

AERIAL SEEDING OF HIGHWAY SLOPES

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The Oregon State Highway Department accomplished its first seeding by helicopter during the week of October 6, 1958.

Two areas were seeded. Hooskanaden Creek, located on new Coast Highway construction north of Brookings, comprised a 200-acre slide area which has been cleared and regraded to drain all surface waters from the slide area. The second, Myrtle Creek on new Pacific Highway construction, is about 15 acres in extent. It is a benched section with minimum 1-to-1 gradients in cuts up to 250 ft in slope distance, further enlarged to twice this distance by a slide in one section. Because of the inaccessibility of the slide area to trucks and hydraulic seeding equipment and the danger and difficulty of working men on the high, steep slopes at Myrtle Creek, it was decided to try seeding and fertilizing by helicopter.



Figure 1. View shows helicopter being loaded with grass seed. Each hopper contained approximately 126 lb, enough for about 8 acres per load.



Figure 2. Completing the reloading of the helicopter with liquid fertilizer. The two barrels hold a maximum of 30 gallons each.



Figure 3. Helicopter flying at about a 50-ft elevation fertilizing the 1:1 cut slopes near Myrtle Creek.

Bids for the aerial seeding and fertilizing were requested on an acreage basis. The specifications required that the helicopter be equipped with two containers having a minimum capacity of 100 lb each, equipped with power-driven, adjustable disseminating mechanisms capable of maintaining a constant and measured rate of grass seed and fertilizer output. The Oregon Highway Department furnished and delivered the seed and fertilizer to the job sites. The contract was awarded to Dean Johnson, Inc., of McMinnville, at a price of \$35 per acre. The contractor used a light 3-passenger Hiller helicopter with a single rotor and capable of carrying a maximum load of 300 lb. It was towed by truck and trailer to the job sites.

The seeds were pre-mixed and bagged in weights which expedited the loading of the hoppers. The seeding was accomplished from two hoppers equipped with a corrugated rotor at the bottom of each hopper controlling the amount of seed released to the distribution plate beneath the hopper. Flying at an indicated air speed of 40 mph at a 50-ft elevation, the air ram formed by the forward movements of the helicopter and the downblast of the rotor distributed the seed evenly in approximately a 40-ft swath. The following rates of seed and fertilizer were used:

	Myrtle Creek (lb per acre)	Hooskanaden Creek (lb per acre)
Perennial ryegrass	12	14
Highland bentgrass	7	0
Red creeping fescue	10	3
Chewings fescue	2	4
Velvet grass	0	7
Dutch white clover	<u>4</u>	<u>2</u>
Total seed	35	30
Fertilizer	26	25

A 10-15-0 liquid fertilizer formulation weighing 10.3 lb per gallon was hauled to the sites in a tank directly from the dealer. The liquid was distributed from two barrels holding a maximum of 30 gal each, mounted on both sides of the helicopter. A 26-ft spray boom attached underneath the helicopter was equipped with 26 nozzles capable of discharging 10 gal per min at 20-lb pressure. A liquid fertilizer was used to obtain a more even distribution and, as it would be absorbed into the soil immediately, it would be readily available to the new seedlings. The cost of liquid and dry fertilizers is comparable.

The helicopter crew was made up of the operator and one man furnished by the contractor and three truck drivers furnished by the highway department. The truck drivers hauled the seed and fertilizer to the job sites and assisted in the loading of the helicopter. The helicopter averaged about 15 trips per hr and, based on weight, seeded approximately 8 acres per load and fertilized $1\frac{1}{4}$ acres per load. To minimize the possibility of missing in the strip method employed, the areas were seeded and fertilized in two directions where possible. The average per acre cost of the Hooskanaden Creek project was \$51.56 and the Myrtle Creek job averaged \$65.48 per acre.

