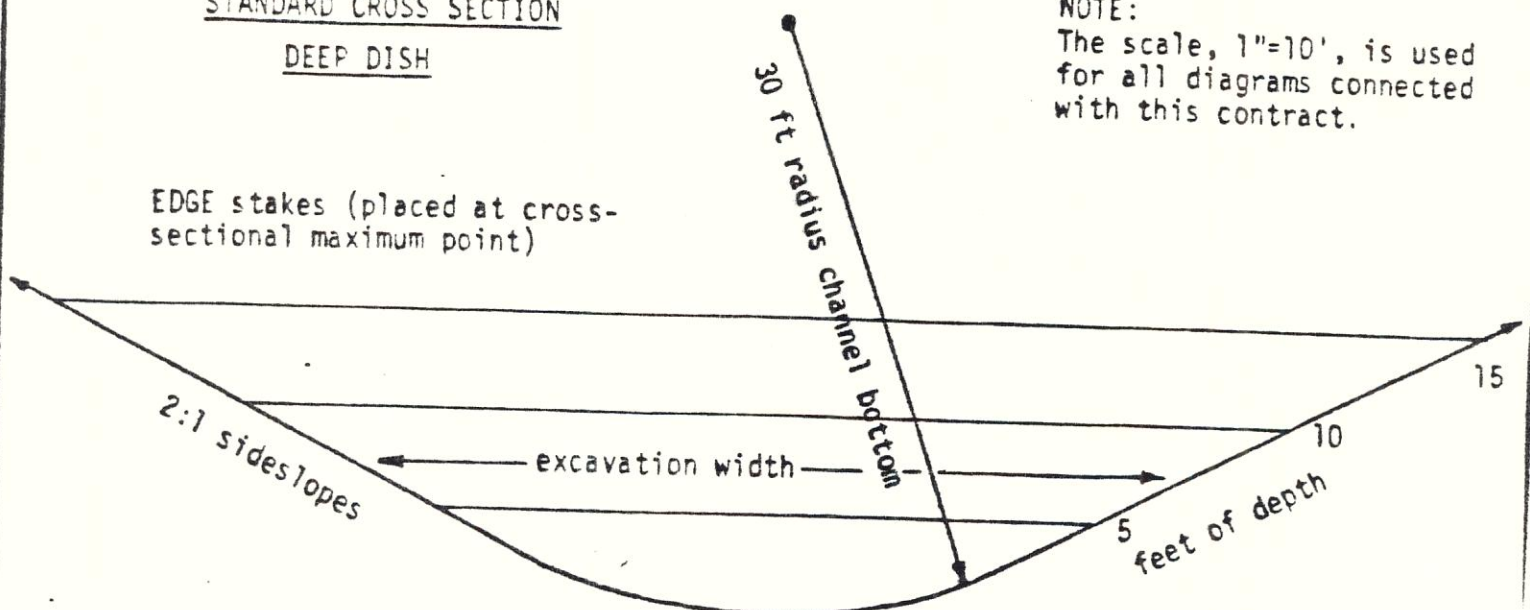
SECTION C - DESCRIPTIONS/SPECIFICATIONS (Continued)

STANDARD CROSS SECTION
DEEP DISH

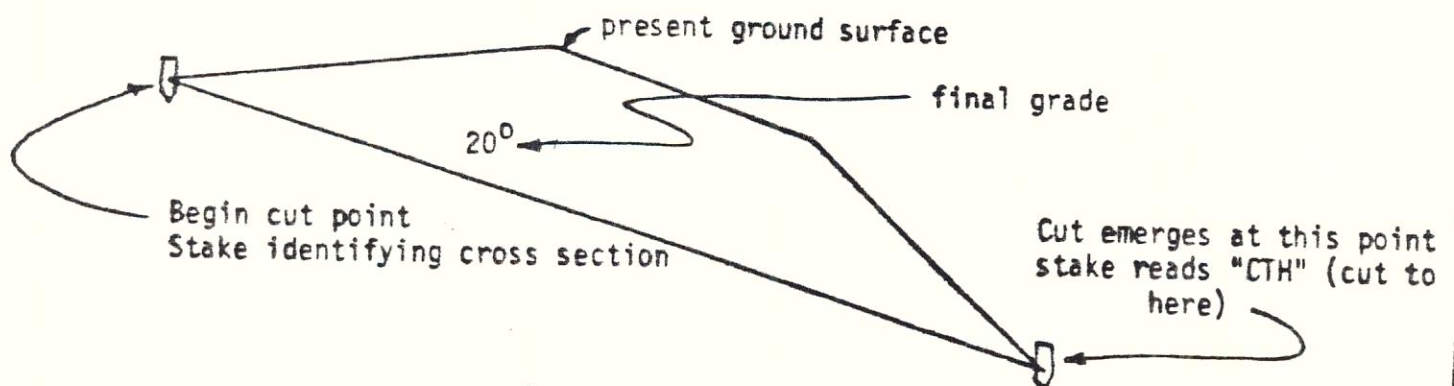
NOTE:

The scale, 1"=10', is used for all diagrams connected with this contract.

