

FRUIT GROWERS



SUPPLY COMPANY

PATTERSON CREEK, SCOTT VALLEY, CA

ROAD SEDIMENT REDUCTION PROJECT



FINAL REPORT

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.

TABLE OF CONTENTS:

<u>Page Number</u>	<u>Contents</u>
1	Abstract Introduction & Description of Study Area
2	Methods and Materials
3	Methods and Material Continued Results and Accomplishments
4	Summary and Conclusions
5	Illustration #1: Road Reconstruction
6	Illustration #2: French Drain Construction
7	Project Vicinity Map
8	Project Location Map #1
9	Project Location Map #2
10	Photo Log
11 - 18	Photo's
19	Summary of Project Costs
20 - 26	Details of work accomplished and costs by site.

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.

1. Abstract:

Fruit Growers Supply Company entered into a cooperative project agreement with the US Fish and Wildlife Service in 1998 to correct past erosion problems on FGS' main access road up Patterson Creek in Scott Valley, California. The primary goals of the project were to reduce ongoing road erosion and sediment discharge into Patterson Creek thereby improving downstream spawning habitat for anadromous fisheries. The entire project took a little over 1 month to complete starting in mid September 1999, and ending in late October, 1999. All work specified in the "Methods" section of the agreement was completed as well as additional road maintenance between stations 1 and 10.

2 & 3. Introduction & Description of Study Area:

The project took place in the Patterson Creek watershed which is tributary to the Scott River tributary to the Klamath River. The Scott River and many of its tributaries support runs of anadromous fish species: chinook (king) salmon, coho (silver) salmon, and steelhead. Only steelhead are known to exist in the lower reaches of Patterson Creek with all of the anadromous species listed utilizing the main stem of the Scott River and some other tributaries. The Scott River produces a large proportion of the natural fall chinook salmon in the Klamath River system. In five of the last eight years, the Scott was the largest contributor of natural fall chinook spawners in any Klamath tributary (excluding the Trinity) or mainstem reach. (*Scott River Watershed CRMP - Fish Population and Habitat Plan - 1997*).

Watercourses where the project is situated are first, and second order perennial, and intermittent headwater streams tributary to Patterson Creek. Typically these streams are low volume, high velocity, high stream gradient, transport systems.

Land use is diverse within the Patterson Creek watershed. Western portions of the watershed are in wilderness preserve associated with the Marble Mountain Wilderness. Central portions are owned by Fruit Growers Supply Company and are used for timber production. Eastern portions on and near the valley floor are mostly owned by ranchers. Primary land uses here are cattle grazing and alfalfa production.

The project is located on private timber lands in central portions of the watershed owned by Fruit Growers Supply Company. Timber production is the primary land use on this ownership. Unevenaged management has been allocated to most areas in the watershed with evenaged management assigned to scattered locations on the more gradual slopes. Activities associated with timber production which take place in areas where the project is situated include the growing and periodic (10 to 30 re-entry) harvesting of timber, the skidding of timber to landings, and the use of the road system for transporting timber from the woods to the mill.

High flood stage storm events which occurred during the winter of 1997 caused significant levels of erosion on the Patterson Creek road north of Patterson Creek. It is estimated that about 6,000 cubic yards of sediment was displaced as a result of this storm event. Roughly 4,000 cubic yards of this erosion was the result of poor road

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.

drainage and road inside ditches associated with road segments "A", and "B". Roughly 2,000 cubic yards of this erosion came from road stream crossing failures. Without corrective action future erosion levels and sediment discharge into Patterson Creek would likely remain high.

Project Goals were as follows:

- To reduce ongoing erosion and sediment discharge into streams tributary to Patterson Creek tributary to the Scott River.
- To improve downstream spawning habitat for steelhead, chinook, and coho through the reduction of sediment entering the watercourse system.
- To improve the permanence of road drainage structures making the road system more resilient to flood stage storm events, and greatly reducing future potential erosion and sediment discharge. The proposed improvements will also reduce the level of road maintenance necessary in the future.
- To actively participate cooperatively with other landowners in the Scott River CRMP in ongoing efforts to improve habitat conditions for anadromous fisheries.

4. Methods and Materials:

Refer to pages 19 to 26 for a detailed summary of work accomplished and materials used by project site. Refer to pages 8,9 for maps showing work site locations.

Four basic methods were used in this project to improve road drainage thereby reducing erosion and potential sediment discharge. These were 1) french drain construction, 2) corrugated metal pipe (CMP) installation, 3) road reconstruction, and 4) road reshaping.

French Drain Construction: French drains are a type of open rock ford that when properly constructed are very effective in reducing erosion. Although the magnitude of materials needed, excavation, and construction varies by site, a standard sequence of steps is used in their construction as described below: 1) Site Preparation: Road fill at crossing locations will be excavated to produce a solid foundation for rock base. Road approaches will be reconstructed to produce a dip at the crossing site to eliminate the potential for future stream diversions down the road surfaces. 2) Road Base: The excavated erodible fill will be replaced with large 500 pound boulders to build up the road base. Large boulders will also be placed on the downhill side of the crossing below the outside edge of the road to act as an effective water energy dissipater and to eliminate the potential for downcutting. 3) Road Surface: Geotextile fabric will be laid over the boulder base. Heavy rock (4 to 8 inches diameter) will then be laid on top of the fabric at the crossing for the road surface. Road approaches will be rocked with pit run material to reduce the potential for road fines to enter the watercourse.

The advantages to using french drains are many. Their open rock ford design greatly reduces the potential for failure compared to more standard culvert installations and they require much lower levels of maintenance to remain functional. The large boulder

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.

foundation greatly reduces the potential for downcutting on the road surface and road fill during high stream flows. The road dip at the crossing location and the concave channel shape of the boulder base across the road and down the fill slope confines stream flows to the natural channel and reduces stream diversion potential. The road surface will remain intact during peak stream flows due to the heavy rock construction. The crossings are designed to allow water to flow through the boulder rock base below the road surface during normal stream flow periods when traffic levels are highest there by reducing fine sediment deposition from vehicles.

Refer to page 6 for an illustration on french drain construction.

Culvert Installation: Where the effectiveness of using a french drain was questioned because of high winter stream flows, corrugated metal pipes were installed. At 3 locations CMP's were installed in combination with french drains. During peak winter stream flows these culverts act as a relief valve allowing for the passage of high volumes of water. The french drains act as heavily rock armored safe outlets for water flows exceeding culvert capacity.

Road Reconstruction: The intent in road reconstruction was to make road segments more "hydrologically invisible" on the hillslope. Concentrated road runoff was eliminated as much as possible. This was accomplished by narrowing road width, eliminating outside road berms and through cuts, and by rocking and outsloping road surfaces. Where needed rolling dips were installed in the road prism to drain water. These were strategically placed to reduce as much as possible potential hillslope erosion below the road. Road reconstruction took place at road segment locations "A" and "B" shown on the Project Location Map #2. Refer to page 5 for an illustration on road reconstruction.

Road Reshaping: Road reshaping involved eliminating outside road berms, narrowing road widths, and outsloping road surfaces to disperse and effectively drain runoff. Road segments where reshaping was employed did not show signs of major erosion problems but were in need of "touch up" corrective action to maintain effective road drainage. Road reshaping took place between reference points 1 and 15 as shown on Project Location Maps #1, and #2.

Bank Stabilization: A grass seed mix of 80% tetraploid rye, and 20% wild oats has been applied to exposed soil areas created by reconstruction activities at a rate of 11 pounds per acre. This grass seed mixture was developed during rehabilitation work associated with the Scott River CRMP supported French Creek watershed improvement projects. This mixture has proven to be very effective in stabilizing soils. The wild oat seed germinates rapidly providing immediate ground cover. The tetraploid rye seed is used for more long term stabilization. It germinates in clumps and has been found to be very effective especially decomposed granitic soils.

5. Results and Accomplishments:

All of the work specified in the original cooperative agreement was accomplished. Such work included installing 14 french drains, installing 5 corrugated metal pipes, reconstructing and rocking 4,600 feet of road, and reshaping 3.4 miles of road to improve drainage.

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.

6. Summary and Conclusions:

In conclusion, the initial installation of improved road drainage facilities on the main access road to Patterson Creek was very successful. Although a quantifiable figure of cubic yards of soil material saved from entering the stream system is unknown, it is considerable and is likely in the thousands of cubic yards. All drainage facilities installed under this project will be monitored over time for effectiveness and permanency.

