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AN EXPERIMENTAL MAINTENANCE MANAGEMENT SYSTEM

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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ABSTRACT

The purpose of this study was to evaluate Virginia's maintenance management system and to recommend modifications directed at improving it.

The study revealed that (1) the current system of allocating maintenance monies is based upon centerline mileage rather than the quantities of maintainable items, (2) the area superintendents' desired level-of-service is higher than that recommended in the guidelines issued by the Maintenance Division, and (3) the accomplishments of field crews for an 8-hour day including travel, preparation, safety and productive time often fall to two-thirds of the current state productivity standards.

The implementation and evaluation of a pilot program employing an "assessed needs" approach to maintenance management are recommended. The basic input to the assessed needs approach would originate from the maintenance area headquarters and would include: (1) A graphic log inventory of maintainable items, (2) a roadway needs inventory, (3) a long-range work plan and budget, (4) a short-range work plan, (5) an evaluation of productivity standards based on local constraints, (6) an ongoing evaluation of the maintenance activity standards, and (7) an evaluation of the assessed needs approach.

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SUMMARY OF FINDINGS

1. The current system of allocating monies to maintenance activities in Virginia is based upon the centerline mileage rather than the quantities of maintainable items.

2. A sampling of opinions among maintenance area superintendents indicated that their desired level-of-service is higher than that recommended in the guidelines issued by the Maintenance Division.

3. The accomplishments of field crews for an 8-hour day including travel, preparation, safety and productive time often fall to two-thirds of the current state productivity standards.

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RECOMMENDATIONS

1. The highway maintenance management program employing the "assessed needs" approach outlined in this report should be pilot tested in a number of residencies to allow an evaluation of its potential for benefiting the state highway maintenance program.

2. An in-depth evaluation of the current state productivity standards is warranted.

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INTRODUCTION

The increased cost of maintaining Virginia's roadway system prompted the initiation of the Virginia Maintenance Study 1963-1966.[1] Based on the results of that study, Virginia implemented a state maintenance management system designed to help management plan, organize, direct and control the state maintenance program. This system has been successful in achieving its objectives; however, as with any system, there is a need to continuously modify and update the system to satisfy changing demands. As part of this continuous process, this study was initiated to evaluate the maintenance management program in Virginia and to make recommendations aimed at improving it. The results of the evaluation are presented in this report. The plans for the evaluation were described in the working plan "Evaluation of Virginia's Maintenance Management System", dated June 1977.

PURPOSE AND SCOPE

The purpose of this study was to evaluate Virginia's maintenance management system and to recommend modifications directed at improving it. An effective maintenance management system must be able to aid management at all levels in planning, organizing, directing and controlling the state maintenance program. To satisfy these requirements the system should have

the three basic ingredients of (1) long-range planning, (2) short-range planning, and (3) evaluation. Long-range planning includes the identification of specific objectives based upon existing roadway needs and available resources. Short-range planning includes the assignment of available men, equipment and materials to satisfy existing roadway needs. Evaluation includes the comparison of work performed to the work planned. Thus, an effective maintenance management system should provide the framework for (1) setting objectives based on existing roadway conditions (long-range planning), (2) directing work towards achieving these objectives (short-range planning) and (3) measuring the success achieved in meeting these objectives (evaluation). These basic ingredients are the subject of the succeeding sections of this report.

LONG-RANGE PLANNING

Long-range planning encompasses the identification of specific objectives based upon existing roadway needs and available resources. The long-range planning process includes (1) an inventory of all maintainable items, (2) a set of maintenance activity standards, (3) an inventory of roadway needs, (4) a set of productivity standards, and (5) a yearly work plan. The inventory of all maintainable roadway items is used as a datum from which to plan the maintenance program. The activity standards are used as a basis from which to evaluate existing roadway conditions. The inventory of roadway needs is developed from those maintainable items which do not meet the activity standards. The productivity standards stipulate the rate at which work can be performed based upon local constraints. The yearly work plan is developed based on assessed needs and is expressed as the maintenance program work load in terms of men, equipment and materials required to satisy the roadway needs.

Inventory of Maintainable Roadway Items

The current system of allocating monies to maintenance activities in Virginia is based upon centerline mileage. The basic problem with this system is the difficulty in properly allocating monies to maintenance items not directly related to centerline mileage. A review of data obtained from several maintenance areas in the state has indicated that the only item directly related to centerline mileage was the total road miles. For example, the number of ditch miles are controlled by cut and fill sections, the number of entrance pipe fluctuates with population density, and the number of drainage structures is that required to satisfy the requirements of the terrain.

Table 1 contains a summary of two ditching activities for three maintenance areas representing different regions of the state. The summary shows the actual inventoried quantities in the areas along with quantities used in the present allocation system. The point emphasized by the data in Table 1 is that the quantities of many maintainable items are not a function of the centerline mileage.

Table 1. Example of actual quantities of maintainable items compared with quantities used in present allocation system.

ACTIVITY \ MAINTENANCE AREA	A			B			C		
	ACTUAL	ALLOCATION	DIFF.	ACTUAL	ALLOCATION	DIFF.	ACTUAL	ALLOCATION	DIFF.
1. Machine Ditches (miles) Hard Surface	55	100	+82%	175	186	+6%	225	225	0%
Non-Hard Surface	64	113	+77%	102	141	+38%	45	45	0%
2. Hand Cleaning Ditches (feet)	N/A	6,156	---	16,880	24,458	+45%	335,150	40,509	-88%

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The basic shortcoming of the present allocation system can be corrected by inventoring all maintainable items and allocating monies based on the quantities of items present. The inventory can be performed quickly with the roadway maintenance log shown in Figure 1. The heading on the roadway maintenance log (top) includes the date, start and end locations, travel direction, route number, section number, district, residency, county, and maintenance area. Any revisions to the log are noted by a date change. The start and end locations correspond to the termini given in the "Virginia Department of Highways and Transportation — Road Inventory."(2) Travel direction is given as the general direction in which the route traverses the county. Route number is entered under the appropriate heading and the section number serves as the page number. General information as to surface type, road type and basic profile is indicated on the left side of the log form. The road surface is represented in the center of the form with ditch miles, shoulder type, mowable swaths and other incidental items being shown on the left and right sides of the surface.

A legend for the roadway maintenance log is shown in Figure 2. This legend provides a uniform method for representing bridges, box culverts, pipes, entrances, signs, and guardrails. All of the necessary descriptive information for these items, except signs, can be found on the structure (e.g. bridge number) or can be determined from field measurements (e.g. pipe size, culvert size). The sign type and code information can be found in the Virginia Manual on Uniform Traffic Control Devices, (VA. MUTCD).(3)

The actual logging of a road can be done by a two-man team using a vehicle equipped with an odometer reading in tenths of a mile. Possible combinations for team members are the superintendent and the timekeeper, superintendent and inspector, or the superintendents from adjoining areas. Other pieces of equipment required are a straightedge, clipboard, Road Inventory, VA. MUTCD, and an adequate quantity of the Roadway Maintenance Log sheets. The driver verbally notes the items to be entered and the corresponding odometer readings. The other team member enters the items on the log sheets, locating them by mileage and road location. Using this method, an average time of 20 minutes is required to log 1 mile of roadway.

Ditching areas, shoulder type, and mowable swaths are indicated by a line in the space provided on the left and right sides of the road surface. Mowable swaths are defined by the number of swaths or cuts necessary to mow the roadside. Mowing is calculated in swath miles. For example, if the mowing requirement is 2 swaths for a half-mile and 1 swath for a half-mile, the total swath miles would be (2 x .5) + (1 x .5) or 1.5 swath miles.

A summary of maintainable items is provided on the right side of the form for the 1-mile section inventoried. Quantities of mowable swaths, shoulder type, ditch miles and guardrail are summarized by length, while quantities of signs, entrance pipes and drainage structures are summarized by number. Any incidental items such as outfall ditches, paved ditches, sidewalk, and curb and gutter are totaled by length in the summary category "Other".

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Date	Start Location	End Location	Travel Dir.	Route	Section

District	Residency	County	Maintenance Area

SURFACE TYPE	Plant Mix	Surface Treatment	P. C. C.	Gravel
ROAD TYPE	Interstate	Primary	Secondary	Other (Specify)
BASIC PROFILE	4-Lane Divided	4-Lane Undivided	2-Lane	Other (Specify)

Other
Mowable Swath
Shoulder Type
Ditch Miles
St. Reading
Ditch Miles
Shoulder Type
Mowable Swath
Other

SUMMARY

Mowable Swaths
length
1
2
Total

Shoulder Type
length
Paved
Sod
Aggregate

Ditch Miles
length
Left
Right
Total

Guardrail
length
Type

Signs
No.
Type

Entrances
No.
With Pipe
Without Pipe

Drainage Structures
Size Type No.
Pipe
Box Culvert
Bridges

Other

Figure 1. Roadway maintenance log.

