

VIRGINIA'S MOWING EXPERIMENTS

by

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(The opinions, findings, and conclusions expressed in this report are those of the authors and not necessarily those of the sponsoring agencies.)

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SUMMARY

With construction of the interstate and arterial highway systems nearing completion, the Department's major concern has shifted to maintenance. Because the highways must be maintained to very high standards, the reduced buying power means that frugality and efficiency are essential. Consequently, the Department must continue to seek ways of cutting costs without reducing quality. As a part of this search, the Maintenance Division undertook an examination of the efficiency of many of its operations, and in this self-examination it questioned if the frequency of mowing along highways could be reduced without sacrificing aesthetics or safety. This questioning led the Department to conduct a five-year study to evaluate and modify its mowing standards.

The research effort, which was jointly conducted by the Maintenance and Environmental Quality Divisions, the Department of Agronomy and Plant Pathology and Physiology at VPI & SU, and the Research Council, was primarily concerned with whether a well-planned, reduced mowing effort could be instituted without sacrifice of highway safety or aesthetics. During the study it was found that the mowing effort could be reduced without sacrifice by —

1. delaying the first mowing until the seed heads of the cool season grasses were severed with this mowing;
2. mowing less frequently;
3. mowing less area; and
4. applying herbicides to help control weeds.

Modified mowing standards recommended on the basis of the findings from the study are being implemented, and it is anticipated that these standards will reduce mowing costs by a half million dollars a year.

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BACKGROUND

During the past twenty-five years the major portion of the Department's energy and money has been expended on construction. Not only has the Department constructed its allotted interstate mileage, it has rebuilt many miles of the two-, three- and four-lane undivided primary highways into a dual-divided arterial system and has upgraded the primary and secondary systems. During these years, with the infusion of federal financing, money for these activities has been adequate. Over the next twenty-five years, however, the Department's major concern will be maintenance rather than construction, and its work must be accomplished with a budget shrunken by inflation.

Because the highways must be maintained to very high standards, the reduced buying power means that frugality and efficiency are essential. Consequently, the Department must continually seek ways of cutting costs without reducing quality. As a part of this search, the Maintenance Division is examining the efficiency of many of its operations and in this self-examination has questioned if the frequency of mowing along the highways can be reduced without sacrificing aesthetics or safety.

The Department maintains a highway system encompassing about 863 miles of interstate roads; 1,285 miles of arterial roads; 6,568 miles of primary roads; and 43,121 miles of secondary roads.

To control the vegetation along these roads it has for some years adhered to four mowing priorities. Priority No. 1, which applies to interstate, arterial, high type primary, and a few secondary roads, requires that vegetation be maintained at a height between 4 inches and 10 inches. Priority No. 2, which is for low type primary and high type secondary roads, requires that vegetation be maintained between 4 inches and 18 inches. It also specifies that the first mowing not be done until the vegetation becomes 10 inches high. Priority No. 3 requires that the accessible rights-of-way on secondary roads be mowed once a year, or more frequently if necessary; and No. 4 requires that gated roads be given that attention necessary to keep the traveled way clear of all objectionable vegetation. The experiments discussed here related to priorities 1 and 2.

EXPERIMENTS

Genesis

The mowing experiments were undertaken in response to a suggestion from Dr. R. E. Blaser of the Department of Agronomy at Virginia Polytechnic Institute and State University. Dr. Blaser, who had been doing contract research for the Department for a number of years, suggested that in light of the economic crunch faced by the Department as a result of the energy crisis mowing operations might be curtailed by increasing the minimum height for mowing and delaying the date for the first mowing of the year. He reasoned that the majority of the rights-of-way covered by priorities 1 and 2 are planted in Kentucky 31 fescue, a cool season grass that produces seed heads only once a year, and that once the seedheads have been severed, the leafy portion of this and other cool season grasses will grow to a height of only about 12 to 14 inches. Thus, if the first mowing is delayed until all the seedheads have developed to a height above the mower blade and are then severed, it is conceivable that an area planted with fescue only would not require even a second mowing, if the 12- to 14-inch height was acceptable from the viewpoint of safety and aesthetics.

Survey of Existing Conditions

To evaluate the feasibility of Dr. Blaser's suggestion, the Department organized a team of people from its Research, Maintenance, and Environmental Quality Divisions, and the Departments of Agronomy and Plant Pathology and Physiology at VPI & SU.

The first thing the team did was to determine how the mowing instructions were being interpreted and followed. Basically, it was found that much of the right-of-way was being mowed as if it were a finely kept lawn. For instance, under Priority 1, on medians over 50 feet wide mowing should be undertaken for a minimum of 20 feet from the edge of the pavement on slopes 4 to 1 or flatter. In its survey, the study team found that medians several hundred feet wide with slopes much greater than 4 to 1 were being mowed in their entirety. Huge interchange infields were being mowed clean, and in some cases the right-of-way was being mowed from five to seven times each summer. In addition, the mowers were set so low that they were scalping the turf, thus killing the grass and providing areas for weeds to grow.

It was also noted that while all parts of the state had cool season grasses, the eastern part also had some warm season grasses that produce seed heads throughout the warm months. The weed population was found to vary from a very low to a very high percentage of the total vegetation.

1975 Experiment

After the survey, a plan for mowing was devised which took into account the above factors plus one very important intangible fact — the knowledge that human nature being what it is, there would be resistance to change from some people within the Department as well as from some citizens. Test sections a mile or less in length were selected in various areas of the state for experimentation with different mowing dates and mowing heights during the summer of 1975. As previously mentioned, the Department's mowing standards imply a 4 inch mowing height, which results in the use of the lowest mowing height of which the equipment is capable. Thus, historically the rights-of-way have been mowed to a height of 4 inches or less, with a mean height of about 2 inches. To eliminate the scalping that resulted from these low blade settings, the team decided to try an 8 inch mowing height in addition to the specified 4-inch height.

With respect to mowing dates, the practice has been to begin mowing in April or, at the latest, early May, and to continue mowing throughout the summer. As a result, in many areas the grass was seldom permitted to grow to a height of more than 4 to 8 inches. To ascertain when mowing should begin, it was decided that the experimental first mowing dates would be early and mid-May, early and mid-June, and early July. The experiments also provided that certain areas would be mowed only once and other areas would be mowed a second time between mid-August and early October.

The primary objectives of the first summer's work were to —

1. determine the minimum number of times that typical cross sections of right-of-ways should be mowed;
2. determine the appropriate dates for mowings; and
3. ascertain the effect of raising the mowing height.

Secondary objectives were to observe —

1. the effects of delayed mowings;
2. the effects of reduced mowings;
3. the need for weed control other than mowings; and,
4. the need for and design of additional experiments in controlling vegetation.

Ten test sites were selected. These were located in the Suffolk, Richmond, Fredericksburg, Culpeper, and Salem districts and were divided into 60 sections, some designated to be mowed once but most to be mowed twice.

Two mowing heights were selected: the regular height of about 4 inches and a second height of 8 inches. The higher mowing height was selected because in comparison to the lower height (1) it entails less shock to the root system; (2) it produces less cut foliage for rot and, therefore, less opportunity for fungi growth; and (3) it entails less chance of the mower being damaged by striking hard objects or the turf being scalped.

The earliest date of the first mowing was May 20, and the latest date of the last mowing was September 23.

From this first summer's work, it was learned that the difference in mowing heights could not be detected about four to five weeks after mowing, and that in general the grass mowed at the 8-inch height appeared healthier than that mowed at 4 inches because of shock being inflicted on the root system when mowing at the lower height. It was also felt that the May mowings were too early, since all of the seed heads had not developed and the ones coming later made the grass appear scraggly. In addition, it was learned that the most propitious time for the second mowing was from mid-September until early October, with no further mowings being required. In short, these first experiments confirmed the soundness of Dr. Blaser's advice regarding

cool season grasses. However, two problems remained in the form of weeds and warm season grasses.

1976 Experiment

For the summer of 1976, in addition to the 10 test sites of 1975 the entire length of Interstate 81 in the Staunton District, with the exception of the three or four miles closest to the West Virginia line, was included in the experiment.

Because of its apparent advantages, only the 8 inch mowing height was employed. The first mowings were made during the first two weeks in June and the second during the latter part of September. In addition, herbicides were sprayed on some areas about a week after the first mowing. The spraying was quite effective and in some of the sprayed areas only one mowing was required. Some of the areas not sprayed produced unsightly weeds prior to the second mowing.

1977 Experiment

For the experiments in 1977, it was decided that all experimental mowing again would be at an 8-inch height, and that rather than setting a date for the first mowing, it would be made after all seed heads had grown above 8 inches. In addition, Dr. W. E. Chappell, plant pathologist at VPI & SU, experimented a great deal with herbicides and growth retarders. These were applied to different areas at various times during the year, including the fall and winter of 1976, the late winter of 1976-77, early and late spring of 1977, and about a week after the first mowing.