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.

Road Reconstruction Illustration

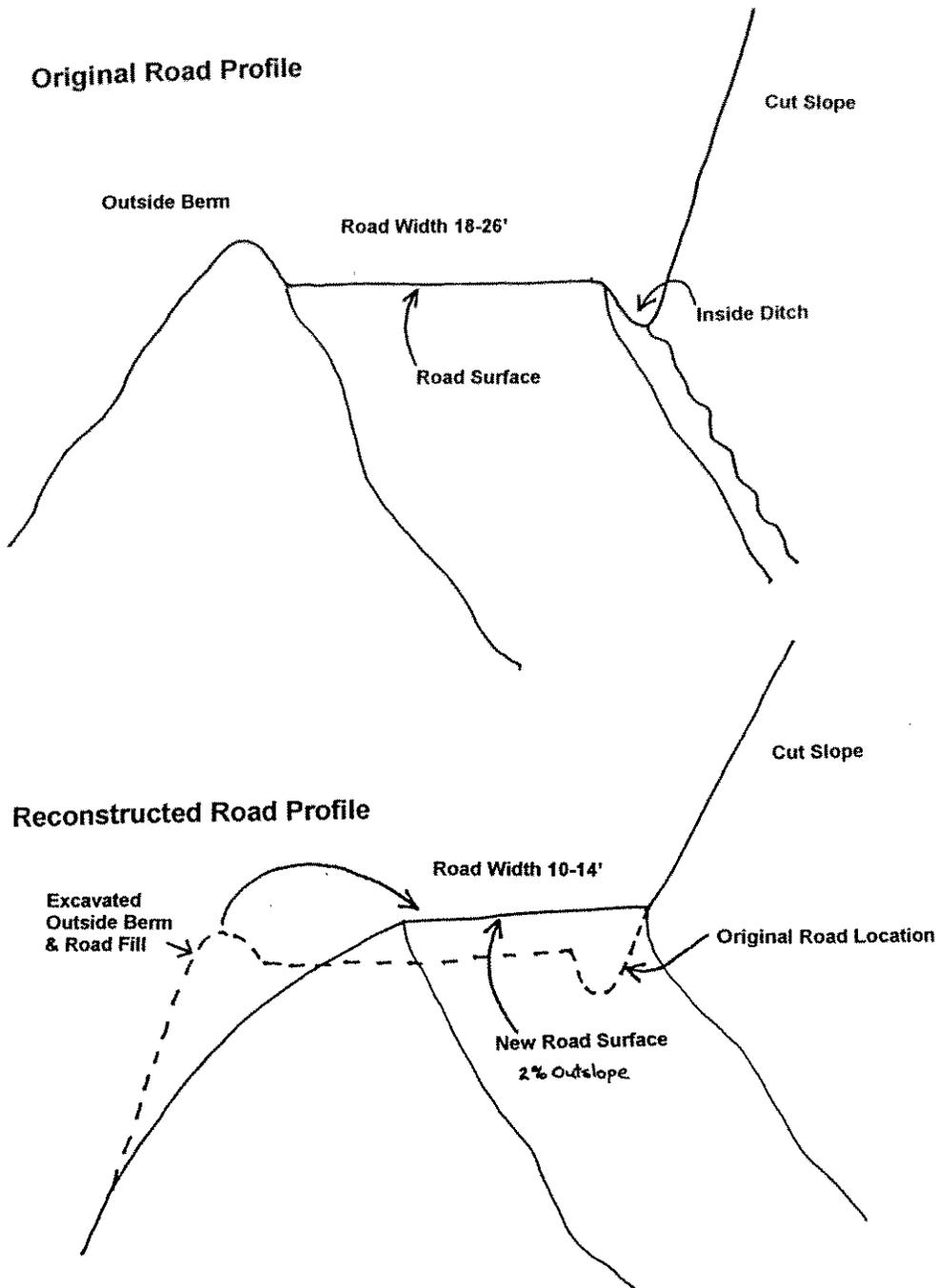


Illustration #1: This illustration shows a typical road profile before and after reconstruction. The original road has an inside ditch and an outside berm. In reconstruction the inside ditch and outside road berm are eliminated. Outside berm and road fill material is excavated and placed to create a new road base. The end product is a much narrower outsloped road which tends to disperse rather than concentrate water.

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.

