

LOWER-COST ROADSIDE MAINTENANCE by SPRAYING

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Sussex County, New Jersey, is located in an area of hills and valleys, streams and lakes. To people from the prairies it is mountainous, but to those from the mountains, it is mere foothills. It is dotted with some 80 lakes. Some of them are natural and some man-made.

It is an agricultural county of 526 square miles in land area. Although formerly noted for the production of grain, during the past half century its farmers have turned to producing milk. The number of dairy cattle owned by them is about the same as the human population, 36,000. There use to be more cattle than people, but because of the movement of people from city to country the ratio is changing.

Some 25 or 30 years ago the development of lake areas started. Marginal farm land began to pass into the hands of city dwellers, who wanted to make their homes in the country, and to developers with an eye to business. The changeover from horsepower to motor power was accelerated, and the need for better roads became more and more apparent.

The Sussex County Road Department began to change over from horse-drawn dump wagons, picks, shovels, and wheelbarrows to more efficient equipment and methods, too. In fact the Road Department is and has been for a long time one of the most progressive and efficient to be found anywhere. The credit for that is due more to the Supervisor of Roads, Leon C. McKeon, than to any other one man. Freeholders come and go at the will of the voters, but McKeon's ability has been recognized by freeholders of both parties as the balance of power shifts from one to the other, and so he goes on and on. He has been Supervisor of Roads since 1921 (36 years). The department employs 75 men the year round, with some additional help during snow storms for round-the-clock snow and ice removal. Equipment consists of some 200 pieces including trucks, tractors, graders, loaders, etc., besides a completely equipped repair shop manned by able mechanics. Our supervisor is never satisfied with things as they are; he is always looking for better and more efficient equipment and methods.

Roadside maintenance is as great a problem for the Supervisor of Roads as any with which he has to deal. If not properly handled it can cause trouble the year around. We generally think of it as something which develops with the coming of summer and is gone in the fall but that is not always the case.

The supervisor also has to deal with vagaries of the weather. In a very rainy season, mowing roadsides is one job that is easy to postpone in order to get what seems to be more important work done. When that happens, weeds and brush grow high, obstructing vision on curves and intersections. During storms in the fall and winter the coarse weeds break down and clog gutters and drains. The brush hinders snow removal. Tall vegetative growth provides cover for game too close to the roadbed, which creates another hazard and is the cause of many traffic accidents.

The supervisor has a budget to provide the manpower, equipment, and materials necessary for building and maintaining roads. His is a many-sided job. He has to

provide a smooth, safe roadbed, safe shoulders, keep gutters and culverts clean to allow free flow of runoff water, maintain guardrails, and remove snow and ice. Warning and directional signs must be properly placed and maintained at intersections, curves, and other danger spots. Keeping the repair shop manned with good mechanics maintaining a fleet of over 50 trucks and many other pieces of equipment in good repair is an important part of his responsibilities, and there are many others.

Economy and efficiency must be the watchword in order to accomplish the desired results.

The pros and cons of spraying versus cutting had been discussed some 6 or 8 years before actually giving spraying of chemicals a real trial.

The results of the use of chemicals on railroad rights-of-way and along utility lines had been observed, and the unpleasant, browned-out, lifeless effect was disliked. When the possibilities of such a program were first considered, one company was given permission to demonstrate its product along a 2- or 3-mile stretch of road. Reaction to that result was the same as that just mentioned in regard to railroads and utility lines.

A question might well be raised if a program were instigated that would change the natural beauty of the rural roadsides to a hideous, repulsive, barren waste along a network of hundreds of miles of county road system, and it was decided that a way of achieving better results must be available before changing the method of weed control.

Another reason for not spraying roadsides was the fear of the spray drifting beyond the boundaries of the road into gardens and fields, damaging crops, and perhaps having a bad effect on livestock. This is an agricultural county with fields of farm crops bordering a goodly portion of our roads.

Finally, things began to happen that gave encouragement to give this new idea a fair trial. One thing was that farmers began experimenting with chemicals to control weeds in field crops, principally corn. It was learned that they were using some of the same spray that was recommended to the department right on their corn fields to kill weeds without damaging the corn.

Homeowners began using it on their lawns. It killed weeds and gave the grass a better chance to flourish.