The 1977 experiments confirmed the findings of the first two years. In addition, they showed that the use of growth retarders is not economically feasible, with the exception of applying them to areas around guardrails and other places that are difficult to mow. The herbicides were found to be most effective when applied from about a week to two weeks after the first mowing.

1978 and 1979 Experiments

The success of the early experiments led to the full-scale implementation of a change in mowing standards in the Richmond District for 1978. The standards were revised to read as follows:

1. Mowing should not be started until June 1, and no mowing shall take place until all fescue seed heads are above 8 inches.

2. The mowing height shall be 8 inches rather than 4 inches. To accomplish the change to the 8-inch height —
 - (a) the sickle bars will need two shoes attached, one on either end of the bars;
 - (b) the bushhog type mowers will need a sled attached to the bottom of each side; and
 - (c) low profile tires will need to be replaced with larger tires.
3. With respect to areas mowed, the existing mowing standards shall be strictly observed.
4. In areas where weeds have been a problem, and when possible, herbicides should be applied to the first 8 feet from the pavement edge about one week after mowing.
5. The numbers of mowings are to be reduced. To accomplish this reduction, mowings beyond the first one shall not be undertaken until the vegetation is 14 inches high.
6. With the money saved by this reduced mowing, a fertilization and reseeding program shall be developed for the first 8 feet from the pavement.

In addition to providing these revised standards to the Richmond District, the experimental team met with all of the involved personnel of the Richmond District at their residences to discuss the experiment. At these meetings the experimental team advised the Richmond personnel that they should omit from the experiment any areas they felt would not be suitable for the experiment, and that they could deviate from the experiment at any time engineering judgment indicated that such deviation was prudent.

After the 1978 mowing season, the experimental team again met with members of the Richmond District staff to obtain their opinions with respect to changing the mowing standards. About thirty members of the staff filled out a questionnaire designed for this purpose. The composite results of the questionnaire are included in Appendix A and a general summary of the responses is given below.

- I. On many issues the respondents were about equally divided in their opinions. The responses to question 3 provided an example.

(3. Do you feel that frequent mowings are as important as ditching, shoulder work, blading, etc? YES 15, NO 14).
- II. There was overwhelming opinion that mowing should not be delayed until a certain date.

(Paragraph (a), Question 1).
- III. There was complete agreement that the first mowing should not take place until the fescue seed heads are at least 6 inches high.

(Paragraph (b), Question 1).
- IV. There was complete agreement that the grass should not be mowed shorter than 4 inches.

(Question 2).
- V. The weighted averages determined for Question 6 were as follows:

Height grass should be before mowed:
(a) Residential areas — 7 inches.
(b) Interstate close to and in and around cities and towns — 9 inches.
(c) Rural interstate — 11 inches.
(d) Rural primary — 11 inches.
- VI. In regard to Question 5, more than half of those responding felt that after the first mowing the grass should not be mowed again until it is 12 inches or taller, and all felt it should be 8 inches or taller.
- VII. The responses to Questions 4 and 6 indicated that a large majority of the staff agreed with the proposed use of herbicides and the fertilization and reseeding programs.

In light of the responses of the Richmond District staff, the guidelines were modified for 1979 for the Richmond District as follows:

1. The first mowing will be undertaken at the discretion of the resident engineer.

2. The mowing height will be between 4 inches and 6 inches, with great care being taken in setting the blade height to avoid cutting the grass shorter than 4 inches.
3. In carrying out 1 and 2 above, consideration will be given to the possibility of eliminating one mowing by cutting the grass below the lowest seed heads of the fescue by the first mowing.
4. Within three weeks after the first mowing, the residencies will spray herbicides on the first 8 feet of the grass adjacent to the highway.
5. After the first mowing, the grass will not be mowed again until it is between 10 inches and 14 inches high.
6. Arrangements will be made for everyone responsible for the mowing operations to review the mowing standards and to abide by them, especially with respect to the areas to be mowed.
7. The district and/or the residency will disregard these instructions for areas in which they feel the experiment is not applicable.

Although the experiment officially included only the Richmond District, in 1978 and 1979 a good many engineers throughout the state followed the general guidelines provided that district. No formal survey has been made of the opinions of these engineers, but informal feedback has indicated that several of them feel that the mowing standards should be modified to accomplish fewer mowings of less area and at higher heights. The one thing tried in 1978 that received almost unanimous opposition, not only in the Richmond District but throughout the state, was the setting of a specific date for the first mowing.

ECONOMIC EVALUATION

To evaluate the economics achieved from reduced mowing, a comparison was made between the costs of mowing in 1974-75 and those for 1978-79. However, before these relative costs are discussed, the expenditures on ordinary maintenance for the years 1974-75 and 1978-79 are given in Table 1. Some of the increase for 1978-79 resulted from additional mileage being taken into the highway system, but most of it resulted from inflation. The interstate mileage increased about 11%, and the primary about 3%, and the mowable mileage on these systems went up at the same rates.

Table 1

Ordinary Maintenance Expenditures For 1974-75 and 1978-79

	<u>1974-75</u>	<u>1978-79</u>	<u>Increase</u>
Interstate	\$ 7,122,000	\$14,391,000	102%
Primary	18,746,000	31,936,000	70%
Secondary	29,942,000	47,038,000	57%
TOTAL	\$55,810,000	\$93,365,000	67%

Because most of the expenditures for mowing are made for equipment and labor, the expenditures for these items on the three systems combined are shown in Table 2.

Table 2

Ordinary Maintenance Expenditures For Labor and Equipment For 1974-75 and 1978-79

	<u>1974-75</u>	<u>1978-79</u>	<u>Increase</u>
Labor	\$35,991,505	\$51,019,109	42%
Equipment	8,097,382	16,154,709	100%
	\$44,088,887	\$67,173,818	52%

Appendixes B, C, and D show, for the interstate, primary, and secondary systems, respectively, data on acres mowed, man-hours employed, money spent, and centerline mileage on mowing for the five years from 1974-75 through 1978-79, along with some calculations showing changes among various relationships for these data. Tables 3, 4, and 5 show some percentage changes between the years 1974-75 and 1978-79 as computed from the data in these appendixes.

In Table 3, which contains the calculations for the interstate, it is interesting to note that in the five year study period

the acreage mowed statewide on this system decreased by 32% (Column 1) and the man-hours decreased by 18% (Column 2). While other relationships are shown in Table 3 for the reader to study, attention is directed to the very important statistics on costs. Even in the face of the high inflation, the dollars spent on mowing on the interstate increased by only 15% (Column 3), even though the mileage mowed increased 11%. This resulted in an increase of 3% in expenditures for mowing a mile of interstate (Column 9). When this 15% increase in mowing expenditures is compared to the 52% increase of expenditures for labor and equipment for ordinary maintenance over the same five-year period, it is obvious that the saving already realized from the mowing experiments is considerable. Even more impressive are the data for the Bristol, Richmond, Fredericksburg, and Staunton districts. The Bristol District spent 7% (Column 3) less on mowing on the interstate even though the mileage increased by 9% (Column 4); the Richmond District spent 3% more while the mileage increased by 2%; the Fredericksburg District spent 7% less for 0.3% less mileage; and the Staunton District spent 11% more while the mileage increased by 18%.

In examining the data for the primary system, Table 4, it can be seen that the statewide acreage mowed was reduced by 25% (Column 1) and the man-hours by 9% (Column 2). The expenditures increased by 32% (Column 3), which is, of course, greater than the 15% on the interstate but still substantial when compared to the 52% increase shown in Table 2 for the labor and equipment for ordinary maintenance.

The secondary system was not included in the mowing experiments since many of the roads on this system are mowed only once a year and then only in a few feet on either side of the traveled portion of the roadway. However, for comparison, cost data for this system are given in Table 5. As can be seen in this table 0.4% (Column 1) more acreage was mowed in 1978-79 than in 1974-75 while the man-hours required increased by 7% (Column 2) and the cost by 54% (Column 3). This 54% cost increase is, of course, comparable to the 52% increase for labor and equipment for an ordinary maintenance during the same time.

To ascertain the probable saving in mowing over the five year study period, the dollar expenditures from Appendixes B, C, and D for 1974-75 and 1978-79 were used in conjunction with the 52% increase for ordinary labor and equipment expenditures for the calculations given in Table 6. As can be seen, the calculated saving on mowing for the interstate and primary systems is \$330,206. Because this saving is not for a five-year period but for the year 1978-79, the total saving over ten years would amount to more than \$3 million. The saving will, of course, be much more when all of the highway districts apply the modified mowing standards recommended in this report.