French Drain Construction Illustration

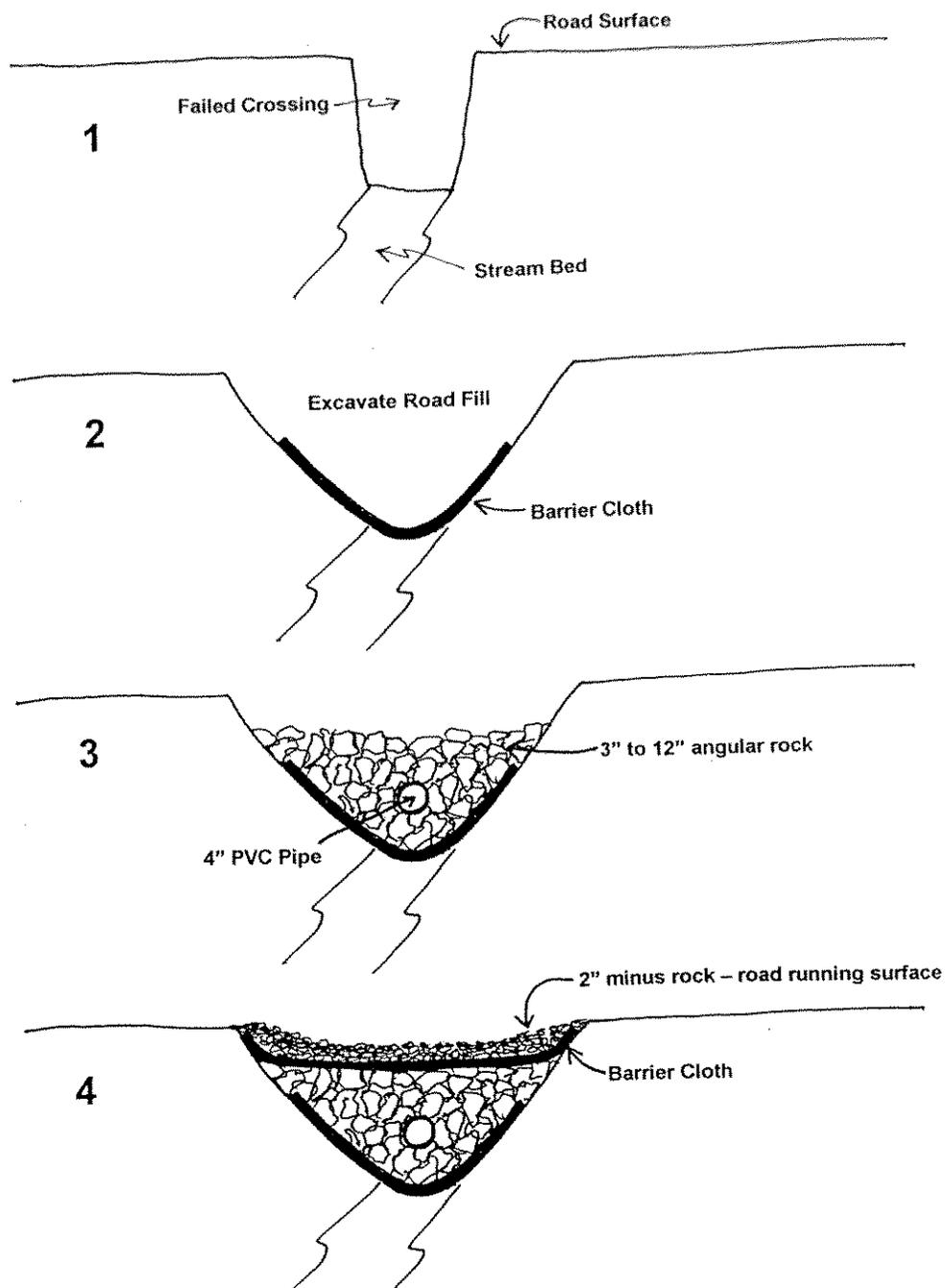


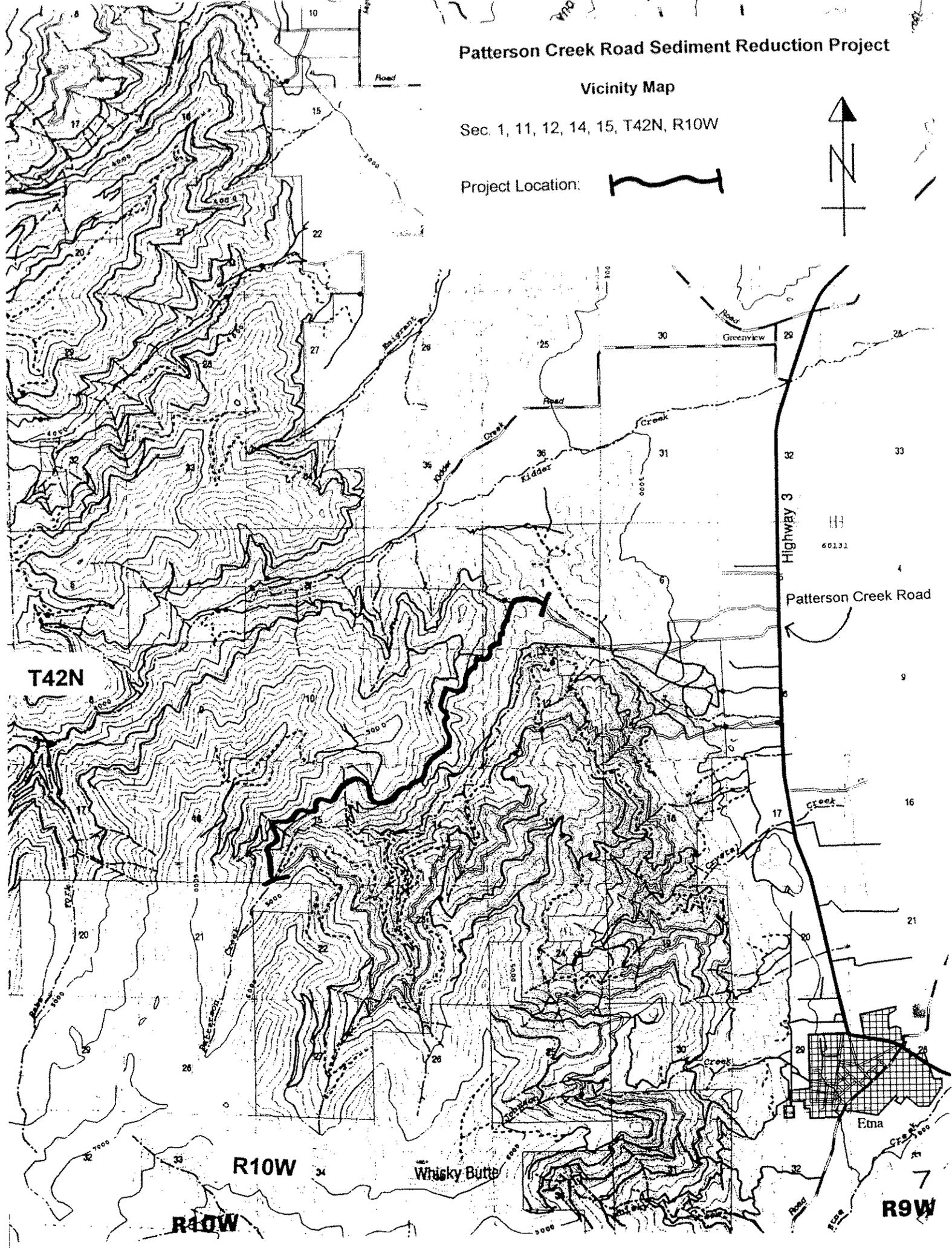
Illustration #2: This illustration shows the basic steps in constructing a french drain. Step 1: Failed Crossing. Step 2: Road fill at failure is excavated out. Barrier cloth is laid across bottom of excavation to prevent future downcutting. Step 3: 3" to 12" angular rock is placed on top of barrier cloth. Water flows through this angular rock. 4" PVC pipe is installed in bottom 1/3rd of the drain to allow for macro invertebrate passage. Step 4: Barrier cloth is laid on top of angular rock to reduce the potential of clogging from soil fines from road surface. Road running surface is laid on top of barrier cloth.

Patterson Creek Road Sediment Reduction Project

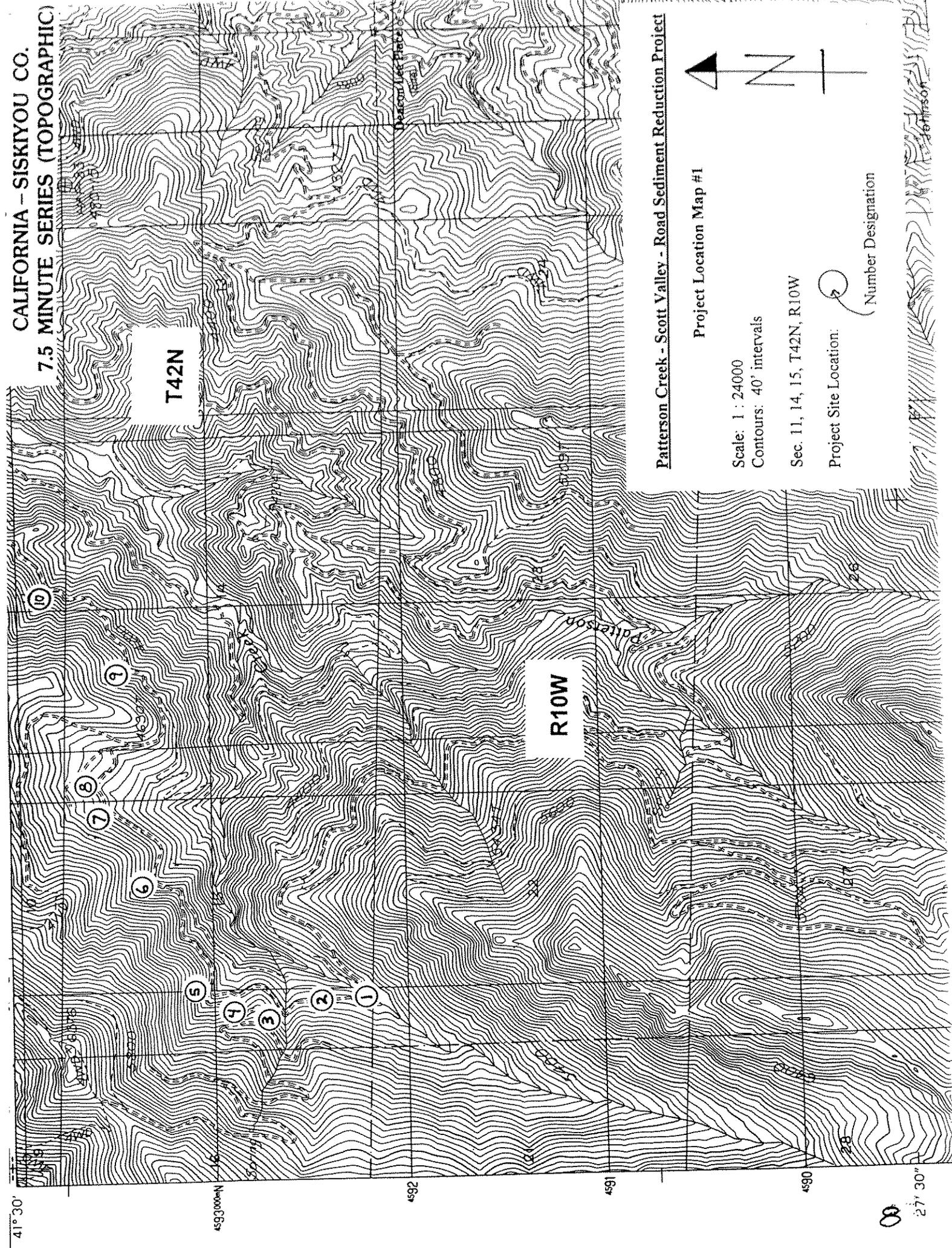
Vicinity Map

Sec. 1, 11, 12, 14, 15, T42N, R10W

Project Location:



CALIFORNIA - SISKIYOU CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



Patterson Creek - Scott Valley - Road Sediment Reduction Project

Project Location Map #1

Scale: 1 : 24000

Contours: 40' intervals

Sec. 11, 14, 15, T42N, R10W

Project Site Location:



Number Designation

41° 30'