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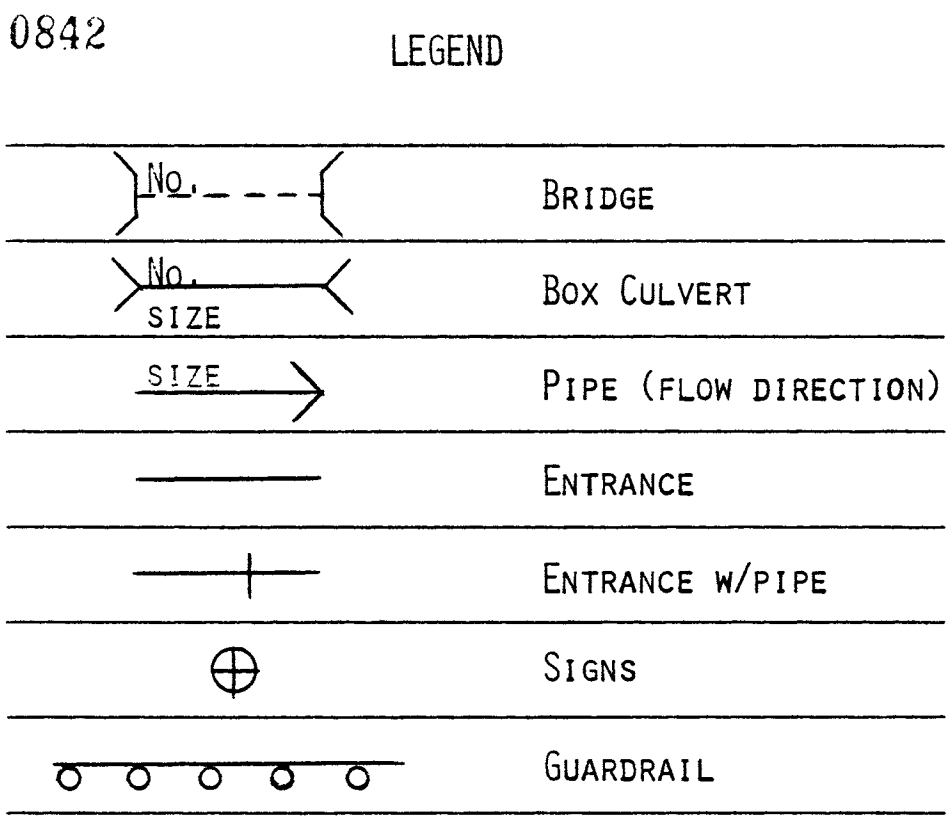

Figure 2. Legend for the roadway maintenance log.

After the Roadway Maintenance Logs have been completed for a route, the information is summarized on the Roadway Maintenance Log Summary as shown in Table 2. This summary includes the route number, the number of sections, the length by surface type and the total information contained in the summary portion of the Roadway Maintenance Log Sheets for the route. This total information is entered in the upper portion of the Roadway Maintenance Log Summary for the route. The lower portion is used to record the results of the inventory of roadway needs. The completed summary allows a comparison of route totals of maintainable items and aids in the preparation of the yearly work plan.

The completed inventory of maintainable roadway items consists of a graphic representation of each route in the maintenance area on the Roadway Maintenance Log sheets (Figure 1) and a summary of maintainable items by route and totals for the area on the Roadway Maintenance Log Summary (Table 2). These two documents contain the inventory of all maintainable roadway items and are used as the basis for planning. For more

Table 2. Roadway maintenance log summary.

District	Residency	County	Maintenance Area

Route	Sections	Length (miles)	Mowable Swath (miles)	Shoulder Type	Ditch Miles	Guard-rail (ft.)	Signs		Entrances		Drainage Structures			Side-walk (ft.)	Curb & Gutter (ft.)	Paved Ditch (ft.)	Drop Inlets	Outfall Ditch (ft.)	Other
							Type	No.	w/pipe	w/o pipe	Pipe	Box Culvert	Bridges						

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information on the inventory of maintainable roadway items the reader is referred to Appendix A, "How to Conduct the Roadway Maintenance Log Inventory".

Maintenance Activity Standards

In any maintenance management system there are mechanisms or tools for assisting the maintenance superintendent in decision making. One such tool is the maintenance activity standards. Basically, these standards set the level-of-service to be provided. They serve as a basis for determining when work is needed. Statewide uniformity is also enhanced by the use of these standards.

The development of the maintenance activity standards was accomplished on a trial and error basis in this study. Superintendents in selected maintenance areas were asked to state their own standards for ordinary maintenance activities. Many of the actual quantities were derived from physically measuring and assessing a maintenance need after the superintendent had indicated that the particular situation warranted attention. After many situations were evaluated the information was summarized. It was found that many superintendents' standards were very high when compared to "level-of-service" guidelines issued by the Maintenance Division. Therefore, these preliminary maintenance activity standards were used to compute the money allocations for several maintenance areas. The findings indicated that an overall increase of from three to four times the normal allocation would be necessary if the superintendents' standards were adhered to. In light of this, the standards were evaluated by the Highway Maintenance Standards Committee and revised. The maintenance activity standards as they are now stated appear to satisfy the requirements for the "level-of-service" as well as budgetary allocations. The results of this effort are contained in Appendix B, "Maintenance Division Activity Standards".

Inventory of Needs

The inventory of roadway needs is a list of those maintainable items which do not meet the maintenance activity standards. The area superintendent develops this inventory by evaluating each of his roadways in terms of the activity standards. As the superintendent evaluates his roads, the roadway needs are noted on the Roadway Maintenance Log. The superintendent then summarizes these quantities by route and by maintenance area on the Roadway Maintenance Log Summary and submits this to the residency supervisor. The supervisor reviews each area's inventoried needs within the residency. Priorities are set in regard to route and activity. As the roadway needs are satisfied, the progress is noted on the Roadway Maintenance Log. This procedure will provide for an assessment of planning as well as serve as a basis for forecasting maintenance needs.

Productivity Standards

The productivity standards are the rates at which work can be performed. These standards are primarily statements of work performance for various activities based on experience, efficient work methods, and acceptable work procedures. The productivity standards serve as the key in planning since they describe the anticipated duration of work activities.

The productivity standards currently used in Virginia are based on the results of the Maintenance Management Study and have been modified to satisfy changing demands. The standards were developed by averaging the results of time studies of maintenance activities performed in various parts of the state.

In an attempt to evaluate the accuracy of the current productivity standards, "Daily Performance Data Cards" were developed and distributed to selected area headquarters. To complete the cards, the following information was required: personnel by classification, equipment by type, time spend for preparation, travel, safety and actual productive work, and quantities of materials used. As the superintendents reported the work, figures were developed showing the accomplishments for actual productive work times as well as for the 8-hour day. Comparisons were then made with the present state standards. An example of the comparison is shown in Table 3. In general, the findings showed that actual productive time compared favorably with the state standards. However, productivity figures for the total 8-hour day including travel, preparation, safety, and productive time often fell to two-thirds of the state productivity standards. This finding indicates that the superintendent is able to do only approximately two-thirds of the work that the productivity standards indicate that he can do in an 8-hour day. Thus, the writers recommend that an in-depth evaluation of the current state productivity standards be performed.

Table 3. Example comparison of actual productivity man-hours per unit) to present state standards.

ACTIVITY	$-\sigma$	MEAN	$+\sigma$	STATE ALLOC.	% PREP	% TRAVEL	% SAFETY	% PROD.
Skin Patching (man-hours per ton)	1.75	4.01	6.28	2.8	12	12	10	66
Premix Patching (man-hours per ton)	2.64	5.02	7.40	4.0	8	19	12	61
Tractor Mowing (man-hours per acre)	1.10	1.65	2.20	1.30	8	11	9	72

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Yearly Work Plan

The yearly work plan is an estimate of the work load in terms of the men, equipment and materials required to maintain the roadway system. In Virginia, the yearly ordinary maintenance budget is prepared using the average reported information with consideration being given to geographic regions and population extremes. This practice does not provide a dynamic budget; the allocations do not change to meet the changing maintenance needs. An oversimplified example would be a maintenance area that had expended a majority of its available resources in surface maintenance for the past few years. The budget developed using the past years' averages would indicate the primary need to be surface maintenance; however, more than likely the need would be in some other area, such as drainage.