Then, too, the department was reminded of the fact that the roadsides were badly infested with poison ivy and ragweed, two plants that cause humanity a lot of suffering each year. Up to a dozen men would be laid up with ivy poisoning during the mowing season. No accurate knowledge was available as to how many others may have been suffering, and at times unable to work, because of the bad effect of ragweed. It is known that a lot of people are allergic to that pest.

Also, it is estimated that 150,000 or more people come to this county from metropolitan areas to spend a holiday, a weekend, or the entire summer at some of the lakes or in the hills for rest and relaxation. Many of them are susceptible to ragweed and poison ivy. So it is known that anything that can be done to eliminate these weeds that cause so much human suffering will help to make the county a better place in which to live and work and play.

About four years ago the department was approached by the firm of McMahon Bros., of Binghamton, N.Y., with a proposal to contract with them to spray the roadsides. The department was assured that if this new idea were given a trial it would (a) cut the cost of roadside maintenance, (b) decrease the number of cases of poison

ivy and ragweed infections, (c) aid farmers in their weed-control problems, (d) decrease the number of mosquito-breeding places, (e) aid in snow removal, (f) create a more beautiful roadside area, and (g) improve traffic safety by stopping growth that obscures drivers' vision, especially at curves and intersections.

Finally an agreement was entered into to spray about 70 miles of the roadside area. The program provided for three sprayings each year, at the proper times, for a three-year period, at the end of which the aforementioned benefits would be realized.

It may be of interest to note here that a part of the mileage in this experiment includes the Old Delaware Mine Road which is the oldest traveled road in the United States. It lies along the Delaware River in Sussex County and leads from the old copper mines in Pahaquarry Township, just over the line in Warren County, to Kingston, N. Y. It was carved out of the wilderness by early Dutch settlers and used to transport copper with horses and oxen to Kingston. Many tourists travel this historic old road each year and view the many historic sites located thereon. Supervisor McKeon is especially proud of this piece of road and sees to it that the best methods are employed to maintain and protect it. This latest new method of controlling weeds probably will also protect the well-being of those who travel from afar to view it.

The equipment used to apply this selective herbicide which eradicates weeds and brush but is harmless to grass is a specially built truck which travels at 20 to 25 mph while spraying. To cover the 292 miles in the county road system takes about three days. Actually only 260 miles are sprayed. The other 32 miles are in the towns where there is no weed or brush problem and a few miles left unsprayed as a check for what one might call a side-by-side comparison of the old way with the new.

This truck is operated by one man who drives and operates the spraying equipment from the driver's seat. The spray boom is jointed with nozzles placed so that complete coverage is achieved from the edge of the road to the right-of-way line. By the use of levers inside the cab the operator can raise the boom over guardrail or sign post near the edge of the roadbed and lower it down a bank so that the spray is applied at the right distance from the nozzle. This is important in windy weather. Then, of course, when the slope is upward, the boom is raised to the proper height and bent in any shape that is necessary to get over rough, uneven terrain.

Progress of the work and early results were watched with considerable interest. Complaints were expected but only three came. These were investigated by the department and also the spraying contractors but no serious difficulties were encountered. At the close of the season a tour of inspection was arranged to which interested people were invited. These included state and municipal officials, representatives from Agricultural Experiment Stations, representatives from organizations whose mission it is to eliminate ragweed and thereby relieve hay-fever sufferers; well over 100 attended. They came not only from Sussex County and New Jersey, but some traveled long distances from other states to learn what they could from this experiment. Results that take three years to achieve were not expected at the end of one year. However, progress that is pleasing to report was seen. Ragweed and poison ivy took a real beating. There was not a single case of ivy poisoning among the maintenance men who worked in the area that was sprayed.