493000m

492

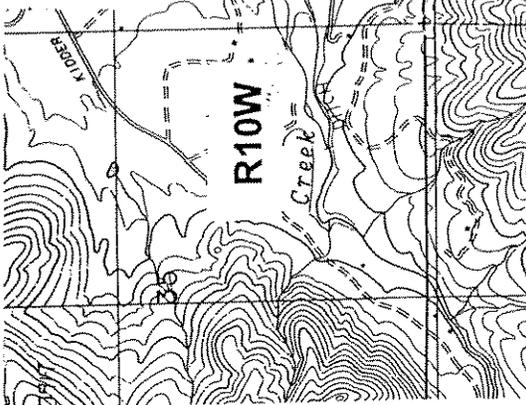
491

490

27° 30'

28

**GREENVIEW QUADRANGLE
CALIFORNIA—SISKIYOU CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)**



Patterson Creek - Scott Valley - Road Sediment Reduction Project

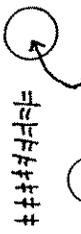
Project Location Map #2

Scale: 1 : 24000

Contours: 40' intervals

Sec. 1, 11, 12, T42N, R10W

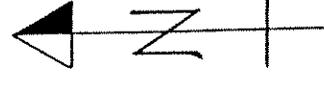
Road Reconstruction:



Letter Designation



Number Designation



4598

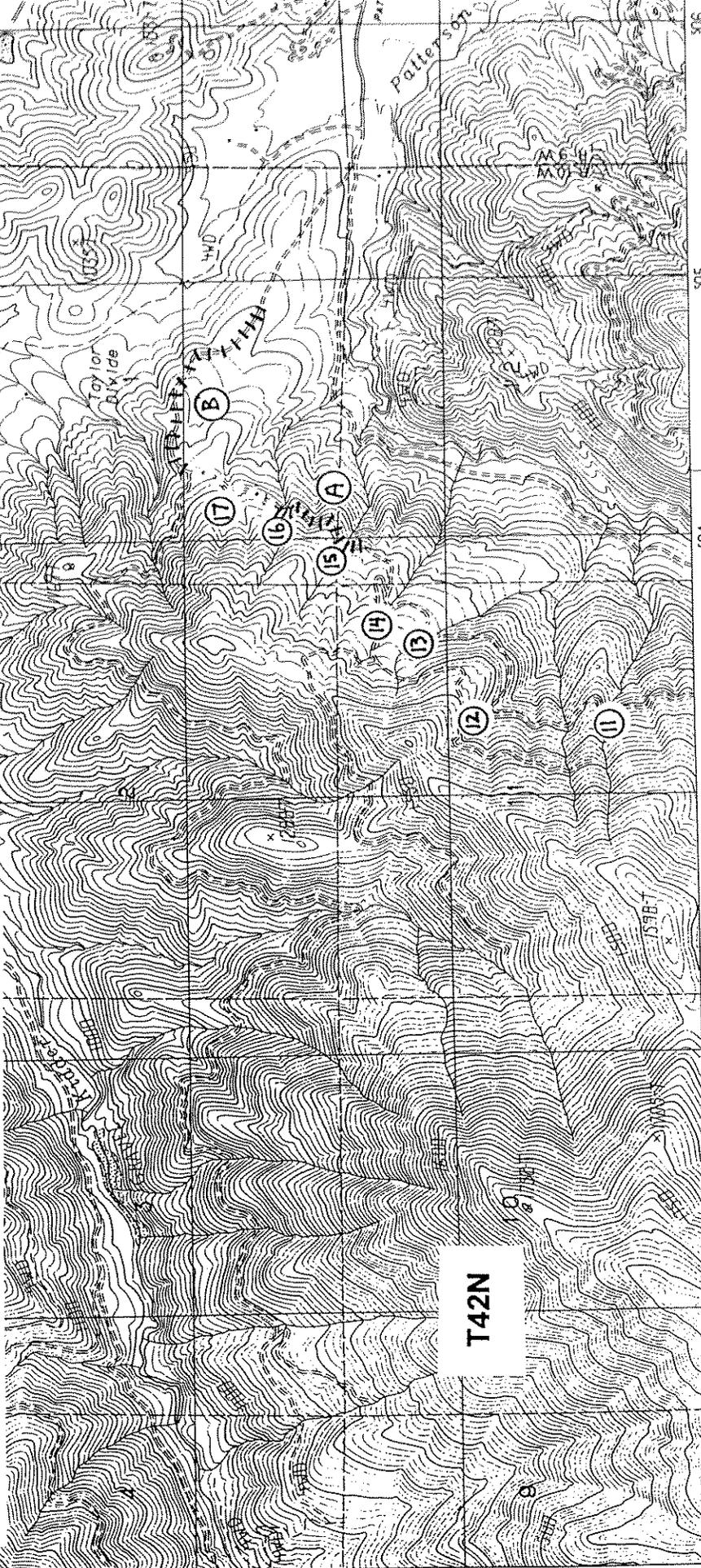
4597

800 000
FEET

4596

4595

41° 30' 123° 00'



1730 000 | FEET

41° 30' 123° 00'

SCALE 1:24 000



PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY USGS, NOS/NOAA
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN 1974 AND 1980
FIELD CHECKED 1980. MAP EDITED UNIVERSAL TRANSVERSE MERCATOR
PROJECTION 1000-METER UNIVERSAL TRANSVERSE MERCATOR ZONE 10
CALIFORNIA

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.

Photo Log

Refer to the table below for descriptions of photo's shown on pages

Photo	Description
A	Site #5 – Large French Drain with culvert. Processing rip rap to be placed in french drain.
B	Site #5: Rip rap being placed with excavator in french drain.
C	Site #5: Rip rap being placed with excavator on outside edge of road for fill protection.
D	Site #5: Barrier cloth placed over french drain rock. The road running surface will be placed on top of barrier cloth.
E	Site #14: Barrier cloth laid over french drain. Notice 4" PVC for macro-invertebrate passage.
F	Site #14: Road running surface deposited over barrier cloth.
G	Site #11: Site before installation of french drain.
H	Site #11: Channel excavated across road for french drain installation.
I	Site #11: 4" PVC pipe and french drain rock in place.
J	Site #11: Barrier cloth in place above french drain rock.
K	Site #11: Finished product – french drain with road running surface in place.
L	Road Reconstruction – Outside road berm and road fill is excavated to dissipate runoff. Road is outsloped at about 2%.
M	Road Reconstruction – Excavating outside road berm and road fill. This excavated material is placed on the road to build up new much narrower road surface .
N	Road reconstruction – finished product.

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.



Photo
A



Photo
B

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.