To eliminate this problem, the yearly work plan should be based on inventoried roadway needs. Since the needs are identified by route and activity, priorities can be assigned with consideration being given to traffic volumes, road use, plans for future reconstruction, or maintenance improvement projects. Of course, the amount of work that can be accomplished is constrained by available man-hours, local productivity rates, local unit costs, and available monies.

The yearly work plan is developed from the inventory of roadway needs. This inventory, along with the productivity standards, can be used to determine the quantity of resources required to satisfy the roadway needs. Since the resources required will more than likely exceed those available, it will be necessary for the residency supervisor and the area superintendent to establish priorities. Based on available resources and the priorities established the maintenance objectives for the coming year can be set. These objectives make up the yearly work plan.

SHORT-RANGE PLANNING

The second basic ingredient of an effective maintenance management system is short-range planning. While long-range planning is primarily directed at identifying roadway needs and setting yearly objectives, short-range planning is directed at the day-to-day accomplishment of these objectives. Short-range planning is the assignment of available men, equipment and materials to accomplish the planned objectives. In the day-to-day field operation, short-range planning is the determination of (1) what work is needed, (2) where work is needed, (3) when specific work is to be done, (4) what men, equipment and materials are required, (5) how the work is to be done, and (6) an estimate of how long the work will take.

The determination of what work is needed is based on maintenance activity standards which define the conditions in which maintainable items are to be kept. The identification of where work is needed is influenced by (1) the priority listing developed in the long-range planning process, (2) user complaints, and (3) periodic reviews of existing roadway conditions. The

determination of when specific work is to be done is a function of the present work load and the priority assigned to that work. The labor, equipment and materials required to satisfy the needs and how the work is to be done are determined by available resources, present work load and efficient work methods. The estimate of how long the work will take is determined by using the quantities of work required and the productivity standards developed in the long-range planning.

All of these factors make up the short-range plan. This plan is implemented by using a planning board which aids in scheduling the men, equipment and materials needed to satisfy the maintenance objectives. The planning board is shown in Figure 3. Across the top of the planning board is a column for each maintenance activity number. In the upper portion of the board on the left side are listed the days of the week, thus there is a block for each activity for each day of the week. The upper portion of the board is used in the following manner. Based on (1) the priority list developed in the long-range planning process, (2) user complaints, and (3) a review of existing roadway conditions, each day's work for a week is scheduled by activity. The men, equipment and materials required to perform the needed maintenance, along with the location of the work, are written on a card which is placed on the board under the appropriate activity on the day in which it is to be performed. Enough activities are scheduled for each day to utilize all available men and equipment. This process is repeated for each day of the week, thus completing the upper portion of the board.

In the center portion of the planning board there are three spaces to schedule inclement weather activities. On the bottom portion of the board there is space under each activity to list other work which could not be scheduled above, thus forming an activity pool. The activity pool and the inclement weather portion of the board serve as a reservoir of needed maintenance activities from which to draw when unforeseen events prevent the accomplishment of the planned schedule. These unforeseen events can include equipment failure, crew members being sick, and so on.

The planning board is a scheduling tool to aid the superintendent in performing his job. It contains a great deal of information concerning maintenance needs, it provides flexibility in scheduling men and equipment, it is easy to manipulate and update, and it is a day-to-day mechanism for ensuring that the long-range planning needs along with the day-to-day needs are satisfied.

EVALUATION

The third basic ingredient in an effective maintenance management system is evaluation. Evaluation is the process of comparing the actual work accomplished to the work planned and the maintenance activity standards. The process encompasses (1) the efficiency of the work methods employed, (2) the quality of the work completed, and (3) the overall accomplishments of the maintenance program.

	102	106	111	112	113	115	119	131	132	133	139	141	142	143	144	149	151	152	153	154	159	161	162	163	165	166	167	171	172	173	174	175	181	191	194	196	213	214	MAINTENANCE REPLACEMENT	CONSTRUCTION
MONDAY																																								
TUESDAY																																								
WEDNESDAY																																								
THURSDAY																																								
FRIDAY																																								

INCLEMENT WEATHER

ACTIVITY POOL

Figure 3. Short-range planning board.

The efficiency of the work methods employed should be evaluated by comparing the rate at which the actual work is performed to the productivity standards. The results of this evaluation can be influenced by a number of factors. For example, the number of men and number and types of equipment can significantly affect the production rate. Other factors such as safety requirements, traffic volume, soil conditions, and weather conditions also affect the production rate.

The quality of the work completed should be determined by the road condition with the applicable maintenance activity standard. This evaluation provides a method by which the superintendent can inform the crew foreman of the quality of work that is expected.

The overall accomplishments of the maintenance program should also be evaluated by comparing the work accomplished to the list of maintenance needs developed in the long-range planning process. This overall program evaluation provides a method by which residency personnel can inform the superintendent of his progress in satisfying the maintenance needs.

The specifics of how this evaluation process should be structured have not been determined in this study. The writers feel that a pilot study of a number of residencies in the state would be required to mold the evaluation process to existing conditions in the residencies and area headquarters. In structuring the evaluation process, it must be remembered that the process is a mechanism for monitoring the accomplishments of the maintenance program and not a mechanism for enforcing compliance with the state standards. If the latter is emphasized, the original purpose of an evaluation process will not be accomplished.

REFERENCES

1. Roy Jorgensen and Associates, Virginia Maintenance Study 1963-1966, Gaithersburg, Maryland, December 1966.

2. "Virginia Department of Highways and Transportation — Road Inventory" Form T&S-5, Richmond, Virginia.

3. Virginia Manual on Uniform Traffic Control Devices for Streets and Highways, Virginia Department of Highways and Transportation, Traffic and Safety Division, Richmond, Virginia, June 1974.

APPENDIX A

HOW TO CONDUCT THE ROADWAY MAINTENANCE LOG INVENTORY

INTRODUCTION

A roadway maintenance log inventory provides a listing of all roadway features maintained by the Department. The inventory performs several functions necessary for an efficient and effective highway maintenance program. First, all levels of the Department are furnished accurate information of the gross quantities of maintainable items with which to plan and budget. Second, the inventory serves to make the area superintendent aware of all items and their condition by requiring him to inspect, in an orderly manner, all items in his area. Third, in day-to-day work the inventory aids the area superintendent in formulating daily work schedules.

LOGGING PROCEDURES

The inventory is taken by 2-man teams. Each team — a driver and a recorder — covers all of the roads in a maintenance area and records all of the features that are maintained by the Department. The driver calls out the odometer readings while the recorder indicates on an inventory sheet the locations of all features. Both persons share the job of locating — or picking out — the features.

The driving speed used will depend on (1) the number of features being recorded, (2) how quickly features can be located and recorded, and (3) traffic conditions. The speed should vary from 5 to 30 mph. Frequently, stops will be required to check or measure certain features. Under normal conditions the inventory process should proceed at a rate of 1.0 mile of road per 20 to 30 minutes.

WHAT IS INVENTORIED?

All roadway features which are maintained by the Department are logged. These include the following:

1. Pipes (inlet & outlet ditches) — size and direction of flow
2. Box Culverts — size and number
3. Bridges — structure number
4. Entrances — with or without pipe
5. Signs — number and type on each post

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6. Guardrail — length
7. Ditch Miles - ditchable areas
8. Shoulder Type — sod, gravel, or paved
9. Mowable Swaths — (1), (2), (3) or more
10. Paved Ditch & Flumes — length
11. Curb and Gutter — length
12. Sidewalk — Length
13. Drop Inlets — number
14. Waysides — number
15. Lights — number and type

UNIT OF MEASUREMENT DESIGNATION FOR MAINTAINABLE ITEMS

Ditches, shoulders, mowable swaths, and road length are measured by estimating the odometer reading to the nearest 0.01 mile. Guardrail, sidewalk, curb and gutter, paved ditch and outfall ditch are measured in feet. Drainage items, signs, entrances, drop inlets, and lights are graphically indicated and are totaled as to the number in each category.