Table 3

PERCENTAGE CHANGES BETWEEN 1974-75 and 1978-79 — INTERSTATE SYSTEM

	ACRES (1)	MAN- HOURS (2)	DOLLARS (3)	CENTERLINE MILES (4)	MAN-HOURS PER ACRE (5)	DOLLARS PER ACRE (6)	ACRES PER MILE (7)	DOLLARS/ MAN-HOURS (8)	DOLLARS PER MILE (9)	MAN-HOURS PER MILE (10)
<u>BRISTOL DISTRICT</u>										
Up				9.0%		18.0%		53.0%		
Down	22.0%	39.0%	7.0%		23.0%		28.0%		14.0%	44.0%
<u>SALEM DISTRICT</u>										
Up		8.0%	43.0%	26.0%	23.0%	63.0%		33.0%	13.0%	
Down	13.0%						31.0%			14.0%
<u>RICHMOND DISTRICT</u>										
Up			3.0%	2.0%	32.0%	97.0%		48.0%	0.7%	
Down	48.0%	31.0%					49.0%			32.0%
<u>SUFFOLK DISTRICT</u>										
Up		2.0%	19.0%	15.0%	21.0%	42.0%		17.0%	3.0%	
Down	16.0%						27.0%			12.0%
<u>FREDERICKSBURG</u>										
Up					66.0%	132.0%		39.0%		
Down	60.0%	34.0%	7.0%	0.3%			60.0%		7.0%	33.0%
<u>CULPEPER DISTRICT</u>										
Up		5.0%	45.0%	7.0%	13.0%	54.0%		38.0%	35.0%	
Down	6.0%						3.0%			2.0%
<u>STAUNTON DISTRICT</u>										
Up			11.0%	18.0%	29.0%	1.28%		77.0%		
Down	51.0%	37.0%					60.0%		6.0%	47.0%
<u>STATEWIDE</u>										
Up			15.0%	11.0%	22.0%	70.0%		40.0%	3.0%	
Down	32.0%	18.0%					39.0%			27.0%

Table 4

PERCENTAGE CHANGES BETWEEN 1974-75 and 1978-79 — PRIMARY SYSTEM

	ACRES (1)	MAN- HOURS (2)	DOLLARS (3)	LANE MILES (4)	MAN-HOURS PER ACRE (5)	DOLLARS PER ACRE (6)	ACRES PER LANE MILE (7)	DOLLARS/ MAN-HOURS (8)	DOLLARS/ LANE MILE (9)	MAN-HOURS/ LANE MILE (10)
<u>BRISTOL DISTRICT</u>										
Up			29.0%	4.0%	3.0%	58.0%	22.0%	53.0%	24.0%	19.0%
Down	18.0%	16.0%								
<u>SALEM DISTRICT</u>										
Up	33.0%	17.0%	58.0%	2.0%		19.0%	30.0%	35.0%	54.0%	14.0%
Down					12.0%					
<u>LYNCHBURG DISTRICT</u>										
Up			37.0%	2.0%		48.0%	9.0%	49.0%	35.0%	9.0%
Down	7.0%	8.0%			0.8%					
<u>RICHMOND DISTRICT</u>										
Up			19.0%	4.0%	13.0%	65.0%	31.0%	46.0%	15.0%	21.0%
Down	28.0%	19.0%								
<u>SUFFOLK DISTRICT</u>										
Up		0.8%	49.0%	4.0%	23.0%	83.0%	22.0%	48.0%	43.0%	4.0%
Down	19.0%									
<u>FREDRICKSBURG</u>										
Up			15.0%	3.0%		37.0%	18.0%	40.0%	12.0%	20.0%
Down	16.0%	18.0%			3.0%					
<u>CULPEPER DISTRICT</u>										
Up		9.0%	24.0%	5.0%	0.7%	36.0%	13.0%	37.0%	19.0%	13.0%
Down	9.0%									
<u>STAUNTON DISTRICT</u>										
Up		8.0%	32.0%	2.0%	19.0%	70.0%	24.0%	43.0%	29.0%	10.0%
Down	23.0%									
<u>STATEWIDE</u>										
Up			32.0%	3.0%	23.0%	76.0%	28.0%	44.0%	28.0%	11.0%
Down	25.0%	9.0%								

Table 5

PERCENTAGE CHANGES BETWEEN 1974-75 and 1978-79 — SECONDARY SYSTEM

	<u>ACRES</u> (1)	<u>MAN-HOURS</u> (2)	<u>DOLLARS</u> (3)	<u>MAN-HOURS</u> <u>PER ACRE</u> (4)	<u>DOLLARS</u> <u>PER ACRE</u> (5)	<u>DOLLARS</u> <u>MAN-HOURS</u> (6)
<u>BRISTOL DISTRICT</u>						
Up			48.0%	8.0%	61.0%	49.0%
Down	8.0%	0.8%				
<u>SALEM DISTRICT</u>						
Up	21.0%	23.0%	67.0%	2.0%	36.0%	35.0%
Down						
<u>LYNCHBURG DISTRICT</u>						
Up	16.0%	18.0%	73.0%	0.9%	49.0%	47.0%
Down						
<u>RICHMOND DISTRICT</u>						
Up	6.0%	13.0%	67.0%	7.0%	53.0%	48.0%
Down						
<u>SUFFOLK DISTRICT</u>						
Up			34.0%	16.0%	77.0%	53.0%
Down	25.0%	13.0%				
<u>FREDERICKSBURG</u>						
Up	0.6%	25.0%	78.0%	25.0%	77.0%	42.0%
Down						
<u>CULPEPER DISTRICT</u>						
Up			33.0%		38.0%	41.0%
Down	4.0%	6.0%		2.0%		
<u>STAUNTON DISTRICT</u>						
Up		8.0%	51.0%	19.0%	65.0%	39.0%
Down	9.0%					
<u>STATEWIDE</u>						
Up						
Down	0.4%	7.0%	54.0%	7.0%	55.0%	44.0%

Table 6

Calculated Savings From Revision of Mowing Standards

	<u>EXPENDITURES</u>	<u>5-YEAR LABOR- EQUIPMENT INCREASE</u>	<u>1974-75 COST x 1.52%</u>	<u>PROBABLE SAVING</u>
<u>Interstate</u>				
1974-75	\$ 330,957	52.0%		
1978-79	380,313		\$ 503,054	\$122,741
Increase	49,356			
<u>Primary</u>				
1974-75	1,023,640	52.0%		
1978-79	1,348,467		\$1,555,932	\$207,465
Increase	\$ 324,827			

Total Probable Saving \$330,206

As previously mentioned, the modified mowing standards have been only partially implemented. Richmond is the only district that has been officially included in the implementation. Other districts have to varying degrees implemented programs based on the findings of the study. The study team suggests that implementation of a modified program statewide would increase the yearly saving from \$330,206 to at least \$500,000. In addition, it can be seen in Appendixes B and C that there were savings of 8,058 man-hours on the interstate and 13,343 man-hours on the primary for a total of 21,501 man-hours per year. Again, with full implementation of the modified mowing program this saving in man-hours could be increased.

RECOMMENDATION AND IMPLEMENTATION

On the basis of the findings of the mowing experiments, the study team recommended that the Virginia Department of Highways and Transportation implement, statewide, the modified mowing standards given in Appendix E. These modified standards were discussed

by the Maintenance Research Advisory Committee, (membership is shown on page ii of this report) at its meeting on October 25, 1979, and the committee unanimously approved a recommendation that the modified standards be implemented by the Department.

The Department has issued the new standards and they will be put into effect at the beginning of the 1981 mowing season.

3056



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3058



APPENDIX A

MOWING QUESTIONNAIRE

Richmond District
February 22, 1979

The Mowing Committee is faced with the task of rewriting the mowing standards. Since you experimented with mowing last summer, your ideas are essential to the formulation of these standards. We would, therefore, appreciate your careful consideration in answering the following questions.

1. What type of operator do you use on your mowers?
a 21 b 6 c 2
2. Does mowing time reduce the time you could have equipment such as Athey loaders, motorgraders, etc., in operation?
YES 11 NO 13
3. Do you feel that frequent mowings are as important as ditching, shoulder work, blading, etc.?
YES 15 NO 14
4. Can we mow less frequently and still have our right-of-ways look presentable?
YES 10 NO 18
5. Can we mow less area and still have our right-of-ways look presentable?
YES 16 NO 14
6. How tall do you believe grass should be before it is mowed at the following locations:
(a) Residential areas 2-18 inches.

2	3	4	5	6	8	10	12	14	16	18	inches
(2)	(1)	(4)	(1)	(11)	(7)	(2)	(3)	(1)		(1)	

Weighted average (238 + 33 = 7 inches)

(b) Interstate close to and in and around cities and towns 2-18 inches.