EDGE stakes (placed at cross-sectional maximum point)



OUTSLOPE CROSS SECTION



4. Reference Stakes

Several types of stakes are used on the worksite for grade control in excavations, and for reference points at a later time. In DEEP DISH worksites, the Upper and Lower Endstake (usually rebar) (UES and LES) must never be disturbed or removed. The stakes are used for grade checking during excavation and for bench marks in evaluating the final excavated volumes. Also in DEEP DISH worksites, TOP, BOTTOM, and EDGE stakes are used to illustrate vertical and horizontal limits of each excavation. In many worksites, TOP and BOTTOM stakes have been replaced by flagging (red).

In OUTSLOPE worksites, "TOS" (begin cut) and "CTH" (cut to here) stake pairs are used to control depth and extent of cut.

Two other types of stakes exist on the site. These are RP (reference point) stakes and PP (photo point) stakes. These stakes must not be disturbed or removed.

5. Grade Checks

Vertical control of DEEP DISH channel bottoms may be maintained during excavation using grade checks. Checks can be made from the Upper and Lower Endstakes (UES and LES) with a distance tape and clinometer. Each DEEP DISH profile provides the distance and angle information to the planned grade at three points on the excavation center line (TOP, or point where cut begins, BOTTOM or point where cut emerges, and MAX, or point where maximum depth is encountered).

Use of the checks will be explained, as needed, by the C.O.R. in the field. They permit grade control to within $\pm .1$ foot in most cases, though the grade tolerance is $\pm .3$ feet (vertical) for all channel excavations.

COINUATION SHEET

REF. NO. OF DOC. BEING CONT'D.

1FB 0-84-03

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SECTION C - DESCRIPTIONS/SPECIFICATIONS (Continued)

6. Special Tools Required

The special tools listed in Section H will enable the contractor to check grades. The C.O.R. will instruct the Contractor in the use of these tools as needed.

7. Bid Items

Bid items one and two cover costs of transporting heavy equipment to the contract site initially, and costs for removing the equipment after the contract is completed. (The closest turnaround suitable for a "lowboy" is at the junction of the M-7/M-7-1½ roads, approximately 3 miles from the contract site.)

Item number three covers the cost of record keeping of work performed on the contract site by the contractor and item four covers the cost of the special tools required for grade checking during excavation.

All other bid items fall into one of four categories. They are culvert (CMP) removal, cross road drain installation (XRD), stream crossing excavations (DEEP DISH), and outslope excavations (OUTSLOPE).

Work in fill areas is attributed to the adjacent stream crossing (DEEP DISH) excavations. This work always includes ripping and grading for proper drainage and may include placement of an "optional" cross road drain.

Work is divided into bid items. All work within any bid item must be completed and accepted by the government prior to payment. Complete bid items are identified on the plan sheets within solid, horizontal lines.

8. Culvert Pipe Removal (CMP)

All culverts and half rounds on the site are listed on the plan sheets. Where diagrammed in DEEP DISH profiles, the alignment of the culvert does not necessarily lie along the center line of the excavation. Actual unearthing of the pipe, however, will always occur while excavating a DEEP DISH or XRD. Excavation costs, therefore, should be included in those bid items. For bidding purposes, Culvert Pipe Removal is defined as the loading and hauling of CMP to the storage area.

Culverts may be removed in the most expedient manner without regard to salvaging them in useable condition. All culvert pipe, half rounds, bands, and fragments of pipe will be removed to the storage area, a deck at station L 79+00 at the terminus of the contract site. If additional space is needed, the deck at station L 98+00, 2,000 feet beyond the terminus of the contract site may be used.

No culvert pipes, half rounds, bands, or fragments will be left or buried at the worksite.