Of utmost importance is the fact that the cost of mowing has been cut in half. This means that the cost of spraying was not an additional cost, as expected when the program was started and before weeds and brush were eradicated. Enough control of weeds and brush was effected by spraying, even the first year or two, so that

ROADSIDE DEVELOPMENT 1958

TABLE 1
 SUSSEX COUNTY ROADSIDE REPORT: COMPLETION OF THIRD YEAR OF SPRAYING
 SEPT. 5, 1957

	Before spraying	With spraying	Comments
Total highway personnel	75	75	
Total miles mowed	260	260	
Number of mowings per year	2	1	
Number of mowing machines	7	4	
Starting date of mowing	June 15	July 1	
Ending date of mowing	August 1	July 15	
Brush growth line maintained	4 ft from berm	10 to 12 ft from berm	Brush cutting now is to widen right-of-way, whereas before spraying, cutting was a holding operation.
Miles of brush cut per year	100	100	
Days spent cutting brush	35	35	
Number of men cutting brush	55	30	Manpower diverted to permanent road improvements, e.g., berm stabilization, surface repair, guard-post care, signs, etc.
Days spent improving shoulders and drainage	60	50	Manpower diverted to permanent road improvements, e.g., berm stabilization, surface repair, guard-post care, signs, etc.
Days tree trimming for safety	60	40	Reflects control gained.
General condition of roadsides	Fair	Excellent	
Ragweed content	Heavy	Rare	Grasses replaced ragweed.
Pollen count	No record	4 average (N.J. Dept. Health)	1 of 4 areas recommended for hayfever sufferers in N. J.
Poison-ivy content	Very heavy	Very rare	Grasses replaced poison ivy.
Ivy-poisoning cases among road crews	12 to 14 men per year	None	Strong morale factor among crews.
Man-hours lost per year to poison ivy	1,080	None	Significant
Grass growth	Sparse	Moderate to heavy	No seeding required.
Accidents caused by growth obstruction to vision	No record	None	Growth is controlled 52 weeks a year. There is never a time when growth hides intersection, warning signs, etc.
Litter practice of motorists	Bad	Reduced to minimum	Cans, bottles, wire, and trash were found where growth was heavy. There is now a minimum of littering.
Public reaction	Mixed	Strongly in favor	
Highway Supervisor:	Leon C. McKeon		By The Board of Chosen Freeholders
County Engineer:	George B. Harper		Highway Department
Freeholders:	Lester N. Price, Chairman		Sussex County
	Denton J. Quick		Newton, N. J.
	Victor V. Johnson		

enough former mowing costs were saved to pay for it and nicer looking roadsides appeared in the sprayed areas.

The year following this experiment the department contracted with the same firm to spray the entire highway system three times each year for a 3-year period, leaving only a few miles in strategic locations for comparison.

That program is now completed to the complete satisfaction of the department. It is interesting to compare the results obtained by spraying with the check areas where mowing was continued as it always had been done. Although weeds, brush, and grass were kept down, there remained the ugly-looking stubble from which new growth has already started for next year's crop which will have to be dealt with. The sparse growth of grass is very noticeable where the growth of weeds and brush was heavy. In fact, it is nonexistent in many spots. In the sprayed area grass is flourishing, which is more attractive, of course, than brush and weeds. Then, too, less trouble from erosion is evident where there is a good growth of grass. This is due not only to a better root system beneath the surface but also to the fact that in heavy storms grass tends to bend over to form a mat over which the water glides without taking soil with it.

Grass is a problem too, although a lesser one than weeds and brush. When full grown it sometimes hides guardrail and to some extent obscures driver's vision at curves and intersections where the roadbed is lower than the area at the side of the road. Mowing once a year takes care of it fairly well and certainly costs only half as much as mowing twice a year, as has been done when weeds and brush were a problem.

With weeds and brush out of the way it is believed that much can be done by spraying to control the height of grass. The department is now experimenting with this problem in the county with the same contractor before mentioned.

In the fall of 1956 about one mile of guardrail area was sprayed to a width of about 2 ft on each side, with the idea of retarding the growth of grass. It did just that. No mowing at all was required on that area in 1957. Although a dry season may have had some effect, the result looked so promising that the department has contracted to have all guardrail area (about 80 miles) sprayed in 1958. This agreement also includes spot treatment at culvert headwalls and sign posts. These areas always require costly hand mowing. It will be real economy if it can be eliminated. It is believed that within a few years all mowing of weeds, brush, and grass can be eliminated and that the department will have cleaner, healthier, and more attractive roadsides at much lower cost than by former methods.

DISCUSSION

GARMHAUSEN: Was a pollen count made, and, if so, what were the results?