The primary limiting factor to this type of seeding seems to be wind. The drift was excessive when wind velocities exceeded 10 mph and it was necessary to cease operations. The 200-acre Hooskanaden project was completed in 30 hr, not more than 15 hr of which was actual seeding and fertilizing time. The difference was lost time due either to the wind, to rest periods for the helicopter operator and to servicing or changing the equipment of the machine. The Myrtle Creek proj-

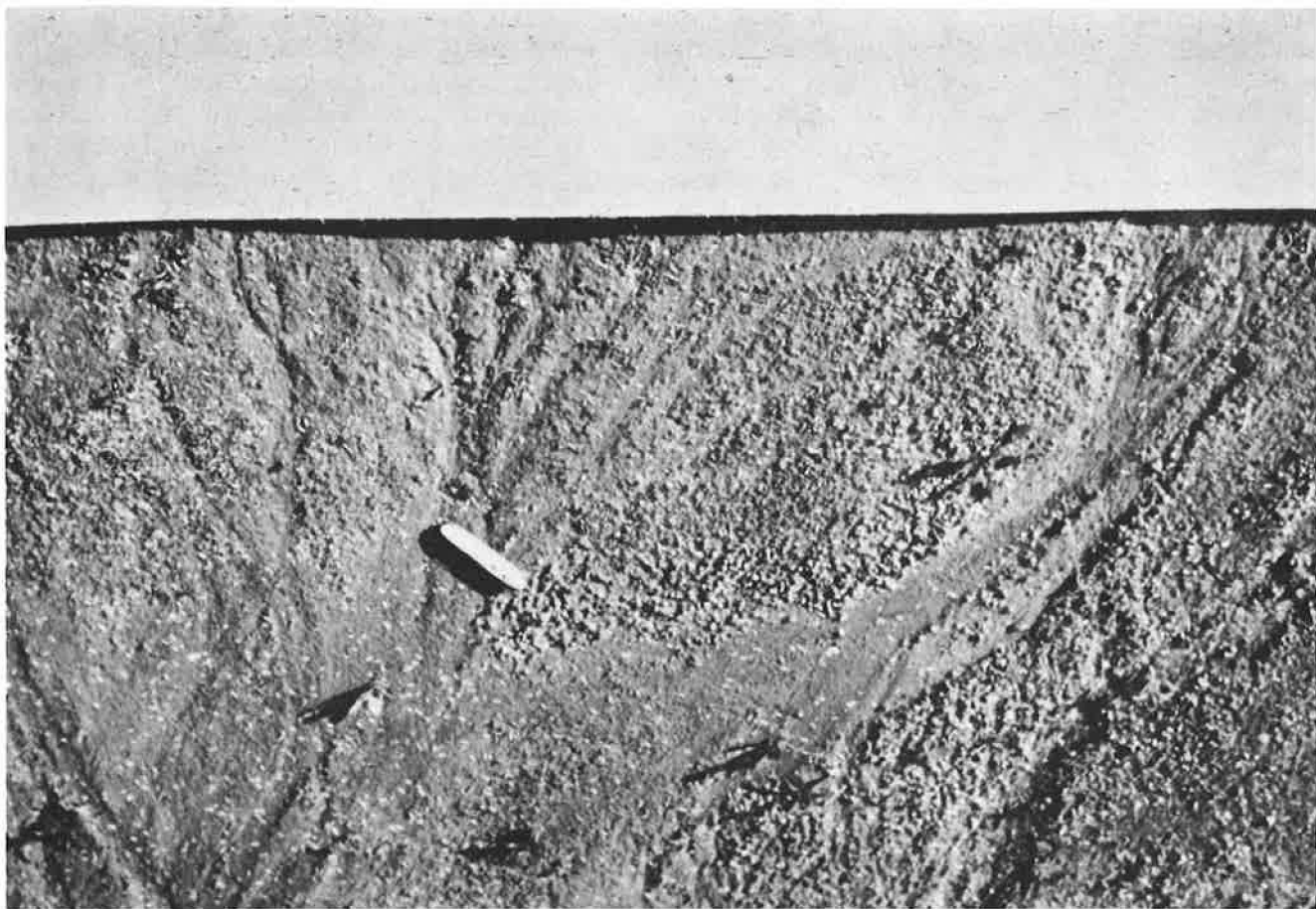


Figure 4. Seed and fertilizer distribution by helicopter. Knife in center of picture is $3 \frac{3}{8}$ in. long. Seed shows plainly against wet ground. Dark and light specks on gray cardboard at top of photo are droplets of liquid fertilizer.

ect was completed in not over 2 hr flying time.

Based on this operation it is believed that seeding by helicopter on highway cut and fill slopes is practical and will prove to be a satisfactory method of obtaining a cover on cut and fill slopes under adverse conditions, either of extreme height and slope gradient, or for locations inaccessible to conventional equipment. The distribution of seed and fertilizer was uniform and a satisfactory germination has been obtained under the adverse growing conditions existing at these two sites.