2	3	4	6	8	10	12	14	15	16	18 inches
(1)	(1)	(3)	(8)	(6)	(5)	(7)	(2)	(1)		(1)

Weighted average (308 ÷ 35 = 9 inches)

(c) Rural interstate 4-24 inches.

4	6	8	10	12	14	15	16	18	24 inches
(1)	(3)	(9)	(4)	(7)	(2)	(2)		(3)	(1)

Weighted average (354 ÷ 32 = 11 inches)

(d) Rural primary roads 6-24 inches.

4	6	8	10	12	14	15	18	24 inches
(1)	(3)	(11)	(4)	(6)	(2)	(2)	(3)	(1)

Weighted average (358 ÷ 33 = 11 inches)

As you know, the experimental mowing during 1978 in the Richmond District included six guidelines. These guidelines are listed below with questions concerning each item.

1. Mowing is not to be started until June 1, and no mowing shall take place until all fescue seed heads are above 8".

(a) Should the first mowing be delayed until a certain date?

YES 2 NO 26

(b) Should the first mowing be delayed until fescue seed heads reach one of the following heights?

10 inches 4, 8 inches 10, 6 inches 9

(c) Other 1 (12") 1 (14")

2. The mowing height shall be 8" rather than 4" as specified by the present mowing standards. To accomplish the change to the 8" height, the sickle bars and bush-hogs will need to be modified.

(a) Which of the following mowing heights should be used?

8 inches 3, 6 inches 11 4 inches 15, 2 inches _____

(b) Other _____

3. With respect to areas to be mowed, the present mowing standards will be strictly observed.

(a) Should the present standards be observed?

YES 17 NO 11

(b) Should the area headquarters mow areas at their own discretion?

YES 14 NO 15

(c) Other _____

4. In areas where weeds have been a problem, herbicides shall be applied to the first 8' from the pavement edge about one week after mowing.

(a) Do you agree with this herbicide program?

YES 22 NO 5

(b) Comments _____

5. The numbers of mowings are to be reduced. To accomplish this reduction mowings beyond the first one shall not be undertaken until the vegetation is 14" high.

(a) Which of the following heights should be used?

16 inches 2, 14 inches 4, 12 inches 9,

10 inches 6, 8 inches 6

(b) Other _____

6. With the money saved by this reduced mowing, a fertilization and reseeding program shall be developed for the area constituting the first 8' from the pavement.

(a) Do you agree with this fertilization and reseeding program?

YES 21 NO 7

(b) Comments _____

General Comments

APPENDIX B

MOWING DATA - INTERSTATE SYSTEM

Fiscal Year	Acres	Man-Hours	Dollars	Centerline Miles	Man-Hours Per Acre	Dollars Per Acre	Acres Per Centerline	Dollars Per Man-Hours	Dollars Per Centerline	Man-Hours Per Centerline
<u>BRISTOL DISTRICT</u>										
74-75	3,236	6,374	39,792	109.80	1.97	12.30	29.47	6.24	362.40	58.1
75-76	3,285	6,134	44,475	110.81	1.87	13.54	29.65	7.25	401.36	55.4
76-77	2,619	5,248	44,115	109.80	2.00	16.84	23.85	8.41	401.78	47.8
77-78	3,106	5,384	47,871	111.43	1.73	15.41	27.87	8.89	429.61	48.3
78-79	2,538	3,869	36,985	119.23	1.52	14.57	21.29	9.56	310.20	32.4
Difference:										
74-75	698	2,505	2,807	+ 9.73	.45	2.27	8.18	+ 3.32	52.20	25.7
78-79				9%		18%		53%		
% Up			7%		23%		28%		14%	44%
% Down	22%	39%								
<u>SALEM DISTRICT</u>										
74-75	2,583	3,129	21,876	93.62	1.21	8.50	27.59	6.99	233.66	33.4
75-76	1,959	2,736	22,380	93.62	1.40	11.42	20.93	8.18	239.05	29.2
76-77	2,283	3,319	30,550	102.36	1.44	13.38	22.30	9.20	298.46	32.4
77-78	2,558	3,574	31,896	108.76	1.40	12.47	23.52	8.92	293.27	32.9
78-79	2,257	3,368	31,211	117.91	1.49	13.83	19.14	9.27	264.70	28.6
Difference:										
74-75	326	- 239	- 9,335	- 24.29	.28	5.33	8.45	2.28	31.04	4.8
78-79				26%	23%	63%	31%	33%	13%	14%
% Up		8%	43%							
% Down	13%									
<u>RICHMOND DISTRICT</u>										
74-75	8,105	10,358	72,485	168.92	1.28	8.94	47.98	7.00	429.11	61.3
75-76	8,194	10,518	83,528	172.22	1.28	10.19	47.58	7.94	485.00	61.1
76-77	6,166	8,356	69,457	172.17	1.36	11.26	35.81	8.31	403.42	48.5
77-78	5,208	7,060	66,163	171.93	1.36	12.70	30.29	9.37	384.82	41.1
78-79	4,228	7,164	74,299	171.93	1.69	17.57	24.59	10.37	432.15	41.7
Difference:										
74-75	3,877	3,194	- 1,814	- 3.01	.41	8.63	23.39	3.37	3.04	19.6
78-79				2%	32%	97%	49%	48%	.70%	32%
% Up			3%							
% Down	48%	31%								

MOWING DATA -- INTERSTATE SYSTEM

Fiscal Year	Acres	Man-Hours	Dollars	Centerline Miles	Man-Hours Per Acre	Dollars Per Acre	Acres Per Centerline	Dollars Per Man-Hours	Dollars Per Centerline	Man-Hours Per Centerline
<u>SUFFOLK DISTRICT</u>										
74-75	6,435	8,668	72,167	90.63	1.35	11.21	71.00	8.33	796.28	95.6
75-76	7,035	8,447	76,498	95.15	1.20	10.87	73.94	9.06	803.97	88.8
76-77	5,986	8,901	80,786	94.53	1.49	13.50	63.32	9.08	854.61	94.2
77-78	5,059	7,432	67,010	98.05	1.47	13.25	51.60	9.02	683.43	75.8
78-79	5,410	8,832	86,019	104.54	1.63	15.90	51.75	9.74	822.83	84.5
Difference:										
74-75	1,025	- 206	- 13,852	- 13.91	.28	4.69	19.25	1.41	26.55	11.1
78-79										
% Up		2%	19%	15%	21%	42%		17%	3%	3%
% Down	16%						27%			12%
<u>FREDERICKSBURG DISTRICT</u>										
74-75	2,094	2,999	24,827	46.99	1.43	11.86	44.56	8.28	528.34	63.8
75-76	1,550	2,612	25,638	46.99	1.69	16.54	32.98	9.82	545.61	55.6
76-77	917	1,701	17,828	46.99	1.85	19.44	19.51	10.48	379.40	36.2
77-78	1,176	1,791	16,892	46.99	1.52	14.36	25.02	9.43	359.48	38.1
78-79	836	1,992	23,014	46.85	2.38	27.53	17.84	11.55	491.23	42.5
Difference:										
74-75	1,258	1,007	1,813	.14	.95	15.67	26.72	3.27	37.11	21.3
78-79										
% Up		34%	7%	.30%	.66%	132%	60%	39%	7%	33%
% Down	60%									
<u>CULPEPER DISTRICT</u>										
74-75	5,106	7,377	53,537	127.72	1.44	10.49	39.98	7.26	419.77	57.8
75-76	4,160	6,423	53,974	129.02	1.54	12.97	32.24	8.40	418.34	49.8
76-77	4,831	7,004	63,071	127.72	1.45	13.06	37.82	9.00	493.82	54.8
77-78	4,332	6,094	56,846	127.74	1.41	13.12	33.91	9.33	445.01	47.7
78-79	4,780	7,744	77,395	136.43	1.62	16.19	35.04	9.99	567.29	56.8
Difference:										
74-75	326	- 367	- 23,858	- 8.71	.18	5.70	1.14	2.73	147.52	1.0
78-79										
% Up		5%	45%	7%	13%	54%	3%	38%	35%	2%
% Down	6%									