Photo
C

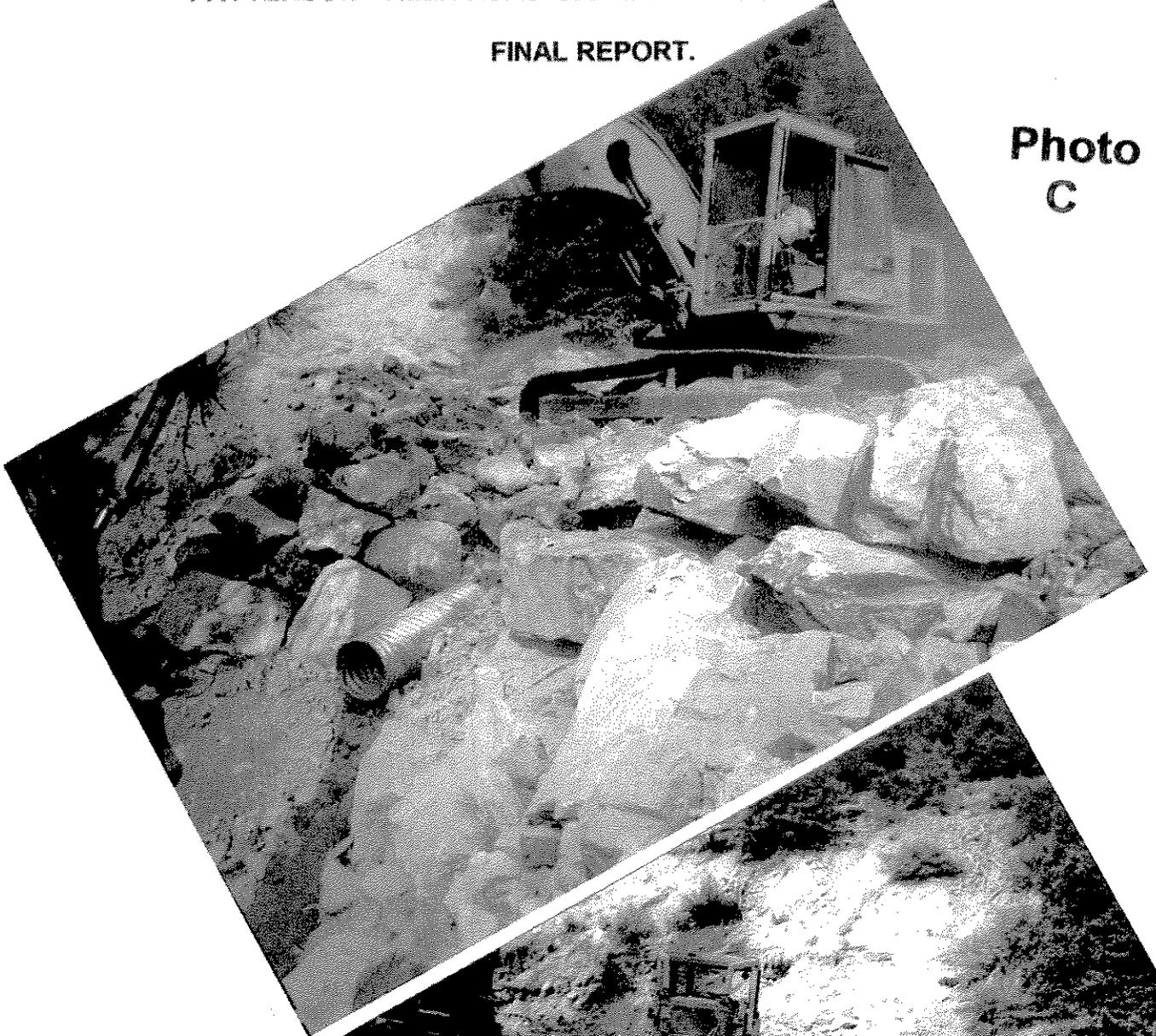
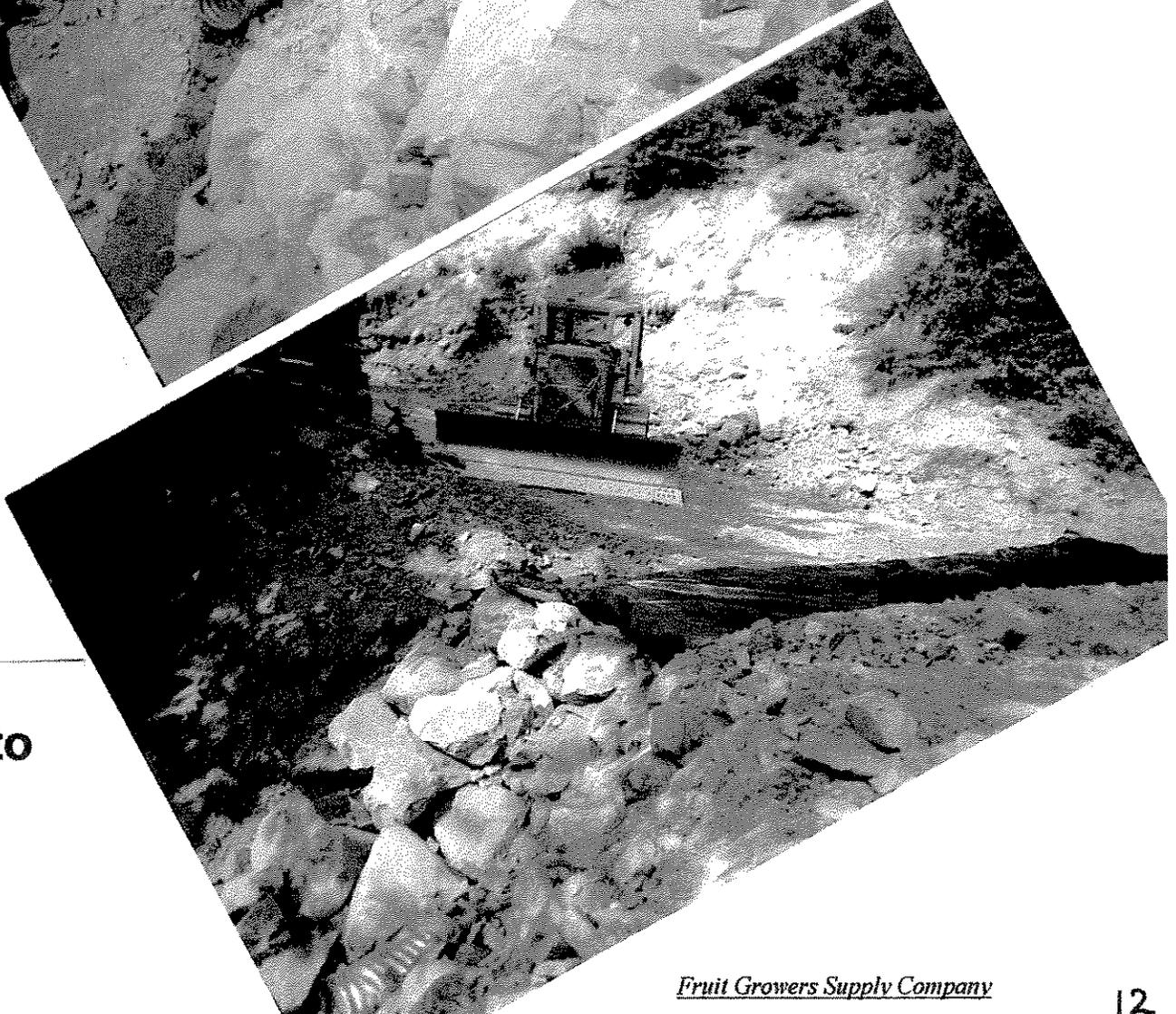


Photo
D



PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.