EQUIPMENT REQUIRED FOR LOGGING

1. Vehicle with an odometer which records in 0.10 of a mile
2. Clipboard — long enough to hold legal size paper (14")
3. Straightedge — 6" ruler
4. Carpenter's ruler and tape measure
5. Road Inventory — T&S-5 (Rev. 2-71) — establishes roadway termini
6. VA. MUTCD
7. Roadway Maintenance Log Sheets and pencils

HOW TO COMPLETE ROADWAY MAINTENANCE LOG SHEETS

All maintainable items are recorded on a Roadway Maintenance Log (see Figure A-1). The log sheet has three sections: a heading, a roadway section and a summary. The heading is completed prior to starting the inventory. The roadway section is completed while conducting the inventory and the summary is completed in the office at the end of the day.

The Heading

The heading is located on the top and left side of the Roadway Maintenance Log shown in Figure A-1. The heading identifies general information as to the location and basic characteristics of the roadway section being inventoried. To complete the heading the following procedure is used:

1. Date — the date of the initial inventory is entered. The dates that any revisions are made are also entered.
2. Start Location — the start location is determined from the information supplied in the Road Inventory (T&S-5). Logging begins where the route enters the maintenance area or terminates at another roadway.
3. End Location — the end location is established where the road exits a maintenance area or terminates.
4. Travel Direction — the travel direction is the general direction in which the route traverses the maintenance area in the direction the logging is being performed (North, South, East or West).
5. Route — the route is State Route number for the roadway being logged.
6. Section — the section is used as the page numbers for that roadway.
7. District, Residency, County, Maintenance Area — enter applicable names for these items.
8. Surface Type, Road Type, Basic Profile — check the box to the right of the characteristic which describes the roadway being logged.

The Roadway

The roadway section of the Roadway Maintenance Log is located in the center of the sheet (see Figure A-1). The first information to be recorded in the roadway section is the last three digits of the odometer reading in the block labeled "St. Reading". It is important that the tenths number be centered on the odometer. Some additional driving may be required to achieve this alignment. Each long mark on the log sheet within the roadway surface represents 0.10 mile and should be numbered consecutively from the start reading.

With the start location and odometer reading established, the team is ready to begin logging. The roadway surface is represented in the center of the roadway section. Rows are provided to the left and right of the roadway surface to indicate ditches, shoulder type, mowable swaths and other incidental items such as paved ditch, sidewalk, and curb and gutter.

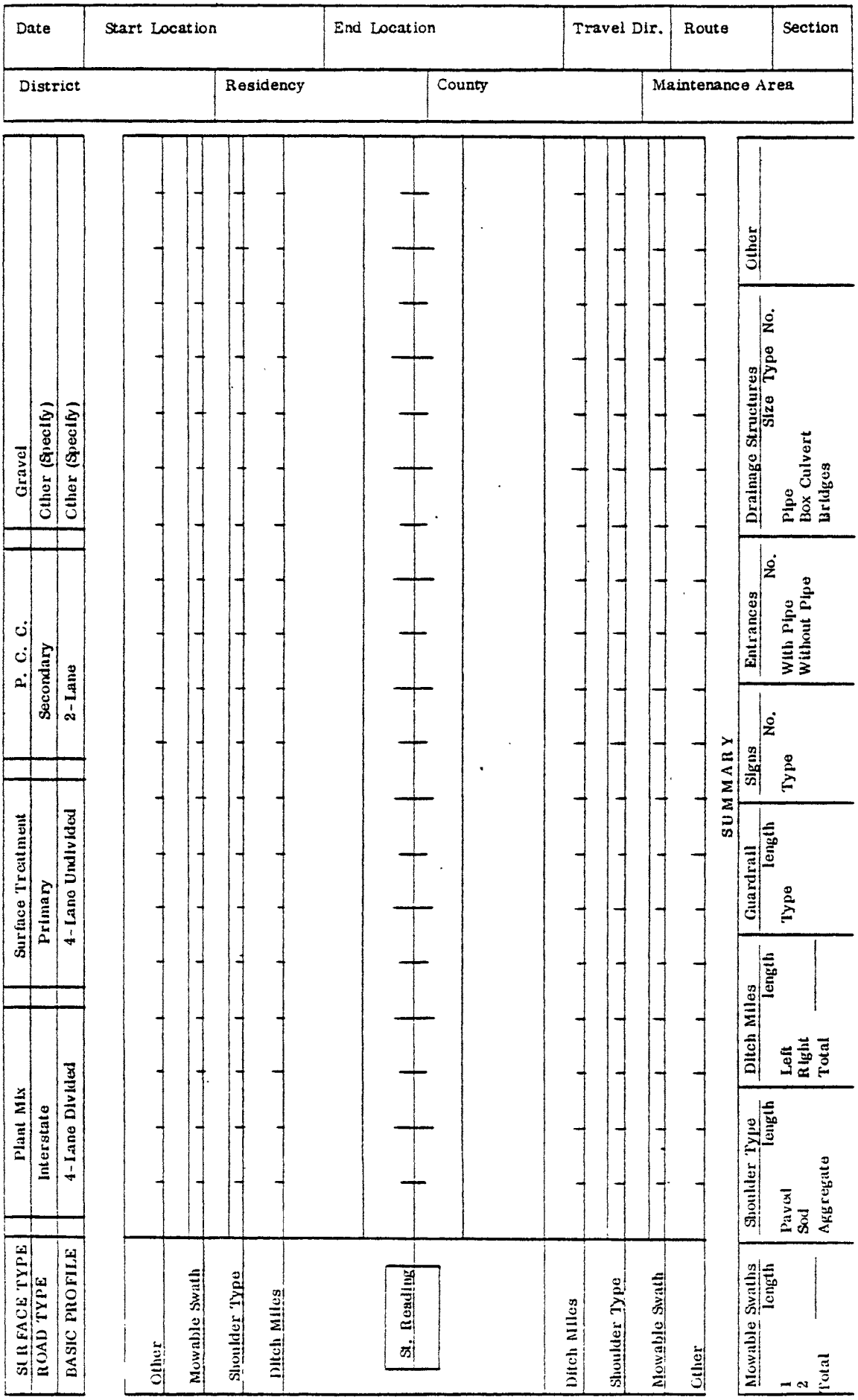


Figure A-1. Roadway maintenance log.

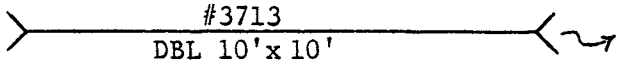
The logging procedure begins by entering maintainable items present at the start location. Ditchable areas are indicated by a solid straight line drawn in the row provided. Shoulder type is entered on the line provided. Mowable swaths, the number of passes necessary to maintain the Department's mowing standards, are also entered on the line provided.

Other maintainable items are entered using the following graphic representations:

Pipe —

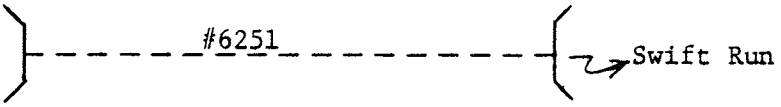
A pipe is represented by a straight line across roadway surface and an arrowhead indicating the direction of flow. The size of the pipe and material are entered on this line. An outfall ditch is shown by indicating its length and the letters "OFD".

Box Culverts —



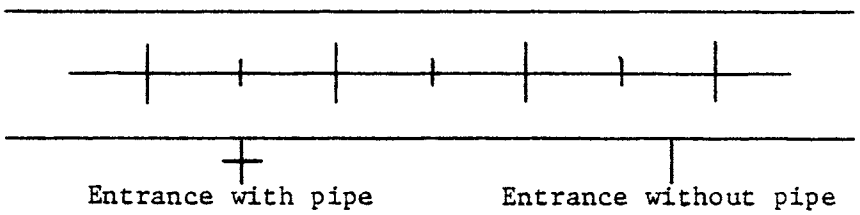
A box culvert is represented by a straight line with wingwalls. The structure number, if present, is noted and the size opening is given. Direction of flow is noted by drawing an arrow on the outlet end.

Bridges —



Bridges are represented by straight lines parallel to the roadway surface with wingwalls and structure number. Stream crossing should also be noted and described as such. Direction of flow is noted by drawing an arrow on the downstream side.

Entrances —



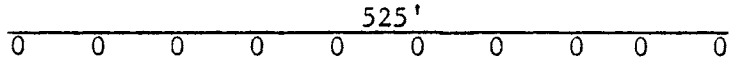
Private driveways, business entrances, etc. are indicated by a short straight line drawn perpendicular to the roadway surface. If a pipe is present, indicate it as shown above.