MOWING DATA — INTERSTATE SYSTEM

Fiscal Year	Acres	Man-hours	Dollars	Centerline Miles	Man-hours Per Acre	Dollars Per Acre	Acres Per Centerline	Dollars Per Man-hour	Dollars Per Centerline	Man-hours Per Centerline
<u>STAUNTON DISTRICT</u>										
74-75	7,660	5,836	46,273	198.81	.76	6.04	38.52	7.92	232.75	29.4
75-76	5,049	4,354	38,961	205.61	.86	7.72	24.56	8.95	189.49	21.2
76-77	4,279	3,603	44,992	205.61	.84	10.51	20.81	12.49	218.82	17.5
77-78	4,231	3,773	46,318	205.61	.89	10.95	20.58	12.28	225.27	18.4
78-79	3,732	3,672	51,390	235.49	.98	13.77	15.85	14.00	218.23	15.6
Difference										
74-75	3,928	2,164	- 5,117	- 36.68	.22	7.73	22.94	6.08	14.52	13.8
78-79			11%	18%	29%	1.28%	60%	77%	6%	47%
% Up										
% Down	51%	37%								
<u>STATEWIDE</u>										
74-75	35,219	44,741	330,957	836.49	1.27	9.40	42.10	7.40	395.65	53.5
75-76	31,232	41,224	345,454	855.42	1.32	11.06	36.51	8.38	403.84	48.2
76-77	27,981	38,132	350,801	859.18	1.41	12.95	31.52	9.20	408.30	44.4
77-78	25,670	35,108	332,996	870.51	1.37	12.97	29.49	9.48	382.53	40.3
78-79	23,781	36,683	380,313	932.38	1.54	15.99	25.51	10.37	407.89	39.3
Difference										
74-75	- 11,438	- 8,058	+ 49,356	+ 95.89	+ .27	+ 6.59	+ 16.59	+ 2.97	+ 12.24	- 14.2
78-79			15%	11%	22%	70%	39%	40%	3%	27%
% Up										
% Down	32%	18%								

3066



APPENDIX C
MOWING DATA -- PRIMARY SYSTEM

Fiscal Year	Acres	Man-Hours	Dollars	Lane Miles	Man-Hours Per Acre	Dollars Per Acre	Acres Per Lane	Dollars Per Man-Hours	Dollars Per Lane	Man-Hours Per Lane
<u>BRISTOL DISTRICT</u>										
74-75	9,346	17,762	103,122	2,605	1.90	11.03	3.59	5.81	39.57	6.8
75-76	9,139	17,472	119,724	2,643	1.91	13.10	3.46	6.85	45.30	6.6
76-77	8,340	16,025	123,829	2,674	1.92	14.85	3.12	7.73	46.12	6.0
77-78	8,900	17,360	141,120	2,685	1.95	15.86	3.31	8.13	52.56	6.5
78-79	7,658	14,938	133,215	2,721	1.96	17.40	2.81	8.89	48.96	5.5
Difference:										
74-75	1,688	2,774	- 30,093	- 116	0.06	6.37	0.78	3.08	9.39	1.3
78-79										
% Up			29%	4%	3%	58%		53%	24%	19%
% Down	18%	16%					22%			

SALEM DISTRICT

74-75	9,562	13,695	92,860	2,413	1.43	9.71	3.96	6.78	38.48	5.7
75-76	9,148	12,334	93,348	2,471	1.35	10.20	3.70	7.57	37.78	5.0
76-77	10,477	13,892	113,125	2,470	1.33	10.80	4.24	8.14	45.80	5.6
77-78	11,658	15,583	136,717	2,438	1.34	11.73	4.78	8.77	56.08	6.4
78-79	12,716	16,016	146,440	2,466	1.26	11.52	5.16	9.14	59.38	6.5
Difference:										
74-75	- 3,154	- 2,321	- 53,580	- 53	.17	1.81	1.20	2.36	20.90	.8
78-79										
% Up	33%	17%	58%	2%		19%	30%	35%	54%	14%
% Down					12%					

RICHMOND DISTRICT

74-75	17,492	24,380	159,923	2,825	1.39	9.14	6.19	6.56	56.61	8.6
75-76	16,808	22,492	169,359	2,894	1.34	10.08	5.81	7.53	58.52	7.8
76-77	15,307	21,662	172,579	2,919	1.42	11.27	5.24	7.97	59.12	7.4
77-78	12,108	18,896	158,885	2,917	1.56	13.12	4.15	8.41	54.46	6.5
78-79	12,590	19,790	189,862	2,928	1.57	15.08	4.30	9.59	64.84	6.8
Difference:										
74-75	4,902	4,590	- 29,939	- 103	.18	5.94	1.89	3.03	8.23	1.8
78-79										
% Up			19%	4%	13%	65%		46%	15%	21%
% Down	28%	19%					31%			

MOWING DATA — PRIMARY SYSTEM

Fiscal Year	Acres	Man-Hours	Dollars	Lane Miles	Man-Hours Per Acre	Dollars Per Acre	Acres Per Lane	Dollars Per Man-Hour	Man-Hours Per Lane
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SUFFOLK DISTRICT

74-75	17,833	21,766	145,968	1,958	1.22	8.18	9.11	6.71	11.1
75-76	15,742	22,940	181,564	1,999	1.46	11.53	7.87	7.91	11.5
76-77	13,247	20,154	175,685	2,000	1.52	13.26	6.62	8.72	10.1
77-78	12,098	19,708	177,160	1,989	1.63	14.64	6.08	8.99	9.9
78-79	14,465	21,784	217,018	2,030	1.50	15.00	7.13	9.96	10.7

Difference:

74-75	3,368	- 18	71,050	- 72	.28	6.82	1.98	3.25	0.4
78-79									
% Up		0.8%	49%	4%	23%	83%		48%	43%
% Down		19%					22%		4%

FREDERICKSBURG DISTRICT

74-75	12,291	17,080	118,010	1,949	1.39	9.60	6.31	6.91	8.8
75-76	14,178	18,600	155,689	1,976	1.31	10.98	7.18	8.37	9.4
76-77	10,981	15,352	141,974	1,982	1.40	12.93	5.54	9.25	7.7
77-78	8,720	13,562	125,227	1,986	1.56	14.36	4.39	9.23	6.8
78-79	10,311	13,954	135,160	2,000	1.35	13.11	5.16	9.69	7.0

Difference:

74-75	1,980	3,126	- 17,150	- 51	0.04	3.51	1.15	2.78	1.8
78-79									
% Up		16%	15%	3%		37%		40%	12%
% Down					3%		18%		20%

CULPEPER DISTRICT

74-75	15,963	23,893	166,708	2,780	1.50	10.44	5.74	6.98	8.6
75-76	19,485	29,980	233,685	2,899	1.54	11.99	6.72	7.79	10.3
76-77	17,168	23,696	202,291	2,898	1.38	11.78	5.92	8.54	8.2
77-78	15,088	22,640	200,191	2,898	1.50	13.27	5.21	8.84	7.8
78-79	14,582	21,596	207,311	2,908	1.49	14.22	5.01	9.56	7.5

Difference:

74-75	1,381	2,197	- 40,603	- 128	0.01	3.78	.73	2.58	1.1
78-79									
% Up		9%	24%	5%		36%		37%	19%
% Down					0.70%		13%		13%

MOWING DATA — PRIMARY SYSTEM

Fiscal Year	Acres	Man. Hours	Dollars	Lane Miles	Man-Hours Per Acre	Dollars Per Acre	Acres Per Lane	Dollars Per Man-Hours	Dollars Per Lane	Man-Hours Per Lane
<u>LYNCHBURG DISTRICT</u>										
74-75	17,043	22,146	131,470	2,533	1.30	7.71	6.73	5.94	51.90	8.7
75-76	16,646	20,996	149,008	2,555	1.26	8.95	6.52	7.10	58.32	8.2
76-77	13,833	17,370	138,823	2,584	1.26	10.04	5.35	7.99	53.72	6.7
77-78	12,995	16,821	136,360	2,591	1.29	10.45	5.02	8.11	52.63	6.5
78-79	15,790	20,330	180,468	2,583	1.29	11.40	6.11	8.88	69.87	7.9
Difference:										
74-75	1,253	1,816	- 48,998	- 50	.01	3.69	.62	2.94	17.97	0.8
78-79										
% Up			37%	2%		48%		49%	35%	9%
% Down	7%	8%			0.80%		9%			
<u>STAUNTON DISTRICT</u>										
74-75	14,191	14,397	105,579	2,405	1.05	7.44	5.90	7.09	43.90	6.2
75-76	13,270	15,030	121,208	2,440	1.13	9.13	5.43	8.06	49.68	6.2
76-77	11,603	13,154	126,773	2,436	1.13	10.93	4.76	9.64	52.04	5.4
77-78	10,620	13,312	125,064	2,452	1.25	11.78	4.33	9.39	51.00	5.4
78-79	10,997	13,718	138,993	2,452	1.25	12.64	4.48	10.13	56.69	5.6
Difference:										
74-75	3,194	1,179	- 33,414	- 47	0.20	5.20	1.42	3.04	12.79	0.6
78-79										
% Up			32%	2%	19%	70%		43%	29%	10%
% Down	23%	8%					24%			
<u>STATEWIDE</u>										
74-75	113,721	155,519	1,023,640	19,468	1.37	9.00	5.84	6.58	52.58	8.0
75-76	114,416	159,344	1,185,906	19,877	1.40	10.36	5.76	7.42	59.66	8.0
76-77	100,956	141,305	1,195,079	19,963	1.40	11.84	5.06	8.46	59.86	7.1
77-78	92,187	137,882	1,200,724	19,956	1.50	13.02	4.62	8.70	60.17	6.9
78-79	84,898	142,276	1,348,467	20,088	1.68	15.88	4.23	9.48	67.13	7.1
Difference:										
74-75	28,873	13,343	- 324,827	- 620	.31	6.88	1.61	2.90	14.55	0.9
78-79										
% Up			32%	3%	23%	76%		44%	28%	11%
% Down	25%	9%					28%			