9. Crossroad Drain Installation (XRD)

The XRD prescription involves thoroughly ripping the entire roadway or landing (inboard ditch to fillslope) to a two foot depth continuously from the last specified item through to the next item, then installing the XRD at specified station locations. For example, on Plan sheet L-2, XRD L6+10 includes ripping the roadway from station L6+00 to station L6+85, and construction of XRD L6+10. The plan sheets identify each XRD, giving its length and final grade. In the field the drain is delineated by a yellow flag at each end, marked with the station number (i.e. XRD L6+10). Each XRD must be free draining for its entire length and have the average grade prescribed in the plan sheets. XRD sideslopes shall be no steeper than 2:1 (50%). Spoil must not impede surface drainage to the ditch. The inboard ditch must be left (or altered to be) free draining but with the downhill side blocked so as to eliminate bypassing flow. No more than 10% of the excavated volume may be sidecast over the fillslope. Specific instructions for individual drains are detailed in the plan sheets.

10. Stream Crossing Excavations (DEEP DISH)

DEEP DISH excavations are identified on the plan sheets by the station number corresponding to their center line locations. DEEP DISH excavations entail removal of stream crossing road fills and placing the spoil at a FILL SITE. Each DEEP DISH is depicted by a centerline profile on the plan sheets showing present ground and the TENTATIVE final grade. Locations of control points (UES, LES, TOP, BOTTOM), and grade checks at these points are shown on the plan sheets. The "UES" and "LES" (Upper and Lower end stakes) are used for grade checking and must not be disturbed. The planned channel bottom is a straight line between the "TOP" and "BOTTOM" stakes. The use of grade checks permit vertical control of the channel bottom during excavation. The lateral limits of the excavation at its widest point are controlled by "EDGE" stakes. Excavation sideslopes follow the format illustrated by the DEEP DISH platen (page 1 of plan sheets). The platen shows standard cross sections for depths to grade ranging to twenty feet. The depths to grade for any point on each center line profile may be measured directly on the plan sheets.

SECTION C - DESCRIPTIONS/SPECIFICATIONS (Continued)

The final excavation grade line (and therefore final excavated volume) is determined on site by the COR as the planned grade is approached (See paragraph 1.e., Section C). This will sometimes involve more or less excavation than shown in the plan sheets. Accordingly, the contractor will alert the C.O.R. in sufficient time prior to commencing a DEEP DISH to ensure his timely presence. No material will be removed beyond the vertical and horizontal limits of the excavation. Any stumps encountered during excavation will be left in place and no live trees greater than one foot in diameter shall be undercut during the prescribed work.

All stream crossing excavations (DEEP DISHES) will be checked and approved for grade before acceptance and payment.

FILLSITES are provided for the spoil from DEEP DISH (and OUTSLOPE) excavations. All work associated with the FILLSITES is attributed to the adjacent DEEP DISH excavation bid items. All FILLSITES must be thoroughly ripped prior to fill placement. Fill must be blended into the existing topography so that surface flow is not impeded. Grade of all fillslopes may not exceed 2.5:1. Most FILLSITES involve placing fill between the cutbank and the outboard edge of the road. Fill may be piled to the top of the cutbank so long as the grade of the finished fillslope does not exceed 2.5:1 and does not extend past the outboard edge of the road or landing.

In unused FILLSITE areas, the roadway or landing will be ripped and "Optional" cross road drains must be installed to provide drainage. Otherwise, accumulation of spoil will assure proper drainage in the designated FILLSITES. Where proper drainage is assured and the Contractor elects not to install the "optional" crossroad drain, right to payment for that "optional" crossroad drain is waived.

There are two ways in which lateral limits of each FILLSITE may be identified. The first, and most common, is for adjacent bid items to limit the fill area. For example, a XRD might limit fill placement at one lateral extent of the FILLSITE, while the other end of the FILLSITE is limited by the DEEP DISH excavation where the fill originated. In other words, the FILLSITE must not impact (overlap) other bid items.

The second way in which one or both lateral FILLSITE boundaries may be identified is by station number. Where a station is cited as the point where the FILLSITE begins or ends, no fill may be placed beyond that point.

Special instructions for individual FILLSITES are detailed in the plan sheets.

11. Outsloping Excavation (OUTSLOPE)

Outsloping consists of removing the fill on the outboard edge of the road or landing and placing it at a FILLSITE. FILLSITE specifications are identical to DEEP DISH excavations. A straight line cut is required from a stake placed on the road or landing bench to its counterpart stake on the fillslope below the road or landing. Cross section profiles are provided in the plan sheets. These show the existing ground, the stake locations, the desired cut, and the finished slope angle. Volumes for these worksites are shown on the plan sheets. No more than 10% of the excavated volume may be sidecast over the fillslope.

12. Wet Crossings

Several of the DEEP DISH excavations will have some flowing water during excavation. These are indicated on the plan sheets. No flows larger than one cubic foot per second are expected. To avoid sediment pollution to these streams during excavation, the contractor may be required to divert flows around the work area or into adjacent stream channels.