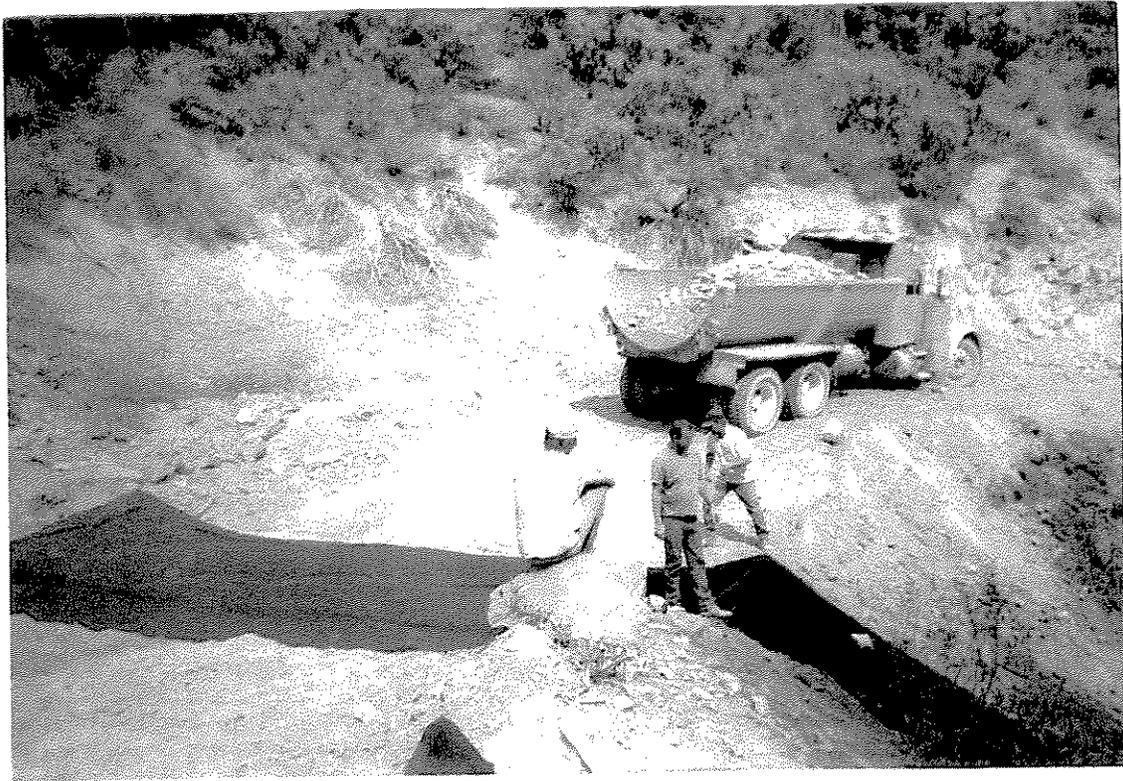


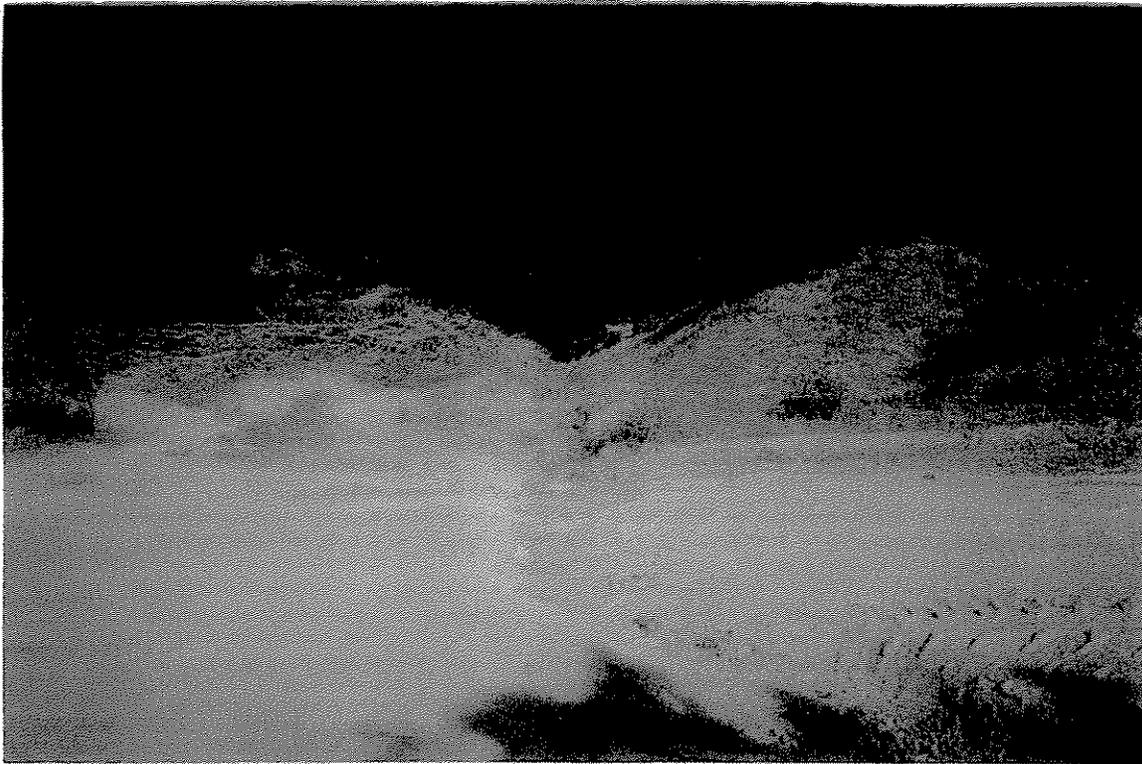
Photo
E



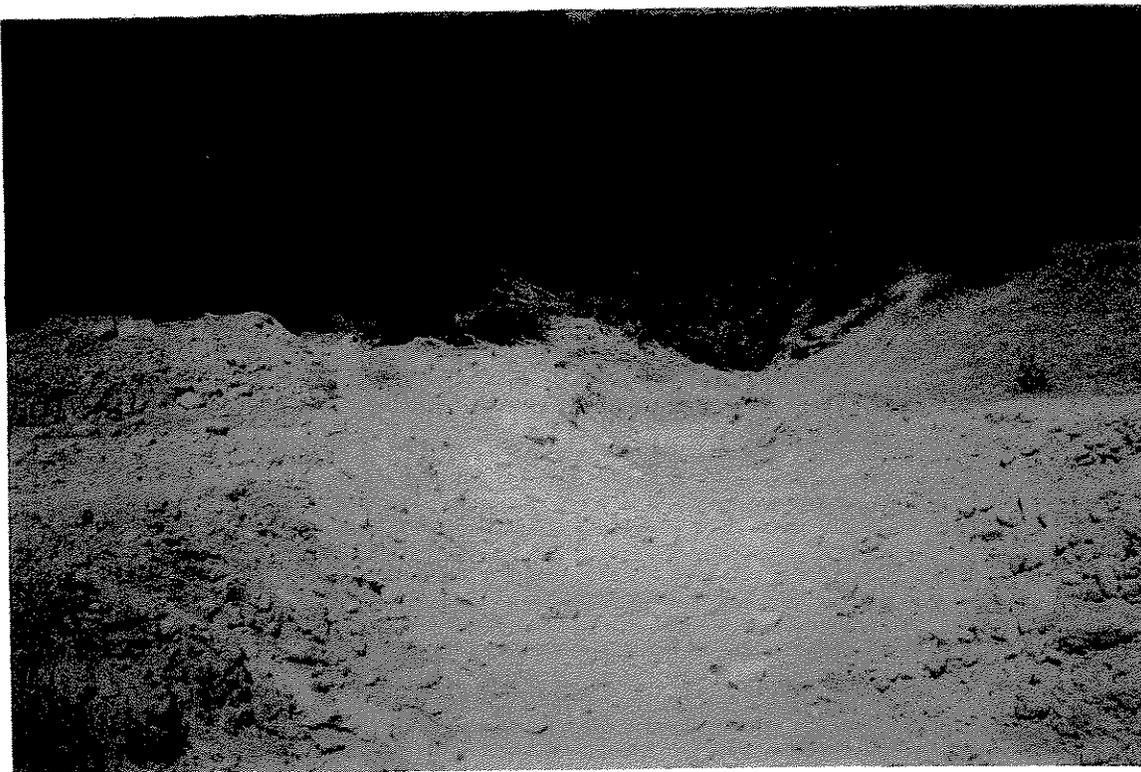
Photo
F

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.



**Photo
G**



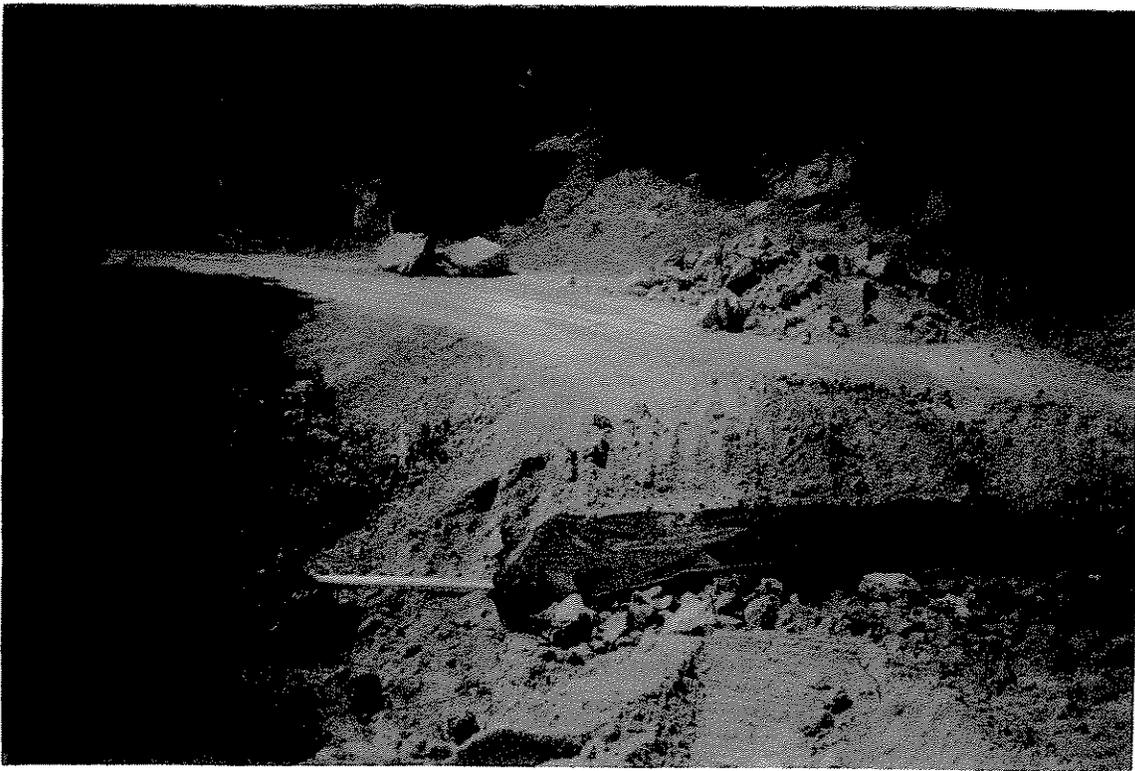
**Photo
H**

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.