3070



APPENDIX D

MOWING DATA — SECONDARY SYSTEM

Fiscal Year	Acres	Man-Hours	Dollars	Man-Hours Per Acre	Dollars Per Acre	Dollars Per Man-Hours
<u>BRISTOL DISTRICT</u>						
74-75	17,232	27,820	164,312	1.61	9.53	5.91
75-76	14,574	24,516	168,410	1.68	11.56	6.87
76-77	16,194	26,242	201,446	1.62	12.44	7.68
77-78	15,794	26,312	213,903	1.67	13.54	8.13
78-79	15,830	27,610	243,447	1.74	15.39	8.82
Difference:						
74-75	1,402	210	- 79,135	.13	5.86	2.91
78-79						
% Up			48%	8%	61%	49%
% Down		0.8%				
<u>SALEM DISTRICT</u>						
74-75	16,901	20,925	139,144	1.24	8.23	6.65
75-76	17,278	20,941	153,903	1.21	8.91	7.35
76-77	18,846	22,926	182,725	1.22	9.70	7.97
77-78	20,340	26,440	220,290	1.30	10.83	8.33
78-79	20,506	25,836	232,458	1.26	11.34	9.00
Difference:						
74-75	- 3,605	- 4,911	- 93,314	0.02	3.11	2.35
78-79						
% Up	21%	23%	67%	2%	38%	35%
% Down						
<u>RICHMOND DISTRICT</u>						
74-75	16,599	22,968	141,935	1.38	8.55	6.18
75-76	16,634	22,477	161,745	1.35	9.72	7.20
76-77	15,048	20,260	160,869	1.35	10.69	7.94
77-78	16,432	24,194	199,085	1.47	12.12	8.23
78-79	17,545	25,908	237,279	1.48	13.52	9.16
Difference:						
74-75	- 946	- 2,940	- 95,344	0.10	4.97	2.98
78-79						
% Up	6%	13%	67%	7%	58%	48%
% Down						

MOWING DATA — SECONDARY SYSTEM

Fiscal Year	Acres	Man-Hours	Dollars	Man-Hours Per Acre	Dollars Per Acre	Dollars Per Man-Hour
<u>SUFFOLK DISTRICT</u>						
74-75	18,774	22,885	149,799	1.22	7.99	6.55
75-76	13,172	17,527	137,023	1.33	10.40	7.82
76-77	12,019	17,837	151,806	1.48	12.63	8.51
77-78	12,825	19,393	171,074	1.51	13.34	8.82
78-79	14,151	19,916	200,228	1.41	14.15	10.05
Difference:						
74-75	4,623	2,969	- 50,429	0.19	6.16	3.50
78-79						
% Up	25%		34%	16%	77%	53%
% Down		13%				
<u>FREDERICKSBURG DISTRICT</u>						
74-75	12,572	14,840	101,145	1.18	8.05	6.82
75-76	12,204	15,582	129,885	1.28	10.64	8.34
76-77	9,696	13,682	126,476	1.41	13.04	9.24
77-78	9,892	13,670	126,309	1.38	12.77	9.24
78-79	12,648	18,580	179,896	1.47	14.22	9.68
Difference:						
74-75	- 76	- 3,740	- 78,751	0.29	6.17	2.86
78-79						
% Up	0.6%	25%	78%	25%	77%	42%
% Down						
<u>CULPEPER DISTRICT</u>						
74-75	18,910	28,568	189,117	1.51	10.00	6.62
75-76	17,757	28,362	212,829	1.60	11.99	7.50
76-77	18,310	27,153	225,449	1.48	12.31	8.30
77-78	16,884	25,913	225,262	1.53	13.34	8.69
78-79	18,176	26,957	251,338	1.48	13.83	9.32
Difference:						
74-75	734	1,611	- 62,221	.03	3.83	2.70
78-79						
% Up	4%	6%	33%		38%	41%
% Down						

MOWING DATA — SECONDARY SYSTEM

Fiscal Year	Acres	Man-Hours	Dollars	Man-Hours Per Acre	Dollars Per Acre	Dollars Per Man-Hours
<u>LYNCHBURG DISTRICT</u>						
74-75	21,239	24,372	139,707	1.15	6.58	5.73
75-76	20,357	24,327	166,374	1.20	8.17	6.84
76-77	20,138	22,190	167,197	1.00	8.30	7.53
77-78	23,389	26,735	207,662	1.14	8.89	7.77
78-79	24,702	28,744	241,985	1.16	9.80	8.42
Difference:						
74-75	- 3,463	- 4,372	- 102,278	0.01	3.22	2.69
78-79						
% Up	16%	18%	73%	0.90%	49%	47%
% Down						
<u>STAUNTON DISTRICT</u>						
74-75	21,132	22,203	153,195	1.05	7.25	6.90
75-76	18,237	21,158	165,889	1.16	9.10	7.84
76-77	17,058	20,090	175,129	1.18	10.27	8.72
77-78	16,731	21,584	194,653	1.29	11.63	9.02
78-79	19,267	24,088	230,884	1.25	11.98	9.59
Difference:						
74-75	1,865	- 1,885	- 77,689	0.20	4.73	2.69
78-79						
% Up		8%	51%	19%	65%	39%
% Down	9%					
<u>STATEWIDE</u>						
74-75	143,359	184,581	1,178,354	1.29	8.22	6.38
75-76	130,213	174,890	1,296,058	1.34	9.95	7.41
76-77	127,309	170,380	1,391,097	1.34	10.93	8.16
77-78	132,287	184,241	1,558,238	1.39	11.78	8.46
78-79	142,835	197,639	1,817,515	1.38	12.72	9.20
Difference:						
74-75	534	- 13,058	- 639,161	0.09	4.50	2.82
78-79						
% Up	0.4%	7%	54%	7%	55%	44%
% Down						

3074



APPENDIX E
 VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION
 MAINTENANCE DIVISION
 STANDARD

3075

ACTIVITY 171 <p style="text-align: center;">Sheet <u>1</u> of <u>6</u></p>	DATE July 1, 1980	WORK UNIT Acres
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DESCRIPTION — TRACTOR MOWING

Includes tractor mowing with sickle bar, rotary mowers and guardrail mowers.

PURPOSE

The objective of the Department is to maintain the vegetation on all highways in accordance with the need for safety and erosion control through a planned and coordinated program.

To aid in accomplishing this objective, four priorities of highways have been established with the right-of-way being classified into various areas and the care of these areas being specified.

All highways shall be assigned one of the following priorities.

PRIORITY NO. 1

Priority No. 1 will normally include Interstate, Arterial, high type primary and a few secondary routes.

Where mowing is required, the vegetation on medians, interchanges and roadside areas shall be mowed as frequently as necessary to maintain the grass between a height of approximately 6" and 16". Where possible the first mowing should be delayed until all seedheads are taller than 6". In specific locations of the right-of-way where slopes are not steeper than 4:1 and not over 5' in height, areas may be mowed to blend with the adjacent property. However, it should be remembered, grass should not be cut shorter than 6" except in very special situations. Areas to be mowed are shown in Figures 1 and 2. Interchange infields are not included in these figures. Special attention should be given to mowing the intersections, crossovers, and those areas in the infield which are needed to assure safe sight distance.