13. Access

No access of any kind will be permitted over a completed bid item. However, access by motorcycle shall be maintained to the most distant, uncompleted site for monitoring purposes.

14. Records and Reports

All rehabilitation work is monitored to provide a data base for the purpose of scientific reports as well as accurate time and cost estimates. The contractor will keep detailed records. The extra costs of this record keeping is recognized and a special line item is provided in the Bid Schedule. All equipment and personnel present on the worksite must be accounted for in the daily report to the COR.

Time, to the nearest one-tenth hour, that each piece of equipment spends working on a BID ITEM must be listed. Note the station location of the BID ITEM, the equipment type(s) working or standing by at that location, and the starting and ending time (of day) for each piece of equipment.

Idle equipment (standby time) must be accounted for at all times. Where standby time can be attributed to a particular BID ITEM, it shall be reported at that station location. Where standby time cannot be attributed to a particular BID ITEM, it will be listed without a station location.

CONTINUATION SHEET

REF. NO. OF DOC. BEING CONT'D.
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SECTION C - DESCRIPTIONS/SPECIFICATIONS (Continued)

Equipment downtime of less than $\frac{1}{2}$ hour, travel time between contract job sites, or any time the contractor spends describing a task to his crew need not be noted but should be included in the categories listed above. Lunch breaks and "coffee breaks" must be noted on the daily record.

The required information will be reported on the form entitled "Contractors Time Sheet (Daily Record)" (see Section J). This form will be provided by the Government. The form must be completed and provided to the COR daily, no later than 12:00 a.m. on the first working day following that day which the work was accomplished.

END OF SECTION C

Appendix II
Bid Schedule

PART I - THE SCHEDULE, SECTION A - SOLICITATION/CONTRACT FORM

SOLICITATION, OFFER AND AWARD		1. CERTIFIED FOR NATIONAL DEFENSE UNDER BDSA REG. 2 AND/OR DMS REG. 1		RATING	PAGE OF 1 1 PAGES	
2. CONTRACT NO.	3. SOLICITATION NO.	4. TYPE OF SOLICITATION		5. DATE ISSUED	6. REQUISITION/PURCHASE NO.	
	IFB 8480-84-03	☒ ADVERTISED (IFB) ☐ NEGOTIATED (RFP)		4-24-84	N/A	
ISSUED BY		CODE		8. ADDRESS OFFER TO (If other than Item 7)		
National Park Service Redwood National Park 791 8th Street, 4th Floor, Suite 0 Arcata, CA 95521				Same as Block 7		

NOTE: In advertised solicitations "offer" and "offeror" mean "bid" and "bidder".

SOLICITATION

9. Sealed offers in original and -0- copies for furnishing the supplies or services in the Schedule will be received at the place specified in Item 8, or if handcarried, in the depository listed in same as block 7 until 2:PM local time 5-23-84
(Hour) (Date)

CAUTION - LATE Submissions, Modifications, and Withdrawals See Section I, Provision No. 52.214-7 or 52.215-10 All offers are subject to all terms and conditions contained in this solicitation.

10. FOR INFORMATION CALL:	A. NAME Bud Hawkins, Contracting Officer	B. TELEPHONE NO. (Include area code) (NO COLLECT CALLS) (707) 822-7611
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11. TABLE OF CONTENTS

(V)	SEC	DESCRIPTION	PAGE(S)	(V)	SEC	DESCRIPTION	PAGE(S)
PART I - THE SCHEDULE				PART II - CONTRACT CLAUSES			
X	A	SOLICITATION/CONTRACT FORM	1	X	I	CONTRACT CLAUSES	21
X	B	SUPPLIES OR SERVICES AND PRICES/COSTS	6	PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACH.			
X	C	DESCRIPTION/SPECS./WORK STATEMENT	5	X	J	LIST OF ATTACHMENTS	1
	D	PACKAGING AND MARKING (not applicable)		PART IV - REPRESENTATIONS AND INSTRUCTIONS			
X	E	INSPECTION AND ACCEPTANCE	1	X	K	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS	4
X	F	DELIVERIES OR PERFORMANCE	1	X	L	INSTRS., CONDS., AND NOTICES TO OFFER	4
X	G	CONTRACT ADMINISTRATION DATA	2	X	M	EVALUATION FACTORS FOR AWARD	1
X	H	SPECIAL CONTRACT REQUIREMENTS	8				

OFFER (Must be fully completed by offeror)

NOTE: Item 12 does not apply if the solicitation includes the provisions at 52.214-16, Minimum Bid Acceptance Period.