Phot
I



Phot
J

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

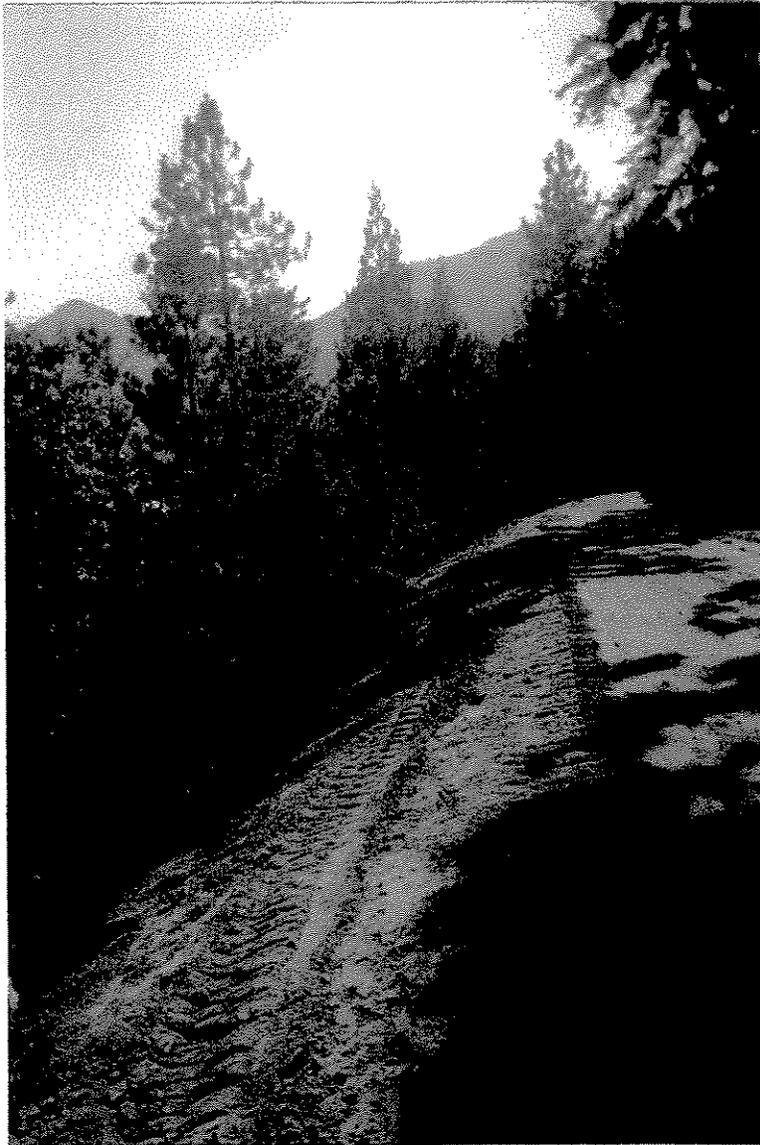
FINAL REPORT.



**Photo
K**

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.



**Photo
L**

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

FINAL REPORT.



**Photo
M**



**Photo
N**

**PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT
SUMMARY OF PROJECT COSTS**

Cooperative Agreement

Agreement # - 113338J254
 DCN # - 11333 - 7 - J132
 Fund # - 11333-1126-0000

UNIT	DESCRIPTION	Equipment Costs	Material & Supply Costs	Total Costs
1	Main Patterson Creek Crossing	\$ 2,705.00	\$0.00	\$2,705.00
2	Humboldt Crossing	\$ 5,615.00	\$ 821.84	\$6,436.84
3	Install French drain	\$ 2,480.00	\$0.00	\$2,480.00
4	Remove Humboldt	\$ 6,780.00	\$ 859.24	\$7,639.24
5	French drain	\$ 8,305.00	\$595.38	\$8,900.38
6	French drain	\$ 8,275.00	\$ 746.74	\$9,021.74
7	Install CMP	\$ 1,285.00	\$ 702.10	\$1,987.10
8	Remove Humboldt	\$ 790.00	\$ 543.40	\$1,333.40
9	French drain	\$ 3,112.50	\$ 275.78	\$3,388.28
10 to 17	French drains	\$11,020.00	\$ 2,582.40	\$13,602.40
Road A&B	Reconstruction	\$26,625.00	\$0.00	\$26,625.00
Road	Reconstruction	\$ 5,485.00	\$0.00	\$5,485.00
Total:		<u>\$82,477.50</u>	<u>\$7,126.88</u>	<u>\$89,604.38</u>

Funding Requested: \$27,700.00

Total Project Costs: \$89,604.38

FGS' Cost Share: 69%

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

Site 1: Main Patterson Creek Road Crossing.

Work Accomplished: Rock road approaches to Patterson Creek.
 Produce, haul, spread rock on 200 feet by 14 feet wide
 segment of road.

Equipment and Operation Costs:

Excavator	hours @	\$125.00	=	\$0.00
CAT	6 hours @	\$90.00	=	\$540.00
966 Loader	8 hours @	\$65.00	=	\$520.00
Dump Trucks	19 hours @	\$55.00	=	\$1,045.00
Grader	8 hours @	\$75.00	=	\$600.00
Water Truck	hours @	\$55.00	=	\$0.00
Additional Labor	hours @	\$37.50	=	\$0.00
		Subtotal:	=	\$2,705.00

Materials:	140 yds rock			\$0.00
		Subtotal:		\$0.00

Total: **\$2,705.00**

Site 2: Humboldt Ford

Work Accomplished: Remove humboldt crossing.
 Install French Drain
 Install 40' X 18" CMP.
 Recondition Road surface where gullyng occurred.

Equipment and Operation Costs:

Excavator	23 hours @	\$125.00	=	\$2,875.00
CAT	12 hours @	\$90.00	=	\$1,080.00
966 Loader	12 hours @	\$65.00	=	\$780.00
Dump Trucks	16 hours @	\$55.00	=	\$880.00
Grader	hours @	\$75.00	=	\$0.00
Water Truck	hours @	\$55.00	=	\$0.00
		Subtotal:	=	\$5,615.00

Materials:	(1) 40' X 18" CMP @ \$7.50 / ft.			\$300.00
	(1) 18" band @ \$11.60 / band			\$11.60
	Additional Labor for CMP installation @ \$37.50 / hr.			\$75.00
	Geotextile Fabric. 70 yds @ \$5.58 / yd			\$435.24
	Rip Rap - 70 yds			\$0.00
	Road Cussion - 30 yds			\$0.00
		Subtotal:		\$821.84

Total: **\$6,436.84**

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

Site 3: Old Crushed Culvert.

Work Accomplished: Remove old CMP.
Install french drain and new CMP.
Reshape Road.

Equipment and Operation Costs:

Excavator	4 hours @	\$125.00	=	\$500.00
CAT	6 hours @	\$90.00	=	\$540.00
966 Loader	8 hours @	\$65.00	=	\$520.00
Dump Trucks	14 hours @	\$55.00	=	\$770.00
Grader	2 hours @	\$75.00	=	\$150.00
Water Truck	hours @	\$55.00	=	\$0.00
		Subtotal:	=	<u>\$2,480.00</u>

Materials:	20 yds french drain rock	\$0.00
	Subtotal:	<u>\$0.00</u>

Total: **\$2,480.00**

Site 4: Stream ford. Old Humboldt Crossing.

Work Accomplished: Remove old humboldt crossing.
Install French drain and CMP.
Recondition road bed.