SCHEDULING FREQUENCY												
MONTH	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
MAJOR EMPHASIS												
MINOR EMPHASIS												
AS REQUIRED												

PROCEDURE

1. Place traffic control devices in accordance with current Department guidelines, "Typical Traffic Control For Work Area Protection". See Section 14 of the Maintenance Division Policy Manual.
2. Service equipment; grease, sharpen blades, etc.
3. Adjust mower to 6" cutting height. (Modification to equipment may be needed to insure 6" cutting height.)
4. Operate mowers in a safe manner.
5. Use mowers to greatest efficiency.
 - a. Larger mowers - wide open spaces - keep swaths long and straight.
 - b. Flail and rotary mowers - major areas of right-of-way - keep maneuvering to a minimum.
 - c. Sickle bars - where other mowers cannot reach or move efficiently.
6. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS		
1 Foreman 9 operators	For Gang Mowing: 8 mowers 1 truck (signs)			
4 operators	3 tractor mowers 1 truck (signs)			
		<table border="1" style="width: 100%; height: 100%;"> <tr> <th data-bbox="1032 1604 1513 1654">SMALL TOOLS</th> </tr> <tr> <td data-bbox="1032 1654 1513 2016"></td> </tr> </table>	SMALL TOOLS	
SMALL TOOLS				

3077

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION
 MAINTENANCE DIVISION
 STANDARD

ACTIVITY 171 (Continued)

DATE

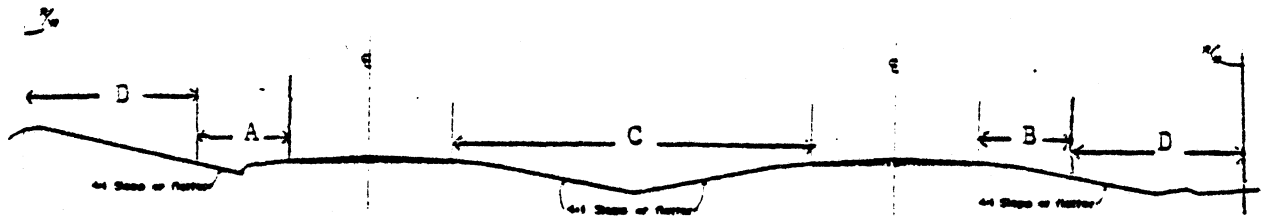
WORK UNIT

Sheet 2 of 6

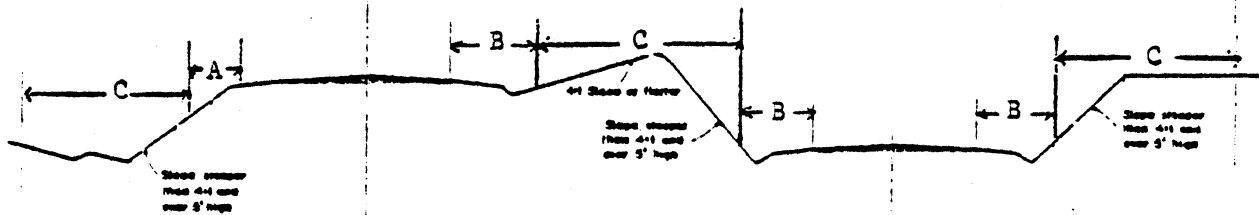
July 1, 1980

Acres

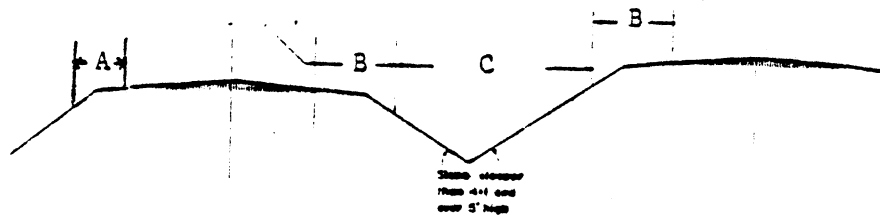
Figure 1. Medians and roadside mowing areas for medians 50' wide or less under Priority No. 1.



- A — Mow from edge of pavement to one swath beyond ditch line.
- B — Mow from edge of pavement to one swath down fill slope.
- C — Mow.
- D — Do not mow.



- A — Mow from edge of pavement to one swath down fill slope
- B — Mow from edge of pavement to one swath beyond ditch line.
- C — Do not mow.



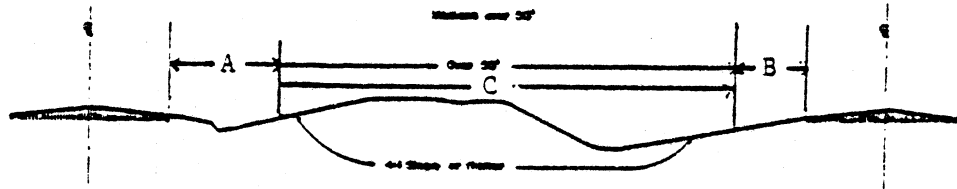
- A — Mow from edge of pavement to three feet beyond guardrail.
- B — Mow from edge of pavement to one swath down fill slope.
- C — Do not mow.

NOTE: There will be cases where areas designated for no mowing will have to be mowed to blend with the adjacent landscape. However, such mowing should be restricted to those areas that truly warrant such mowing and then should never be done on slopes greater than 4:1 which are more than 5' high.

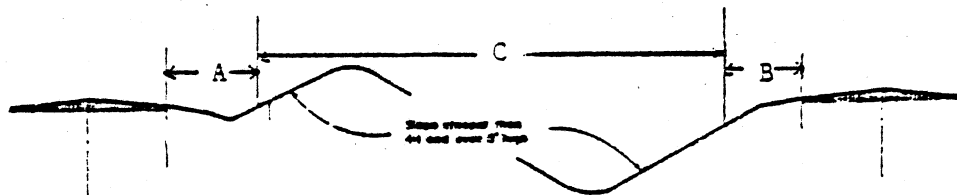
VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION
 MAINTENANCE DIVISION
 STANDARD

ACTIVITY	171 (Continued)	DATE	WORK UNIT
	Sheet 3 of 6	July 1, 1980	Acres

Figure 2. Median mowing areas for medians over 50' wide under Priority No. 1.



- A — Mow from edge of pavement to one swath beyond ditch line.
- B — Mow three swaths from edge of pavement.
- C — Do not mow.



- A — Mow from edge of pavement to one swath beyond ditch line.
- B — Mow from edge of pavement one swath down fill slope.
- C — Do not mow.

3079

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION
 MAINTENANCE DIVISION
 STANDARD

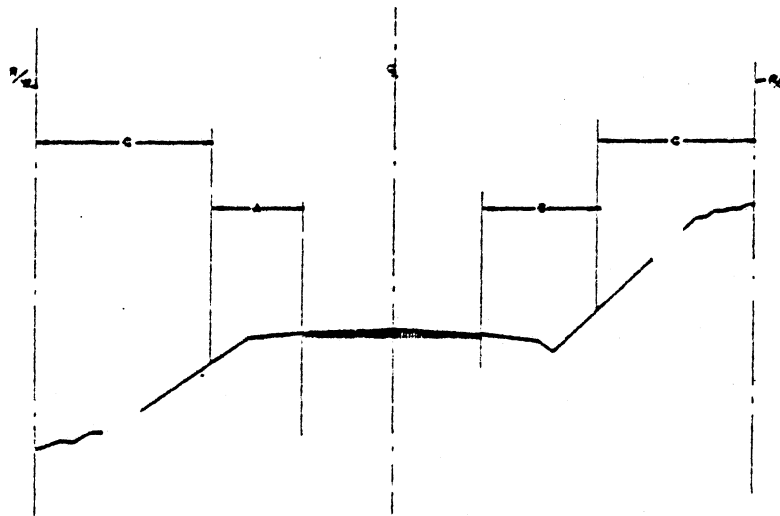
ACTIVITY 171 (Continued)	DATE	WORK UNIT
Sheet <u>4</u> of <u>6</u>	July 1, 1980	Acres

PRIORITY NO. 2

Priority No. 2 normally will include low type primary and high type secondary routes.

The mowing areas as noted in Figure 3 shall be mowed as frequently as necessary to keep vegetation between a minimum height of approximately 6" and a maximum height of 18". Mowing should not be started until vegetation reaches a height of approximately 10". Special attention should be given to mowing intersections in a manner to assure safe sight distance.

Figure 3. Roadside mowing areas under Priority No. 2



- A — Mow from edge of pavement to one swath down fill slope.
- B — Mow from edge of pavement to one swath beyond ditch line.
- C — Do not mow.

NOTE: There will be cases where areas designated for no mowing will have to be mowed to blend with the adjacent landscape. However, such mowing should be restricted to those areas that truly warrant such mowing and then should never be done on slopes greater than 4:1 which are more than 5' high.