12. In compliance with the above, the undersigned agrees, if this offer is accepted within _____ calendar days (60 calendar days unless a different period is inserted by the offeror) from the date for receipt of offers specified above, to furnish any or all items upon which prices are offered at the price set opposite each item, delivered at the designated point(s), within the time specified in the schedule.

13. DISCOUNT FOR PROMPT PAYMENT (See Section I, Clause No. 52.232-8)	10 CALENDAR DAYS %	20 CALENDAR DAYS %	30 CALENDAR DAYS %	CALENDAR DAYS %
14. ACKNOWLEDGMENT OF AMENDMENTS (The offeror acknowledges receipt of amendments to the SOLICITATION for offerors and related documents numbered and dated	AMENDMENT NO.	DATE	AMENDMENT NO.	DATE
15A. NAME AND ADDRESS OF OFFEROR	CODE	FACILITY	16. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print)	
15B. TELEPHONE NO. (Include area code)	15C. CHECK IF REMITTANCE ADDRESS IS DIFFERENT FROM ABOVE - ENTER SUCH ADDRESS IN SCHEDULE.		17. SIGNATURE	18. OFFER DATE

AWARD (To be completed by Government)

19. ACCEPTED AS TO ITEMS NUMBERED	20. AMOUNT	21. ACCOUNTING AND APPROPRIATION
22. SUBMIT INVOICES TO ADDRESS SHOWN IN (4 copies unless otherwise specified)	ITEM	23. NEGOTIATED PURSUANT TO ☐ 10 U.S.C. 2304(a) () ☐ 41 U.S.C. 252(c) ()
24. ADMINISTERED BY (If other than Item 7)	CODE	25. PAYMENT WILL BE MADE BY CODE
26. NAME OF CONTRACTING OFFICER (Type or print)	27. UNITED STATES OF AMERICA (Signature of Contracting Officer)	
	28. AWARD DATE	

IMPORTANT - Award will be made on this Form, or on Standard Form 26, or by other authorized official written notice.

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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Redwood National Park

(Park)

Check One:

Monthly
Estimate ☐

Final
Estimate ☒

UNIT PRICE CONTRACT

ESTIMATE NO. 1	FOR (Period) 7-22-84 through 10-2-84	DATE 10-12-84
CONTRACT NO. CX 8480-4-0005	COMPLETION DATE 9-20-84	EXTENDED DATE 10-20-84
CONTRACTOR H.O. "Whitey" Brown Backhoe Service		ORIGINAL CONTRACT \$23,077.62
PROJECT Watershed Rehab		CHANGE ORDERS* \$ (274.43)
LOCATION M-7-5-4 Road		TOTAL CONTRACT \$22,803.19

Item No.		Quantity	Unit	Unit Price	Amount
1.	Mobilization	Lump Sum			\$ 1,300.00
2.	Demobilization	Lump Sum			\$ 1,300.00
3.	All Record Keeping (Daily Reports)	Lump Sum			\$ 150.00
4.	Cost of Special Tools	Lump Sum			\$ 450.00
Station Numbers COPY					
5.	~~L1+30 A. Optional Crossroad Drain Deleted~~	65	ft.	\$	
	L2+07 B. Deep Dish Excavation	950	yd ³	\$ 1.17	\$ 1,111.50
	L2+07 C. Outslope Excavation (549yd ³)	Lump Sum			\$ 642.33
	L2+07 D. Culvert Removal	Lump Sum			\$ 27.00
	L3+70 E. Crossroad Drain	165	ft.	\$.27	\$ 44.55
6.	L4+05 Crossroad Drain	73	ft.	\$.27	\$ 19.71
7.	L5+36A Deep Dish Excavation	158	yd ³	\$ 1.17	\$ 184.86
8.	L5+36 Deep Dish Excavation	256	yd ³	\$ 1.17	\$ 299.52

RECOMMENDED (Project Supervisor)
(telephone approval received)

Michael Sandecki, COR

APPROVED (Contracting Officer)

Bud Hawkins
Bud Hawkins

DATE

10/12/84

SUMMARY

TOTAL TO DATE	\$ 22,803.19
LESS RETAINED AMOUNT.....	-0-
NET.....	22,803.19
LESS PREVIOUS PAYMENTS.....	-0-
LESS LIQUIDATED DAMAGES.....	-0-
DUE THIS ESTIMATE	22,803.19
% COMPLETED TO DATE:	100%