Signs — 

2 - G-32 (Intersection State Route No. Signs)

1 - R-1 (Stop Sign)

Signs are shown as a circle with an X in the middle. The VA. MUTCD code designation is also shown. Note that more than one sign can be on a pole.

Guardrail — 

Guardrail is shown as a straight line with posts represented by circles and its length. Guardrail lengths can be figured by counting the number of posts, subtracting one and multiplying by the dimension of the spacing. EXAMPLE: If there were 207 posts on 12.5' centers, the total length of the guardrail would be (207 - 1) x 12.5' or 2,575'.

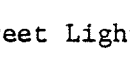
Paved Ditches — are indicated by a straight line in "Other" row and the letters "PD".

Curb & Gutter — are indicated by a straight line in "Other" row and the letters "CG".

Sidewalks — are indicated by a straight line in "Other" row and the letters "SW".

Drop Inlets — are indicated by a square box in the roadway surface and the letters "DI".

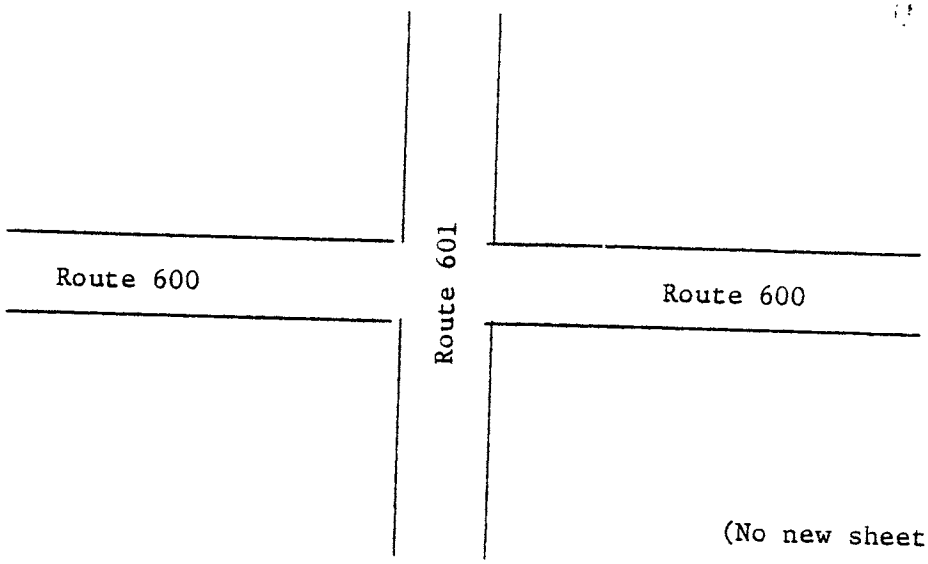
Stop Lights — are indicated by  in the center of roadway section and the letters "SPL".

Street Lights — are indicated by  in the appropriate location and the letters "STL".

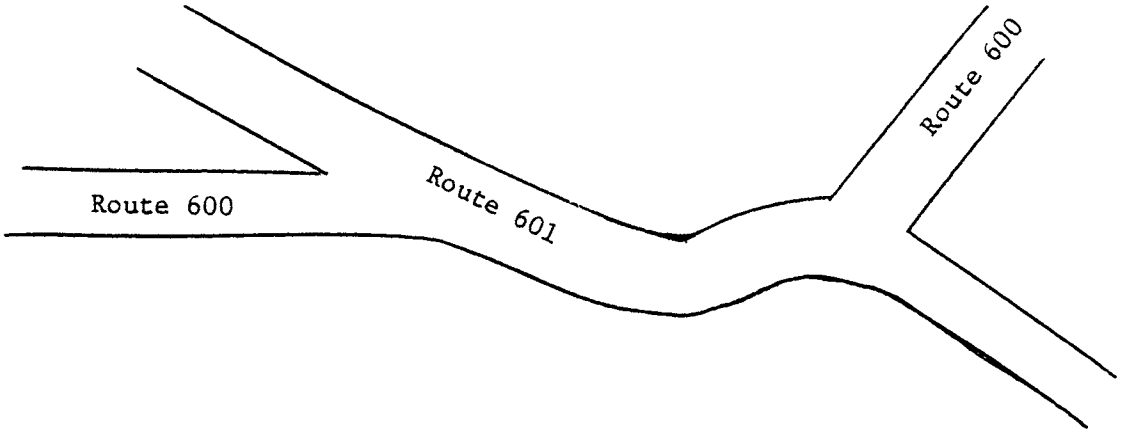
Special Situations —

1. If the surface type (plant mix, surface treatment, P.C.C. or gravel) changes, draw a line across the entire roadway section of the log and terminate all maintainable items at the point corresponding to the odometer reading. Start another log sheet at that point.

2. When the route intersects another route and continues directly across the intersection, do not begin a new inventory sheet. If the route breaks at an intersection begin a new sheet with a new odometer reading where it picks up again.



(No new sheet)



(Use new sheet)

3. In logging a route, the length of road will not always coincide with the end of a log sheet. Therefore, when a route terminates somewhere within the mile section as represented by the log sheet, draw a line across the entire roadway section and terminate all maintainable items at the point corresponding to the odometer reading.

Example of a completed Roadway Section —

The maintainable roadway items are as follows with the completed log sheet shown in Figure A-2.

Start Reading	82.5	-	Ditch - left and right
			Shoulder - sod left and right
			Mowable swaths - (2) left and (1) right
			Stop sign - R-1
	82.58	-	Ditch on right stops
			18" c.m. pipe - draining to right - 25' OFD
	82.62	-	Entrance on left with pipe
	82.70	-	Ditch on left stops
			Mowable swaths on left changes from (2) to (1)
	82.75	-	Box culvert - DBL 4' x 4' - drainage to right
	82.83	-	Ditch on left and right
			(2) Mowable swaths on each side
	82.90	-	Entrance left with pipe
			Entrance right without pipe
	83.09	-	Sign right - bridge end panel W-54
	83.10	-	Ditches and mowable swaths stop left and right
			Guardrail starts on left and right
	83.15	-	Bridge #6251 over New River
	83.20	-	Ditches begin left and right
			(2) Mowable swaths left and right
	83.21	-	Sign left - bridge end panel W-54
	83.25	-	Connection Route 600
	83.30	-	Ditches, shoulders, and mowable swaths stop left and right
			Sidewalk, and curb and gutter start on left
			Curb and gutter start on right
	83.40	-	Drop inlet on left
	83.50	-	End of one mile section