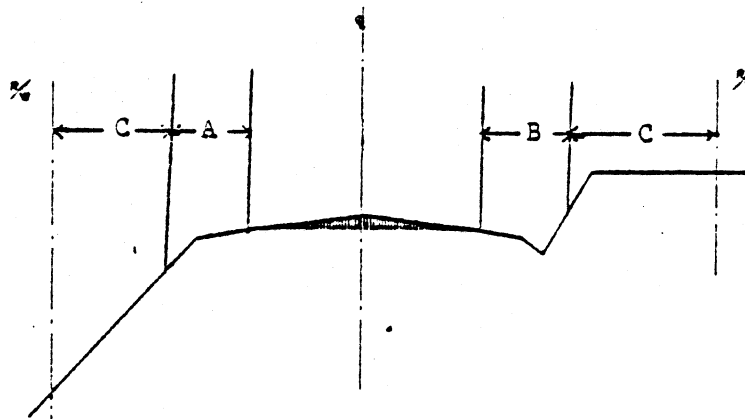
VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION
MAINTENANCE DIVISION
STANDARD

ACTIVITY 171 (Continued)	DATE	WORK UNIT
Sheet 5 of 6	July 1, 1980	Areas

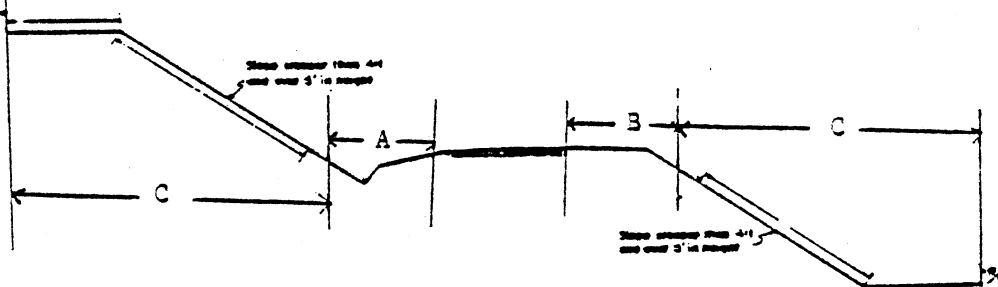
PRIORITY NO. 3

Priority No. 3 will normally include a majority of the Secondary System. That portion of the right-of-way which is not steeper than 4:1 and over 5' in height shall be mowed once per year or more frequently if required for safety. Special attention should be given to mowing intersections and curves in a manner to assure safe sight distance.

Figure 4. Roadside mowing areas under Priority No. 3



- A — Mow from edge of pavement to one swath down fill slope.
- B — Mow from edge of pavement to one swath beyond ditch line.
- C — Do not mow.



- A — Mow from edge of pavement to one swath beyond ditch line.
- B — Mow from edge of pavement to on swath down fill slope.
- C — Do not mow.

NOTE: There will be cases where areas designated for no mowing will have to be mowed to blend with the adjacent landscape. However, such mowing should be restricted to those areas that truly warrant such mowing and then should never be done on slopes greater than 4:1 which are more than 5' high.

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION
MAINTENANCE DIVISION
STANDARD

ACTIVITY 171 (Continued) Sheet 6 of 6	DATE July 1, 1980	WORK UNIT Acres
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PRIORITY NO. 4

Priority No. 4 will normally include routes of the nature of gated roads. Roads in Priority No. 4 shall receive such attention as is necessary to keep the travelled way clear of all objectionable vegetation.

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION
MAINTENANCE DIVISION
STANDARD

ACTIVITY (Continued) Sheet _____ of _____	DATE	WORK UNIT
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VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION
 MAINTENANCE DIVISION
 STANDARD

3083

ACTIVITY 172 <p style="text-align: center;">Sheet <u>1</u> of <u>1</u></p>	DATE July 1, 1980	WORK UNIT None
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DESCRIPTION — HAND MOWING

Hand mowing using scythes, weed eaters, sickles, power hand mowers, etc.

PURPOSE

Hand mowing is required in areas not accessible to sickle bar, flail, and larger type mowers. The vegetation around signs, guardrails, delineators, mailboxes, bridges, and intersections should be maintained to the same standard as the road-side on which they are located.

SCHEDULING FREQUENCY												
MONTH	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
MAJOR EMPHASIS												
MINOR EMPHASIS												
AS REQUIRED												

PROCEDURE

1. Place traffic control devices in accordance with current Department guidelines, "Typical Traffic Control For Work Area Protection". See Section 14 of the Maintenance Division Policy Manual.
2. Proceed with work in a safe efficient manner.
3. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
3 operators *	1 truck (service)	
2 operators * 1 person	1 truck 1 hand mower 1 weed eater	
1 operator * 1 person	1 truck 2 hand mowers	
		SMALL TOOLS
1 Foreman 1 operator prison labor	1 truck	hand sickles hand scythes
* The operator who drives the truck should also act as a tender and be prepared to work with the mower operators in repairing equipment. In addition he should use the weed eater and other hand tools to cut around posts, etc.		

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION
 MAINTENANCE DIVISION
 STANDARD

3085

ACTIVITY 173 Sheet <u>1</u> of <u>2</u>	DATE July 1, 1980	WORK UNIT Acres
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DESCRIPTION — BRUSH CUTTING

Cutting and removal of brush.

PURPOSE

Within the right-of-way brush which is undesirable or which creates a safety hazard shall be controlled.

Desirable flowering shrubs or any other vegetation as may be designated by the Environmental Quality Division which are located in area "B" shall not be cut or sprayed (see Figure 1 on sheet 2).

The area between ditch lines shall be kept clear of all protruding brush which interferes with traffic or restricts adequate sight distance.

At all bridges, curves, intersections, and signs, the brush within the right-of-way shall be controlled to provide adequate sight distance for traffic safety.

SCHEDULING FREQUENCY												
MONTH	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
MAJOR EMPHASIS												
MINOR EMPHASIS												
AS REQUIRED												

PROCEDURE

1. Place traffic control devices in accordance with current Department guidelines, "Typical Traffic Control For Work Area Protection". See Section 14 of the Maintenance Division Policy Manual.
2. Proceed with work in a safe, efficient manner.
3. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 Foreman 2 operators (if required) prison labor or 4 to 6 persons	1 truck 1 truck and Brush Chipper (if required)	
1 operator 1 person	1 truck	
2 operators	1 truck 1 tractor mower or motor grader with side mounted bush hog	SMALL TOOLS
		bush axes chain saws

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION
MAINTENANCE DIVISION
STANDARD

3087

ACTIVITY 173 (Continued)

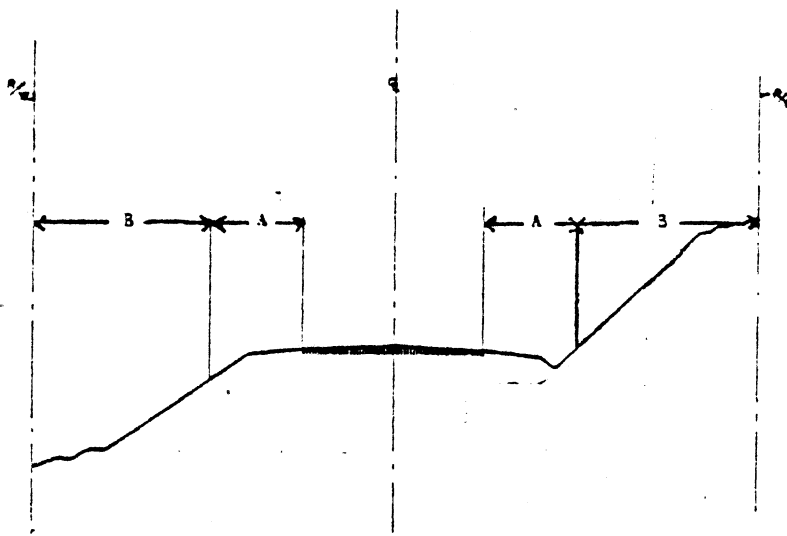
DATE

WORK UNIT

Sheet 2 of 2

July 1, 1980

Acres



- A. Mowed area.
- B. Brush which is undesirable or which creates a safety hazard shall be controlled.

Figure 1. Brush cutting requirements on right-of-way.

3088

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION
MAINTENANCE DIVISION
STANDARD

ACTIVITY (Continued) Sheet _____ of _____	DATE	WORK UNIT
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VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION
 MAINTENANCE DIVISION
 STANDARD

ACTIVITY 174 Sheet <u>1</u> of <u>1</u>	DATE July 1, 1980	WORK UNIT Gallons of Spray
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DESCRIPTION — SPRAYING WEEDS OR GRASS

Control of weeds by spraying; use of growth inhibitors or soil sterilants on grass.

PURPOSE

Proper use of chemical controls can substantially reduce the cost of machine and hand mowing and is an essential part of any program of vegetation control. The areas where chemical controls should be used are as follows:

- A. Areas around signposts, guardrail, headwalls, etc., where growth inhibitors should be used.
- B. Areas such as paved ditches, paved shoulders, etc., where soil sterilants should be used.
- C. Areas where herbicides are used to control noxious weeds, reduce frequency of mowing, control brush and improve the appearance of the roadside.

SCHEDULING FREQUENCY

MONTH	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
MAJOR EMPHASIS												
MINOR EMPHASIS												
AS REQUIRED												

PROCEDURE

The application of pesticides along the state's right-of-way shall be performed by personnel that are well trained and experienced in the use and application of these materials.

The Division's policies governing the spraying of weeds, and grass are contained in Sections 8.360 through 8.366 of the Maintenance Division Policy Manual.

PERSONNEL	EQUIPMENT	MATERIALS
Staff with only well trained and experienced personnel.		
		SMALL TOOLS