Form 10-194a
(12/61)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

UNIT PRICE CONTRACT CONTINUATION SHEET

Contract No. CX 8480-4-D005		Contractor H.O. "Whitey" Brown Backhoe Service			
Item No.	Supplies/Services	Quantity	Unit	Unit Price	Amount
9. L6+10	A. Crossroad Drain	76	yd ³	\$.46	\$ 34.96
L6+85	B. Crossroad Drain	65	ft.	\$.46	\$ 29.90
10. L7+73	A. Deep Dish Excavation	316	yd ³	\$ 1.17	\$ 369.72
L7+73	B. Culvert Removal	Lump Sum			\$ 27.00
L9+47	C. Deep Dish Excavation	276	yd ³	\$ 1.17	\$ 322.92
L9+47	D. Culvert Removal	Lump Sum			\$ 27.00
L11+86	E. Deep Dish Excavation	189	yd ³	\$ 1.17	\$ 221.13
L11+86	F. Culvert Removal	Lump Sum			\$ 27.00
11. L12+56	A. Crossroad Drain	43	ft.	\$.45	\$ 19.35
L13+00	B. Crossroad Drain	170	ft.	\$.45	\$ 76.50
L14+50	C. Crossroad Drain	54	ft.	\$.45	\$ 24.30
L15+36	D. Crossroad Drain	99	ft.	\$.45	\$ 44.55
12. L16+77	A. Deep Dish Excavation	1061	yd ³	\$ 1.17	\$ 1,241.37
L16+77	B. Culvert Removal	Lump Sum			\$ 27.00
L16+77	C. Outslope Excavation (159 yd ³)	Lump Sum			\$ 186.03
13. L20+35	A. Crossroad Drain	36	ft.	\$ 1.22	\$ 43.92
L22+00	B. Crossroad Drain	52	ft.	\$ 1.22	\$ 63.44
14. L23+07	A. Deep Dish Excavation	182	yd ³	\$ 1.17	\$ 212.94
L23+07	B. Culvert Removal	Lump Sum			\$ 27.00
L24+54	C. Outslope Excavation (234 yd ³)	Lump Sum			\$ 273.78
L24+54	D. Deep Dish Excavation	1049	yd ³	\$ 1.17	\$ 1,227.33
L24+54	E. Culvert Removal	Lump Sum			\$ 27.00
L25+63	F. Optional Crossroad Drain	55	ft.	\$.93	\$ 51.15
L26+69	G. Optional Crossroad Drain	40	ft.	\$.93	\$ 37.20

Form 10-194a
(12/61)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

UNIT PRICE CONTRACT CONTINUATION SHEET

Contract No. CX 8480-4-0005		Contractor H.O. "Whitey" Brown Backhoe Service			
Item No.	Supplies/Services	Quantity	Unit	Unit Price	Amount
15. L28+72	A. Crossroad Drain	74	ft.	\$.93	\$ 68.82
L30+00	B. Crossroad Drain	161	ft.	\$.93	\$ 149.73
L33+00	C. Crossroad Drain	59	ft.	\$.93	\$ 54.87
L35+07	D. Crossroad Drain	60	ft.	\$.93	\$ 55.80
L36+30	E. Crossroad Drain	68	ft.	\$.93	\$ 63.24
16. L38+00	A. Deep Dish Excavation	505	yd ³	\$ 1.17	\$ 590.85
L38+00	B. Culvert Removal	Lump Sum			\$ 27.00
17. L40+30	Crossroad Drain	45	ft.	\$ 1.16	\$ 52.20
18. L41+64	A. Deep Dish Excavation	304	yd ³	\$ 1.17	\$ 355.68
L41+64	B. Culvert Removal	Lump Sum			\$ 27.00
L41+64	C. Outslope Excavation (117 yd ³)	Lump Sum			\$ 136.89
19. L45+48	A. Crossroad Drain	41	ft.	\$ 1.94	\$ 79.54
L45+48	B. Culvert Removal	Lump Sum			\$ 27.00
L47+52	C. Crossroad Drain	55	ft.	\$.92	\$ 50.60
L50+08	D. Crossroad Drain	59	ft.	\$.92	\$ 54.28
L51+14	E. Crossroad Drain	40	ft.	\$.92	\$ 36.80
L51+14	F. Culvert Removal	Lump Sum			\$ 27.00
L53+65	G. Crossroad Drain	51	ft.	\$ 1.31	\$ 66.81
L55+70	H. Crossroad Drain	53	ft.	\$ 1.31	\$ 69.43
L56+27	I. Crossroad Drain	82	ft.	\$ 1.31	\$ 107.42
L58+39	J. Crossroad Drain	42	ft.	\$ 1.31	\$ 55.02
L61+00	K. Crossroad Drain	25	ft.	\$ 1.31	\$ 32.75
20. L62+05	A. Optional Crossroad Drain	44	ft.	\$ 1.31	\$ 57.64