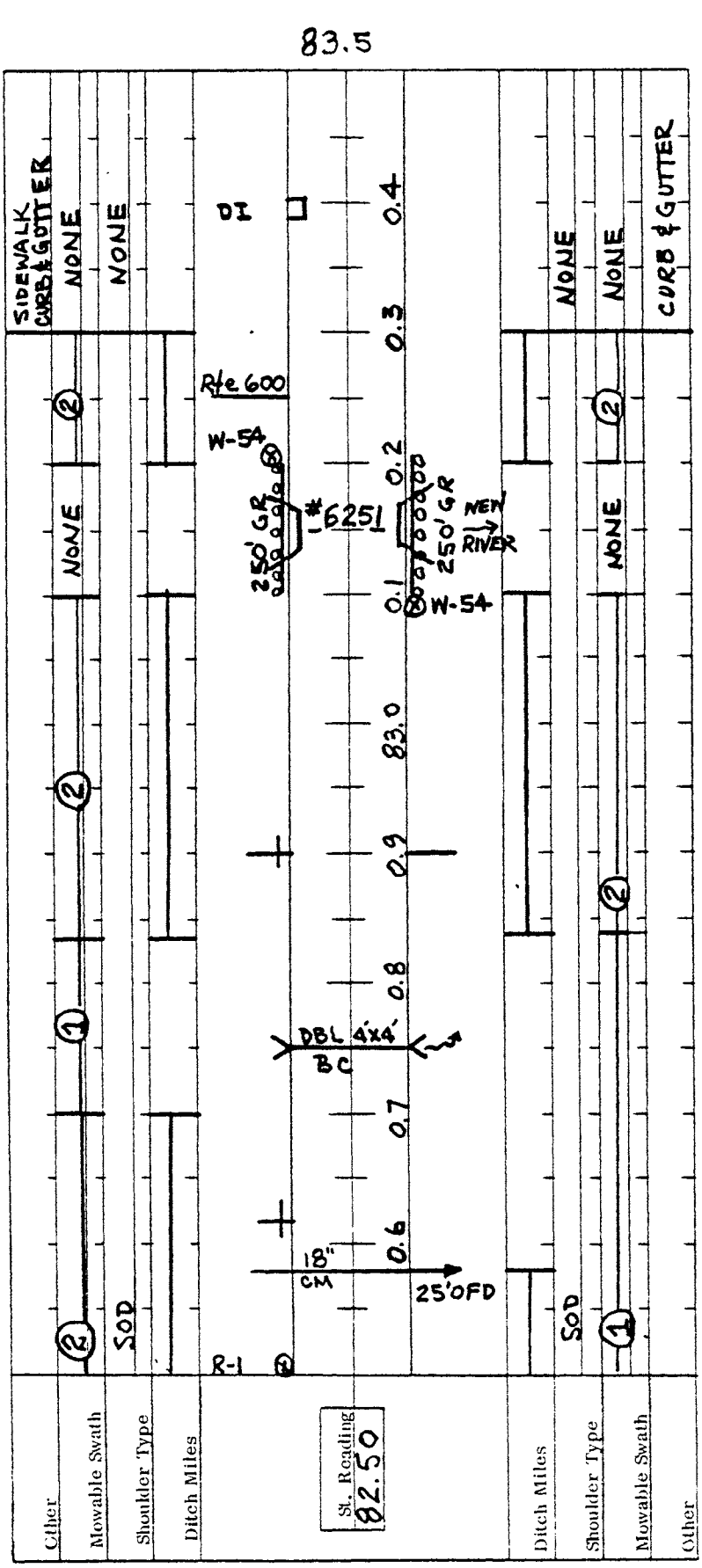


Figure A-2. Example of completed roadway section.

Accuracy in recording information is important. When recording the information be careful to enter the item in the appropriate row or surface section where the item is observed. For items requiring estimates, care should be taken to make sure that these estimates are as accurate as possible. To ensure that your estimates are fairly accurate, periodically spot check them by physically measuring the item. For example, outfall ditch length should be periodically measured in order to avoid overestimating lengths. Pipes should be measured with a carpenter's rule in order to obtain the proper size.

Summary

The maintainable items are totaled for each 1 mile section and entered in the summary on the right side of the log sheet shown in Figure A-1. A summary is shown below for the 1.0 mile section just completed.

SUMMARY

Mowable Swaths	length	Shoulder Type	length	Ditch Miles	length	Guardrail	length	Signs	No.	Entrances	No.	Drainage Structures	Size	Type	No.	Other
1	0.67	Paved		Left	0.57	Type	500'	Type	3	With Pipe	2	Pipe			1	OFD- 25'
2 @.93	1.86	Sod	1.6	Right	0.43					Without Pipe	1	Box Culvert			1	SW- 1056'
Total	2.53	Aggregate		Total	1.00							Bridges			1	C/G- 2112'
																DI- 1

Mowable Swaths —

Total mowable swaths are computed by adding the totals from the left and right sides of the roadway section in regard to either (1), (2), (3) or more mowable swaths. This total will give swath miles or the number of times a tractor mower will be required to pass back and forth over the 1.0 mile section in order to mow the grass. For example: The total number of miles for the (1) mowable swath is 0.67, whereas the number of miles for the (2) mowable swaths is 0.93. This 0.93 mile must then be multiplied by two to obtain the total mileage because this section requires two passes of the tractor mower.

Shoulder Type —

The length of shoulder by type is taken directly from the roadway section for the left and right side. Shoulder type as well as mowable swaths may change several times within the 1 mile section. Therefore, it is possible to have two or more shoulder types entered into the summary. However, the example section remained sod for 0.8 mile on both sides and thus gave a total of 1.6 miles of sod shoulder.

Ditch Miles —

Ditch miles are totaled directly from the roadway section for the left and right side. In the example above there was 0.57 mile of ditch on the left side and 0.43 mile on the right. Total ditch miles for the 1 mile section was 1.00.

Guardrail —

The lengths of guardrail are obtained directly from the roadway section for the left and right sides. In this example there was a total of 500 feet of guardrail.

Signs —

The sign summary is the total number of the various types of signs. Note that one sign post may contain one or more signs.

Entrances —

Entrances are totaled directly from the roadway section. Note that the entrances with pipe are summarized separately from those without pipe.

Drainage Structures —

Drainage structures include such items as pipe, box culverts, and bridges. They are totaled for each 1 mile section and are listed in the appropriate space.

"Other" —

The "other" column is a "catch all" column which serves to list such items as outfall ditch, sidewalk, curb and gutter, drop inlets, paved ditch, railroad crossings and stream crossings.

The outfall ditch, sidewalk, curb and gutter, and paved ditch are entered in the summary in feet for the 1.0 mile section. These summaries are completed for each 1.0 mile section in the route.

ROADWAY MAINTENANCE LOG SUMMARY

After summarizing the roadway log information for each mile of roadway, all of the information is summarized for each route within the maintenance area. This is accomplished through the use of the Roadway Maintenance Log Summary. Basically, the summary consist of a heading and a body. The heading serves to locate the route within the District,

Residency, and County as well as the maintenance area. Applicable names are entered in these blocks. The body of the Roadway Maintenance Log Summary is an expansion of the summary section of the Roadway Maintenance Log. The information in the summary section of the Roadway Maintenance Log sheets for each roadway is summarized as to gross quantities of maintainable items and entered into the Roadway Maintenance Log Summary sheet. After the Roadway Maintenance Log Summary is completed, a grand total can be made for the entire maintenance area as well as for the entire residency.

Table A-1. Roadway maintenance log summary

District	Residency	County	Maintenance Area

Route	Sections	Length (miles)	Mowable Swath (miles)	Shoulder Type	Ditch Miles	Guard-rail (ft.)	Signs		Entrances		Drainage Structures			Side-walk (ft.)	Curb & Gutter (ft.)	Paved Ditch (ft.)	Drop Inlets	Outfall Ditch (ft.)	Other
							Type	No.	w/pipe	w/o pipe	Pipe	Box Culvert	Bridges						

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APPENDIX B

MAINTENANCE DIVISION
ACTIVITY STANDARDS

0866

FOREWORD

These standards are being issued to promote a uniform level of maintenance service throughout the state. They are intended to furnish information and guidance to operating personnel in accomplishing this aim, and they do not in any way establish a legal standard of care.

Occasionally, circumstances will occur which are not specifically covered in these standards or which require modification of the instructions contained in a standard. In these cases the judgment of the various levels of operating supervisors must be relied upon to meet our basic objective of preserving and operating the highway system in such a manner that comfort, convenience and safety are afforded the public; the investment in roads, bridges and appurtenances is preserved; the necessary expenditure of resources is accomplished with continuing emphasis on economy; and the aesthetics of the highway system and the compatibility of the highway system with the environment are preserved or enhanced.

TABLE OF CONTENTS

(Arranged by activity number, not paginated)

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TABLE OF CONTENTS (Continued)

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 111 Sheet 1 of 1	DATE	WORK UNIT Tons

DESCRIPTION — SPOT SEALING OR SKIN PATCHING OF THE ROAD SURFACE

Putting light application of an emulsified asphalt on the bituminous surface and covering with sharp, clean, uniformly graded stone.

PURPOSE

The primary purpose of skin patching is to maintain pavement strength by sealing cracks in the surface layer and thus preventing moisture from weakening the base materials. To prevent serious pavement failure, small cracking should be monitored and should be skin patched when the opening exceeds 1/8".

The common types of surface cracking and their causes are as follows:

1. Alligator Cracking — Poor drainage or small cracks allowing water to saturate and weaken base materials.
2. Edge Cracking — Poor drainage, inadequate base or insufficient lateral support.
3. Ravelling — Dusty stone or too little asphalt binder.
4. Longitudinal Cracking — Unstable base; first stage of alligator cracking.

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. When necessary clean and dry the area to be patched. Broom area if necessary.

3. Spray a light application of asphalt over the deteriorated area and extend spray one foot beyond on each side. Provide a square patch for a neat appearance and minimal annoyance to the travelling public. Application will vary due to the type asphalt, size, and absorption of underlying pavement. As a guide, the proper application will not flow and the texture of the existing pavement will be visible.

4. Apply cover stone. The stone should be applied within one minute of spraying the asphalt. The cover stone should be applied in the direction of traffic, one stone thick and touching on all sides.

5. Begin rolling immediately after the stone is spread and continue until the stone is properly seated or the asphalt shows signs of hardening. On large patches roll from the outside toward the center of the pavement. Care should be taken not to over roll. Stop rolling if crushing of the stone occurs.

6. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 truck driver 1 asphalt sprayperson 1 person	1 truck w/ asphalt kettle & cover stone 1 front end loader (at stockpile)	Asphalt CMS-2 90°-110° CRS-2 130°-160°
2 truck drivers 1 asphalt sprayperson 2 persons 1 roller operator	1 truck w/ asphalt kettle or tow distributor 1 truck w/ cover stone & roller 1 front end loader (at stockpile)	Cover Stone #8 stone - 3/8" max. size #78 stone - 1/2" max. size
1 Foreman 1 distributor driver 1 spray bar operator 3 truck drivers 1 person on tailgate spreaders 1 roller operator 1 loader operator 1 tractor operator	1 distributor 3 trucks (vary to suit haul) w/ tailgate spreaders 1 roller 1 front end loader (at stockpile) 1 tractor broom (if needed)	SMALL TOOLS shovels brooms

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 112 Sheet 1 of 1	DATE	WORK UNIT Tons

DESCRIPTION — PREMIX PATCHING

Patching of the road surface using commercial or shop prepared mixes.

PURPOSE

Premix material should be used to correct surface distortions greater than 1". Cold premix can be used in depths of 1/2" but should not exceed 3" without sufficient curing time. In most cases a cold mix patch should be covered with a skin patch as soon as possible after the mix has cured.

Premix material is typically used to correct the following conditions.

1. Potholes — 6" and greater in width and greater than 1" in depth.
2. Depressions — 1" and greater in depth.
3. 1/4 Point Drop — greater than 2" (Correcting cross section).
4. Pipe Settlement — greater than 1".
5. Settlement of Bridge Approaches.
6. Surface Breakup — to replace surface when sections can be removed and base material is undisturbed.

SCHEDULING FREQUENCY

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

PROCEDURE

1. Plan for trucks going to the asphalt plant to arrive when the plant opens, remainder of crew travels to job site. Asphalt should be covered with tarps to prevent heat loss.

2. 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.

3. Remove any loose material and square the area to be patched. The sides of the hole should be vertical and trimmed to sound material. If the base material is loose or unstable it should be removed and replaced. If there is water present in the hole, it should be dried.

4. Apply a light tack coat to the bottom and sides of the prepared hole.

5. Hot mix is the best choice of premix material. Do not place the hot premix in layers, but overfill the hole and compact it level to the roadway surface. Place cold premix in layers not to exceed 1½" after compaction.

6. Lightly sprinkle patches with sand to prevent tracking.

7. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 truck driver 1 person to remove loose material, square hole, and apply tack coat 1 person to spread material and compact	1 truck	S-5 I-2 Cold Mix (CMS-6) Sand #26 (Crusher Run)
1 Foreman 5 truck drivers 1 motor grader operator 1 roller operator 1 person for handwork	4 trucks (vary to suit haul) 1 truck with asphalt kettle and sand 1 motor grader 1 roller	SMALL TOOLS
INCLUDE AS REQUIRED		5 gal. bucket (tack) brooms shovels hand tamper portable propane burner
	1 truck with air compressor and jackhammer 1 front end loader 1 tow type paver 1 additional truck	

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 113 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION — SPOT RECONDITIONING

The repair of surface and base failures for reshaping and reconditioning sections of roadway less than 1000' in length.

PURPOSE

Spot reconditioning is used to repair severe surface distortion resulting from base failures and to prevent further settling and deterioration of the surface by reconstructing the foundation.

Routes listed on the surface treatment schedule should be inspected and any locations showing signs of base failure should be corrected prior to resurfacing.

Prior to winter freeze-thaw, roads should be inspected and base failures corrected to prevent breakups and the resulting hazardous conditions to the travelling public.

SCHEDULING FREQUENCY

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

0814

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. Scarify area with motor grader if necessary.

3. Remove deteriorated surface and contaminated base material.

4. Correct drainage problem by providing proper ditch, shoulder, or underdrains.

5. Replace base material in layers not to exceed 6" and compact. It may be beneficial to leave the area open for a day or two to allow excess moisture to evaporate.

6. Resurface area with the same type surface material. Compact thoroughly.

7. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
2 truck drivers 1 person for handwork	1 truck w/ asphalt kettle 1 truck w/ stone	#21-A stone #8 stone #78 stone Asphalt Premix
1 loader operator 3 truck drivers	1 front end loader 1 truck w/ asphalt kettle and stone 2 trucks (vary to suit haul)	
1 Foreman 1 motor grader operator 1 roller operator 1 loader operator 3 truck drivers	1 motor grader 1 roller 1 front end loader 3 trucks (vary to suit haul)	SMALL TOOLS hand tamper shovels
1 Foreman 1 distributor driver 1 spray bar operator 1 roller operator 3 truck drivers	1 distributor 1 roller 3 trucks (vary to suit haul)	

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 115 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION — TREATING BLEEDING PAVEMENTS

The application of sand or stone to absorb excess asphalt.

PURPOSE

Flushing or bleeding of asphalt surfaces occurs when the asphalt flows to the surface during hot weather. Sanding pavements is a temporary measure that will require repeated applications to effectively reduce the skid hazard.

Roads should be sanded when the area shows signs of vehicles tracking the asphalt or the area becomes slippery. No. 8 stone may be substituted for sand to roughen extremely slippery surfaces

SCHEDULING FREQUENCY

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

PROCEDURE

1. Load sand into chemical spreader.

2. Apply sand as conditions require. The application rate for the sand is the same as that used for spreading abrasives. However, additional passes may be necessary in order to effectively absorb excessive surface asphalt.

3. When necessary, apply No. 8 stone to extremely slippery surfaces. Roll after applying the stone.

PERSONNEL	EQUIPMENT	MATERIALS
1 truck driver	1 truck w/ chemical spreader 1 front end loader (at stockpile)	sand #8 stone
INCLUDE AS REQUIRED		
1 operator	1 roller	

SMALL TOOLS

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 119 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION — OTHER BITUMINOUS SURFACE MAINTENANCE

Includes planing bituminous surface: emergency patching with stone dust or other non-bituminous materials; cleaning intersections, etc.

PURPOSE

This activity is used for cleaning and emergency work to the road surface. Typically the following maintenance work will be charged to this activity.

1. Cleaning intersection
2. Cleaning ramps
3. Cleaning around traffic islands
4. Maintaining commercial entrances (SHOULDER AREA ONLY)

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. Perform work as required.

3. Recover traffic control devices.

	PERSONNEL	EQUIPMENT	MATERIALS
Traffic Islands	1 truck driver 1 person for hand-work	1 truck	#26 (Crusher Run) Stone Dust Cold Mix
Rutting	1 truck driver 1 person for hand-work	1 truck	
Ramps	1 truck driver 2 tractor operators	1 truck 1 blade tractor 1 broom tractor	
Inter.	1 truck driver 1 person for hand-work	1 truck	SMALL TOOLS
Inter.	1 Foreman 1 truck driver prison labor	1 truck	brooms shovels
Emergency Work	STAFF AS REQUIRED		

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 131 Sheet 1 of 1	DATE	WORK UNIT Tons

DESCRIPTION — PATCHING NON-HARD-SURFACE ROADS

Patching holes, rough spots, ruts, and weak sections by adding spot surfacing material to sections less than 1000' in length.

PURPOSE

Patching non-hard-surface roads or spot stabilization is necessary to repair isolated surface irregularities when time, weather or availability of equipment does not permit machining (Activity 132) of the road surface.

Non-hard-surface roads should be maintained with a smooth and firm riding surface and proper crown.

Guidelines for corrective action are as follows:

1. Potholes — 2" and greater in depth and 6" or greater in width and covering over 1/5 of the affected area.

2. Rutting — greater than 2" in depth.

3. Loss of surface stone — sections 20' or greater in length or any locations where mud is present and passage of vehicles is impeded during periods of inclement weather.

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. Place stone in area as required.
3. Level material with existing surface.
4. For best results, compact material.
5. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 truck driver 2 persons	1 truck 1 front end loader (at stockpile)	#26 (Crusher Run) #21-A stone
2 truck drivers (Tail-gate stone) 1 loader operator	2 trucks (vary to suit haul) 1 front end loader (at stockpile)	
2 truck drivers (Tail-gate stone) 1 motor grader operator 1 loader operator	2 trucks (vary to suit haul) 1 motor grader 1 front end loader (at stockpile)	SMALL TOOLS shovels

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 132 Sheet 1 of 1	DATE	WORK UNIT Miles

DESCRIPTION — MACHINING NON-HARD-SURFACE ROADS

Includes dragging, blading and other incidental labor required to pick up rock or debris; includes minor shaping of ditches.

