Forest Research Notes

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COST OF SKID ROADS FOR ARCH LOGGING IN WEST VIRGINIA

In the mountain hardwood country of the northern Appalachians, tree-length skidding with tractor and arch has proved to be economical logging. One essential part of this type of logging is that tree-length logs are winched to the skid roads: tractor and arch do not run around through the woods. Winching distance is commonly 200 to 300 feet; and occasionally an extra length of cable is added to permit skidding up to 400 or 500 feet.

On the Fernow Experimental Forest in West Virginia this skidding method has been used for a number of years. Hundreds of acres of timber have been logged and many miles of skid roads have been built to accommodate a TD-9 crawler and rubber-tired sulky. These skid roads are of such high standard that often they can be converted to dry-weather truck-logging roads with only a moderate extra cash outlay. Further, if the roads are properly "put to bed" when the logging operation is completed, they will be usable for future logging operations.

Some doubt has existed about the profitability of this method of skidding. Construction of arch skid roads with a gentle grade in this rough mountain country was thought to be an expensive undertaking. This paper presents briefly the method of road construction followed on the Fernow Forest and the costs compiled on seven different logging chances totaling 660 acres over a period of several years.

Perhaps the most important single factor in the success of the arch skidding method is the careful layout of the main skid roads. The roads must provide access to every part of the logging chance. They must also be held within certain grade limits to make skidding efficiency high, and erosion and road deterioration low. The main bulldozed skid roads are located on about a 10-percent grade; after dozing, the grade of the roadbed will vary between 5 and 15 percent.

There are locations where dozing to get a level roadbed is not necessary. Generally these are short spurs over which only a few loads are to be skidded. There is little soil disturbance and little or no erosion. Because of this, the undozed spurs can be located on steeper grades than the bulldozed roads.

Main-road location involves a study of available maps, then ground reconnaissance, and, finally, laying out the road on the ground. The road locator should be a forester or a well-trained logging boss. In the field he uses a helper in sighting the grades with an abney level and in marking the road location. Location of non-bulldozed spurs is a simpler matter, usually involving only ground reconnaissance by a trained man, the logging boss.

All the main skid roads on the Fernow have been built with a TD-9 tractor and bulldozer. The machine operator supervises the job. A swamper, equipped with a power saw, accompanies the tractor to check road alignment and to swamp out vegetation where necessary. No rock blasting has been done. On the undozed spurs only the swamper and his saw are needed to complete the road.

Skid-road costs do not end with the completed road system. Unless adequate surface drains are put in after logging, much of the road may wash out and the capital investment may be lost. After-logging care--mainly the installation of water bars--is a standard practice on the Fernow Forest.

Few water bars are needed on non-bulldozed roads unless the roads have worn down into the subsoil. On bulldozed roads with a 10-percent grade, about 50 surface drains per mile are needed. These include natural outdrainage dips as well as dips cut with the tractor blade and more elaborate water bars dug out by hand or constructed with logs. On the roads of the seven chances studied, some water bars were put in by hand and others were dozed out with the tractor blade. Costs of the two types of drains were not kept separate.

The final average cost[1] of the permanent main skid road was about $318 a mile (table 1). (The range was from about $200 to over $400.) Of this, about 9 percent was charged to the cost of location, and another 9 percent was

[1]The average costs were compiled from all seven logging chances studied, using labor and machine rates considered appropriate at the present time. Labor costs do not include the costs of social security, accident insurance, and similar items. Hours of labor and machine time are tabulated for those who have different cost rates.

Table 1.--Skid-road costs[1] per mile on the Fernow Experimental Forest[2]

Cost item	Rate per hour	Bulldozed main skid roads		Non-bulldozed spur roads	
		Average time	Average cost	Average time	Average cost
	Dollars	Hours	Dollars	Hours	Dollars
ROAD LOCATION					
Locator	3.00	8	24.00	5	15.00
Helper	1.20	4	5.00	--	--
Total	--	--	29.00	--	15.00
ROAD CONSTRUCTION					
Bulldozer	4.35	28	122.00	--	--
Operator	2.00	37	74.00	--	--
Swamper	1.20	38	46.00	23	28.00
Power saw	.50	38	19.00	23	12.00
Total	--	--	261.00	--	40.00
AFTER-LOGGING CARE					
Bulldozer	4.35	1	4.00	--	--
Operator	2.00	1	2.00	--	--
Helper	1.20	18	22.00	--	--
Total	--	--	28.00	--	--
Total road cost	--	--	318.00	--	55.00

[1]All costs are rounded off to nearest dollar.

[2]Based from records of almost 18 miles of skidroads on seven logging chances totaling 660 acres.

charged to cost of after-logging care. These two elements contributed about $57 a mile to the final cost--much less than the cost of building new roads for the next operation, which might be necessary if the roads were not located and cared for properly.

On the average, 65 feet per acre of bulldozed main skid road and 74 feet per acre of non-bulldozed spur road were constructed to log the 660 acres for which these records were kept. On this basis, about 1 mile of combined

bulldozed and non-bulldozed skid road is needed to log every 38 acres. The total cost per acre of the 139 feet of skid road was about $4.70--of which about $0.90 per acre was charged to road location and after-logging care. This is a very modest cost, particularly if one considers that most of it is capital investment that will not need to be repeated.

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