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UNIT PRICE CONTRACT CONTINUATION SHEET

Contract No. CX 8480-4-0005		Contractor H.O. "Whitey" Brown Backhoe Service			
Item No.	Supplies/Services	Quantity	Unit	Unit Price	Amount
	L63+61 B. Deep Dish Excavation	546	yd ³	\$ 1.17	\$ 638.82
	L63+61 C. Culvert Removal	Lump Sum			\$ 27.00
	L64+94 D. Deep Dish Excavation	443	yd ³	\$ 1.17	\$ 518.31
	L64+94 E. Outslope Excavation	404	yd ³	\$ 1.17	\$ 472.68
21.	L67+80 A. Crossroad Drain	41	ft.	\$.61	\$ 25.01
	L67+80 B. Culvert Removal	Lump Sum			\$ 27.00
	L68+44 C. Crossroad Drain	37	ft.	\$ 1.09	\$ 40.33
	L70+35 D. Crossroad Drain	51	ft.	\$ 1.09	\$ 55.59
	L71+38 E. Crossroad Drain	40	ft.	\$ 1.09	\$ 43.60
22.	M2+15 Crossroad Drain	118	ft.	\$.59	\$ 69.62
23.	M3+92 A. Deep Dish Excavation	483	yd ³	\$ 1.17	\$ 565.11
	M3+92 B. Culvert Removal	Lump Sum			\$ 27.00
24.	M5+21 A. Crossroad Drain	29	ft.	\$ 1.40	\$ 40.60
	M7+00 B. Crossroad Drain	120	ft.	\$ 1.40	\$ 168.00
25.	M9+24 A. Deep Dish Excavation	477	yd ³	\$ 1.17	\$ 558.09
	M9+24 B. Culvert Removal	Lump Sum			\$ 27.00
	M9+24 C. Outslope Excavation (189 yd ³)	Lump Sum			\$ 221.13
	M10+88 D. Optional Crossroad Drain	92	ft.	\$.89	\$ 81.88
	M12+98 E. Outslope Excavation (96 yd ³)	Lump Sum			\$ 112.32
	M12+98 F. Deep Dish Excavation	504	yd ³	\$ 1.17	\$ 589.68
	M12+98 G. Culvert Removal	Lump Sum			\$ 27.00
	M15+92 H. Deep Dish Excavation	219	yd ³	\$ 1.17	\$ 256.23
	M15+92 I. Culvert Removal	Lump Sum			\$ 27.00
26.	M17+00 A. Crossroad Drain	51	ft.	\$ 1.54	\$ 78.54

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UNIT PRICE CONTRACT CONTINUATION SHEET

Contract No.		Contractor			
Item No.	Supplies/Services	Quantity	Unit	Unit Price	Amount
	M18+23 B. Crossroad Drain	63	ft.	\$ 1.54	\$ 97.02
27.	M20+40 A. Deep Dish Excavation	279	yd ³	\$ 1.17	\$ 326.43
	M20+40 B. Culvert Removal	Lump Sum			\$ 27.00
28.	M22+14 A. Crossroad Drain	45	ft.	\$ 1.50	\$ 67.50
	M24+70 B. Crossroad Drain	87	ft.	\$ 1.50	\$ 130.50
	M26+54 C. Crossroad Drain	45	ft.	\$ 1.50	\$ 67.50
	M29+27 D. Crossroad Drain	43	ft.	\$ 1.50	\$ 64.50
	M31+00 E. Crossroad Drain	41	ft.	\$ 1.50	\$ 61.50
	M34+00 F. Crossroad Drain	52	ft.	\$ 1.50	\$ 78.00
	M35+10 G. Crossroad Drain	43	ft.	\$ 1.50	\$ 64.50
29.	M35+82 A. Deep Dish Excavation	364	yd ³	\$ 1.17	\$ 425.88
	M35+82 B. Culvert Removal	Lump Sum			\$ 27.00
30.	M37+15 A. Crossroad Drain	41	ft.	\$ 1.54	\$ 63.14
	M39+10 B. Crossroad Drain	66	ft.	\$ 1.54	\$ 101.64
	M41+63 C. Crossroad Drain	48	ft.	\$ 1.54	\$ 73.92
31.	M43+25 A. Deep Dish Excavation	170	yd ³	\$ 1.17	\$ 198.90
	M43+25 B. Culvert Removal	Lump Sum			\$ 27.00
32.	M44+30 A. Crossroad Drain	34	ft.	\$ 2.88	\$ 97.92
	M47+90 B. Crossroad Drain	27	ft.	\$ 2.88	\$ 77.76
	M50+10 C. Crossroad Drain	41	ft.	\$ 2.88	\$ 118.08
33.	M51+80 A. Deep Dish Excavation	172	yd ³	\$ 1.17	\$ 201.24
	M51+80 B. Culvert Removal	Lump Sum			\$ 27.00
	M52+93 C. Optional Crossroad Drain	58	ft.	\$ 1.82	\$ 105.56
34.	M54+86 A. Crossroad Drain	50	ft.	\$ 1.82	\$ 91.00