Equipment and Operation Costs:

Excavator	33 hours @	\$125.00	=	\$4,125.00
CAT	12 hours @	\$90.00	=	\$1,080.00
966 Loader	9 hours @	\$65.00	=	\$585.00
Dump Trucks	18 hours @	\$55.00	=	\$990.00
Grader	hours @	\$75.00	=	\$0.00
Water Truck	hours @	\$55.00	=	\$0.00
		Subtotal:	=	<u>\$6,780.00</u>

Materials:	(1) 18" X 40' CMP @ \$7.50 / yd	\$300.00
	(1) 18" band @ \$11.50 / band	\$11.50
	Geotextile Fabric. 70 yds @ \$5.58/yd	\$435.24
	3 hrs. additional labor for CMP installation @ \$37.50/hr	\$112.50
	Subtotal:	<u>\$859.24</u>

Total: **\$7,639.24**

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

Site 5: French Drain

Work Accomplished: Re-establish road width.
Rip rap overside
Install French Drain.

Equipment and Operation Costs:

Excavator	31 hours @	\$125.00	=	\$3,875.00
CAT	23 hours @	\$90.00	=	\$2,070.00
966 Loader	21 hours @	\$65.00	=	\$1,365.00
Dump Trucks	14 hours @	\$55.00	=	\$770.00
Grader	hours @	\$75.00	=	\$0.00
Water Truck	hours @	\$55.00	=	\$0.00
Additional Labor	6 hours @	\$37.50	=	\$225.00
		Subtotal:	=	<u>\$8,305.00</u>

Materials:	60' of 4" pvc pipe @ \$0.53 / ft.	\$31.80
	Geotextile Fabric. 101 yds @ \$5.58/yd	\$563.58
	260 yds fill material	\$0.00
	140 yds rip rap	\$0.00
	70 yds french drain rock	\$0.00
	Subtotal:	<u>\$595.38</u>

Total: **\$8,900.38**

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

Site 6: French Drain

Work Accomplished: Install French Drain
 Install CMP
 Re-establish road surface
 Re-establish road fill
 Rip rap CMP outlet

Equipment and Operation Costs:				
Excavator	27 hours @	\$125.00	=	\$3,375.00
CAT	19 hours @	\$90.00	=	\$1,710.00
966 Loader	18 hours @	\$65.00	=	\$1,170.00
Dump Trucks	34 hours @	\$55.00	=	\$1,870.00
Grader	hours @	\$75.00	=	\$0.00
Water Truck	hours @	\$55.00	=	\$0.00
Additional Labor	4 hours @	\$37.50	=	\$150.00
		Subtotal:	=	\$8,275.00

Materials:	(1) 40' X 18" CMP @ \$7.50 / ft. + 1 band @ \$11.50	\$311.50
	Geotextile fabric 78 sq yds @ \$5.58/yd	\$435.24
	80 yds fill material for road surface	\$0.00
	280 yds fill material to re-establish road prism	\$0.00
	90 yds french drain rock	\$0.00
	240 yds rip rap over side of fill slope	\$0.00
	Subtotal:	\$746.74

	Total:	\$9,021.74
--	---------------	-------------------

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

Site 7: Installation of 18" CMP.

Work Accomplished: Re-establish natural stream channel above road.
Install CMP.
Construct safe outlet in road prism.

Equipment and Operation Costs:

Excavator	3 hours @	\$125.00	=	\$375.00
CAT	2 hours @	\$90.00	=	\$180.00
966 Loader	1 hours @	\$65.00	=	\$65.00
Dump Trucks	8 hours @	\$55.00	=	\$440.00
Grader	hours @	\$75.00	=	\$0.00
Water Truck	hours @	\$55.00	=	\$0.00
Additional Labor	6 hours @	\$37.50	=	\$225.00
		Subtotal:	=	\$1,285.00

Materials:	(1) 40' X 18" CMP @ \$7.50/ft + 1 band @ \$11.50	\$311.50
	Geotextile Fabric - 70 sq yds @ \$5.58/yd	\$390.60
	Subtotal:	\$702.10

Total: \$1,987.10

Site 8: Humboldt Crossing.

Work Accomplished: Remove old humboldt crossing.
Install 18" CMP.

Equipment and Operation Costs:

Excavator	3 hours @	\$125.00	=	\$375.00
CAT	hours @	\$90.00	=	\$0.00
966 Loader	1 hours @	\$65.00	=	\$65.00
Dump Trucks	5 hours @	\$55.00	=	\$275.00
Grader	hours @	\$75.00	=	\$0.00
Water Truck	hours @	\$55.00	=	\$0.00
Additional Labor	2 hours @	\$37.50	=	\$75.00
		Subtotal:	=	\$790.00

Materials:	(1) 18" X 30' CMP @ \$7.50/ft. + (1) band @ \$11.50	\$236.50
	Geotextile fabric - 55 sq yds @ \$5.58/yd	\$306.90
	Subtotal:	\$543.40

Total: \$1,333.40

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

Site 9: Install French Drain.

Work Accomplished: Re-establish road prism.
Install French Drain.
Install rip rap over fill slope.

Equipment and Operation Costs:				
Excavator	6 hours @	\$125.00	=	\$750.00
CAT	2 hours @	\$90.00	=	\$180.00
966 Loader	9 hours @	\$65.00	=	\$585.00
Dump Trucks	27 hours @	\$55.00	=	\$1,485.00
Grader	hours @	\$75.00	=	\$0.00
Water Truck	hours @	\$55.00	=	\$0.00
Additional Labor	3 hours @	\$37.50	=	\$112.50
		Subtotal:	=	\$3,112.50

Materials:	(1) 26'X4" pvc @ \$0.53/ft	\$13.78
	Geotextile Fabric - 47 yds @ \$5.58/yd	\$262.00
	70 yds fill material to re-establish road	\$0.00
	40 yds french drain rock	\$0.00
	80 yds rip rap over road fill slope	\$0.00
	Subtotal:	\$275.78

Total: \$3,388.28

Sites 10,11,12,13,14,15,16,17. Install French Drains.

Work Accomplished: Install french drain.
Place rip rap over side of fill.
Install 4" pvc.

Equipment and Operation Costs:				
Excavator	32 hours @	\$125.00	=	\$4,000.00
CAT	32 hours @	\$90.00	=	\$2,880.00
966 Loader	16 hours @	\$65.00	=	\$1,040.00
Dump Trucks	40 hours @	\$55.00	=	\$2,200.00
Grader	hours @	\$75.00	=	\$0.00
Water Truck	hours @	\$55.00	=	\$0.00
Additional Labor	24 hours @	\$37.50	=	\$900.00
		Subtotal:	=	\$11,020.00

Materials:	(8) 30'X4" pvc. @ \$0.53/ft.	\$127.20
	Geotextile fabric - (8) X 55 sq yds/site @ \$5.58/ft.	\$2,455.20
	Subtotal:	\$2,582.40

Total: \$13,602.40

PATTERSON CREEK ROAD SEDIMENT REDUCTION PROJECT

Road Segments A and B: Road reconstruction and drainage improvement.
Total Road Length Treated - 4,600 ft.

Work Accomplished: Eliminate inside road ditches and outside road berms.
 Narrow up road width.
 Outslope road.
 Rock road.

Equipment and Operation Costs:				
Excavator	hours @	\$125.00	=	\$0.00
CAT	42 hours @	\$90.00	=	\$3,780.00
966 Loader	73 hours @	\$65.00	=	\$4,745.00
Dump Trucks	184 hours @	\$55.00	=	\$10,120.00
Grader	20 hours @	\$75.00	=	\$1,500.00
Pit CAT	72 hours @	\$90.00	=	\$6,480.00
Additional Labor	hours @	\$37.50	=	\$0.00
		Subtotal:	=	<u>\$26,625.00</u>

Materials:	1,830 cubic yds road rock			\$0.00
		Subtotal:		<u>\$0.00</u>

Total: **\$26,625.00**

Additional Road Reconstruction

Work Accomplished: Reshape, narrow, and outslope 3.4 miles of the main
 Patterson Creek Road between sites 1 and 15.

Equipment and Operation Costs:				
Excavator	17 hours @	\$125.00	=	\$2,125.00
CAT	19 hours @	\$90.00	=	\$1,710.00
966 Loader	hours @	\$65.00	=	\$0.00
Dump Trucks	hours @	\$55.00	=	\$0.00
Grader	22 hours @	\$75.00	=	\$1,650.00
Water Truck	hours @	\$55.00	=	\$0.00
Additional Labor	hours @	\$37.50	=	\$0.00
		Subtotal:	=	<u>\$5,485.00</u>

Materials:				\$0.00
		Subtotal:		<u>\$0.00</u>

Total: **\$5,485.00**