PRICE: Pollen counts were made. So far the average has been 4, which is one of the lowest in New Jersey.

GARMHAUSEN: Are you speaking of any grass-growth inhibitor other than maleic hydrazide?

PRICE: I have no information of any other inhibitor having been used.

HOTTENSTEIN: What are the right-of-way widths?

PRICE: Right-of-way widths vary, but the average width is about 40 ft.

HOTTENSTEIN: We should not assume that the same benefits would result on wider rights-of-way. In some locations it is desirable to have woody or other native volunteer growth.

DEAKIN: The roadside maintenance situation in Sussex County is entirely different from that on parkways and freeways with their wide rights-of-way. In Sussex County the county roadsides are relatively narrow and the area that is being maintained by spraying is really the shoulder area. Use of herbicides in this situation has reduced the need for continual mowing and brushing out of the roadside. Almost all of the county roads pass through miles of wooded roadsides. One is confronted with the continual problem of keeping the woodland from encroaching on the roadsides.

On the Interstate Highway System use of spray material to reduce weed growth on the shoulder area and backslope of the ditch line would help to cut maintenance cost by reducing the number of needed roadside mowings.

NEALE: It was my privilege to see the effects of the excellent and complete herbicidal spray program in Sussex County, N. J., last summer. The results were much better than they appear in the slides shown. Careful inspection showed conclusively the elimination of undesirable and noxious weeds and other vegetation and resulting improvement in the character of the turf. The widening of the roadsides materially contributes to the safety and appearance as well as economics in maintenance. It will be interesting to follow this project for a few years and learn the economies obtained in mowing, snow removal, weed and brush control, and other items that increase maintenance costs.

MC MAHON: Nine percent of all highway accidents are reported to have been caused by obstruction to vision at the side or edge of the road. Most of this obstruction is, according to a report published in the "Saturday Evening Post" (October 10, 1955, issue), "high-growing weeds and bushes."

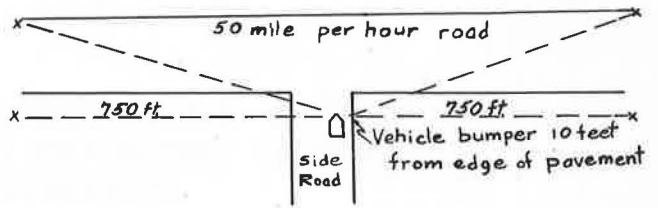
The 9 percent figure comes from the book "Man and the Motor Car," which was published by the Association of Casualty Insurance Companies. One portion of the book is devoted to causes of accidents, based on accident reports. It is stated that in the study of these accident reports it was learned that 15 percent of all fatal accidents had as a contributing cause obstruction to vision. Six percent reported this obstruction as being within the car. (The new windshields have been designed to eliminate or reduce this factor.) Nine percent of this obstruction was outside the car, at the side of the road.

We applied the 9 percent figure to the total accident cost for the United States at the time, and the figure revealed was \$270,000,000. We then took 3,000,000 miles of roads, as listed in the New York "World Telegram" figures, and determined that in terms of per mile cost per year this was \$90.

We felt that a more emphatic idea of this cause and the cost of accidents could be conveyed by stating a cost per mile per year. Furthermore, this cost per mile when related to cost per mile for spraying clearly portrayed the economy of spray.

In Sussex County we, with the county officials, endeavored to realize the ideal conditions of vision on 50-mph highways as set forth by the National Safety Council. A driveway or side road entering a 50-mph highway is considered safe if a driver in a car stopped with the bumper approximately 10 ft from the pavement can see 750 ft in either direction before entering the main highway. In fact, considerable publicity was given to a diagram showing a motorist how to check the safety of his driveway. It was something like the diagram on page 47. Place a flag or marker 750 ft in

each direction from the driveway. Then, from the driver's position in the driveway, determine if you can see each marker clearly. If you can, you have a safe driveway. If you cannot, obstruction to this vision should be corrected. This may not be exactly correct as to wording but is the substance of the plan. In



conjunction with the Sussex County program, a news release was sent out for use by private homeowners as an aid to their taking measures for safe driveways.

I might also point out that at the Ohio Short Course last year it was stated that the first thing to be satisfied in any planting design is sight distance.