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UNIT PRICE CONTRACT CONTINUATION SHEET

Contract No.		Contractor			
Item No.	Supplies/Services	Quantity	Unit	Unit Price	Amount
	M56+70 B. Crossroad Drain	38	ft.	\$ 1.82	\$ 69.16
	M58+00 C. Crossroad Drain	37	ft.	\$ 1.82	\$ 67.34
35.	M59+74 A. Deep Dish Excavation	408	yd ³	\$ 1.17	\$ 477.36
	M59+74 B. Culvert Removal	Lump Sum			\$ 27.00
36.	M61+47 A. Crossroad Drain	31	ft.	\$ 1.93	\$ 59.83
	M62+78 B. Crossroad Drain	39	ft.	\$ 1.93	\$ 75.27
	M66+47 C. Crossroad Drain	50	ft.	\$ 1.93	\$ 96.50
	M68+05 D. Crossroad Drain	31	ft.	\$ 1.93	\$ 59.83
37.	M68+89 A. Deep Dish Excavation	267	yd ³	\$ 1.17	\$ 312.39
	M68+89 B. Culvert Removal	Lump Sum			\$ 27.00
38.	M70+21 A. Crossroad Drain	34	ft.	\$ 2.20	\$ 74.80
	M71+44 B. Crossroad Drain	39	ft.	\$ 2.20	\$ 85.80
	M73+10 C. Crossroad Drain	25	ft.	\$ 2.20	\$ 55.00
39.	M74+41 A. Deep Dish Excavation	351	yd ³	\$ 1.17	\$ 410.67
	M74+41 B. Culvert Removal	Lump Sum			\$ 27.00
	M74+00 C. Deep Dish Excavation	347	yd ³	\$ 1.17	\$ 405.99
	M76+00 D. Culvert Removal	Lump Sum			\$ 27.00
40.	M77+50 A. Crossroad Drain	34	ft.	\$.86	\$ 29.24
	M78+86 B. Crossroad Drain	33	ft.	\$.86	\$ 28.38
	M79+90 C. Crossroad Drain	39	ft.	\$.86	\$ 33.54
	M80+74 D. Crossroad Drain	41	ft.	\$.86	\$ 35.26
	M80+74 E. Culvert Removal	Lump Sum			\$ 135.68
	M82+20 F. Crossroad Drain	31	ft.	\$ 1.85	\$ 57.35
	M83+82 G. Crossroad Drain	34	ft.	\$ 1.85	\$ 62.90

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UNIT PRICE CONTRACT CONTINUATION SHEET

Contract No.		Contractor			
	M85+50	H. Crossroad Drain	46	ft.	\$ 1.85 \$ 85.10
41.	M86+00	A. Deep Dish Excavation	141	yd ³	\$ 1.17 \$ 164.97
	M86+00	B. Culvert Removal	Lump Sum		\$ 27.00
42.	M87+27	Crossroad Drain	51	ft.	\$.97 \$ 49.47

TOTAL \$ 22,803.19

Note: Contractor's Invoice #8190 for \$22,578.84 reflects 90% billing for all Deep Dish Excavations until final surveying and according to the terms of the contract. Modification 3 and Final Estimate reflects adjustments following final survey and subsequent to contractor's Invoice #8190.



Unit: 84-2 PP#5 Pre H.E.



Unit: 84-2 PP#5 8/19/84



Unit: 84-2 PP#5 7/10/84 BBA



Unit: 84-2 PP#6 Pre H.E.



Unit: 84-2 PP#6 8/07/85 NLD



Unit: 84-2 PP#8 Pre H.E.



Unit: 84-2 PP#8 11/19/84



Unit: 84-2 PP#8 7/10/86 BBA



Unit: 84-2 PP#16A 8.23.84



Unit: 84-2 PP#16A 8/7/85 NLD



Unit: 84-2 PP#16A 7/10/86 BBA