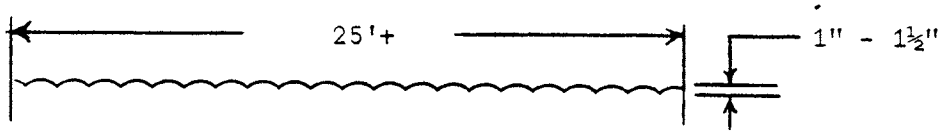
PURPOSE

Two basic operations are conducted under this activity. They are blading and dragging. Non-hard-surface roads require frequent machining to restore proper crown, remove corrugations, correct potholing, and to remix loose surface stone.

In dry weather pull loose material into place without cutting into the crust. When there is sufficient moisture, cut and remix the material.

As a guideline, non-hard-surface roads should be machined when:

1. Corrugations — when depth exceeds 1" - 1½" in sections greater than 25' in length.



2. Potholes — 2" or greater in depth and over 1/5 of affected surface area.

3. Crown — proper crown should be maintained at 3/4" per foot with curves super-elevated as required. This will not apply to sandy soils, as it is impractical and not necessary for proper drainage.

4. Three Ridges — (stone displaced by traffic) when ridge exceeds 2".

SCHEDULING FREQUENCY

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

PROCEDURE

ONE MOTOR GRADER METHOD

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. Make one pass with the motor grader to pull all surface stone on one side to the center of the road. Stone in the drainage ditches should be reclaimed if possible. (If applicable, the ditch work may be charged to Activity 151 or 152.)
3. Make a second pass on the opposite side to pull surface stone to the center of the road. Stone in the drainage ditch should be reclaimed if possible. (See Activities 151 and 152.)
4. Make a third pass to spread the stone to the shoulder break.
5. Recover traffic control devices.

TWO MOTOR GRADER METHOD

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. Make one pass with the motor grader to pull all surface stone on one side to the center of the road. Stone in the drainage ditches should be reclaimed if possible. (If applicable, the ditch work may be charged to Activity 151 or 152.)
3. Make a second pass with the second motor grader on the same side to spread the stone at the proper slope to the shoulder break.
4. Make a third pass on the opposite side with the first motor grader to pull surface stone to the center of the road. Stone in the drainage ditches should be reclaimed if possible. (See Activities 151 and 152.)
5. Make a fourth pass with the second motor grader to spread the stone at the proper slope to the shoulder break.
6. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 motor grader operator	1 motor grader	
1 motor grader operator 1 truck driver	1 motor grader 1 truck	
2 motor grader operators 1 truck driver	2 motor graders 1 truck	
1 truck driver 1 person	1 dump truck and drag	SMALL TOOLS
1 truck driver 1 person	1 truck and pull type grader	pitchfork shovel

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 133 Sheet 1 of 1	DATE	WORK UNIT Tons

DESCRIPTION — APPLYING DUST PALLIATIVES

Application of dust palliatives, includes cost of the palliatives such as calcium chloride, sodium chloride, bituminous material, and used motor oil.

PURPOSE

Dust palliatives will be applied to unpaved secondary roads in front of stores, churches, schools, dairy buildings, and private dwellins, and through villages which are so located as to be affected by the dust. Roadway surface condition and volume of traffic should receive consideration in determining the need for the application of dust palliatives.

As a general rule, the buildings should be located within 200' of the road, and the length of road treated should be approximately 200' on either side of the building on roads with a traffic count of 10 vehicles per day or greater.

SCHEDULING FREQUENCY

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

PROCEDURE

CALCIUM CHLORIDE

1. Load dust palliatives into chemical spreaders.

2. Travel to designated areas and apply palliatives. The application rate for dust palliatives will be from 3/4 to 1 pound of $CaCl_2$ per square yard in the spring and a repeat application of from 1/2 to 3/4 pound per square yard during the summer. Problem areas may require a third application.

USED MOTOR OIL

1. Load used motor oil in distributor.

2. Travel to designated areas and apply used motor oil to roadway surface. The application rate will be 0.15 gallon per square yard for sandy soil and 0.10 gallon per square yard for clayey soils.

	PERSONNEL	EQUIPMENT	MATERIALS
CALCIUM CHLORIDE	1 truck driver (loads own truck)	1 truck w/ chemical spreader 1 front end loader (at stockpile)	calcium chloride ($CaCl_2$) used motor oil
	1 truck driver (loads own truck) 1 water truck driver	1 truck w/ chemical spreader 1 front end loader (at stockpile) 1 water truck	
USED MOTOR OIL	1 distributor operator 1 spray bar operator	1 distributor	SMALL TOOLS

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 139 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION — OTHER NON-HARD-SURFACE MAINTENANCE

Other maintenance of non-hard-surface roads not covered by activities 131 - 133.

PURPOSE

This activity is intended to cover non-accomplishment work required on non-hard-surface roads such as:

1. Stabilizing entrances and mailbox turnouts on non-hard-surface roads.
2. Patrolling and patching non-hard-surface roads during rain.
3. Cleaning debris off non-hard-surface roads.
4. Machining isolated spots.

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. Perform work as required.

3. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 truck driver 1 person	1 truck	#26 (Crusher Run) #21-A stone
1 operator	1 motor grader	
		SMALL TOOLS
		shovel pitchfork

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 141 Sheet 1 of 1	DATE	WORK UNIT Shoulder miles

DESCRIPTION — MACHINE NON-HARD-SURFACE SHOULDERS

Blading and shaping of non-paved shoulders without additional material. Includes cutting high shoulders where no hauling of surplus material is necessary.

PURPOSE

Non-hard-surface shoulders shall be maintained with a uniform slope sufficient to properly drain the roadway surface, be flush with the edge of pavement, be free of ruts and trenches, and be safe for vehicular use in case of emergency.

As a guideline, shoulders should be maintained such that:

1. Uniform slope — shoulder slope of 1" per 1'.

   If slope exceeds desired slope by more than 1" per 1', it should be corrected as soon as possible.

2. Low shoulder — 1" - 1½" maximum below the edge of pavement.

3. High shoulder — 1" maximum; immediate correction if water is ponding or running along the edge of the pavement. (This work should be performed in the spring of the year to aid the growth of vegetation.)

4. Rutting — maximum of 2".

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. Make one pass with motor grader and windrow material at edge of pavement with blade at proper slope.
3. On second pass spread excess material back over the shoulder at the proper slope.
4. Compact the material with a roller or the vehicle making the second pass.
5. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
2 motor grader operators 1 truck driver 1 tractor operator	2 motor graders 1 truck (signs) 1 tractor broom (if needed)	
1 motor grader operator 2 truck drivers 1 tractor operator	1 motor grader 1 truck w/ snowplow 1 truck (signs) 1 tractor broom (if needed)	
1 motor grader operator 2 truck drivers 1 tractor operator	1 motor grader 1 truck w/ pull type grader 1 truck (signs) 1 tractor broom (if needed)	SMALL TOOLS

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 142 Sheet 1 of 1	DATE	WORK UNIT Tons

DESCRIPTION — REPAIR NON-HARD-SURFACE SHOULDERS WITH SOIL OR AGGREGATE

The blading and shaping of non-hard-surface shoulders requiring additional material.

PURPOSE

Non-hard-surface shoulders shall be maintained with a uniform slope sufficient to properly drain the roadway surface, be flush with the edge of pavement, be free of ruts and trenches, and be safe for vehicular use in case of emergency.

As a guideline, shoulders should be maintained such that:

1. Uniform slope — shoulder slope of 1" per 1'.

   If slope exceeds desired slope by more than 1" per 1', it should be corrected as soon as possible.

2. Low shoulder — 1" - 1½" maximum below edge of pavement.

3. Rutting — maximum of 2".

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. Spot dump additional shoulder material as required.
3. Blade material to proper grade and slope.
4. Clean excess off pavement surface.
5. Compact material.
6. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 truck driver 1 person	1 truck 1 front end loader (at stockpile)	#26 (Crusher Run) #21-A stone
2 truck drivers 1 person	2 trucks w/ tailgate spreader 1 front end loader (at stockpile)	
1 Foreman 1 motor grader operator 1 loader operator 3 truck drivers 1 tractor operator	1 motor grader 1 front end loader (at stockpile) 3 trucks (vary to suit haul) 1 tractor broom	SMALL TOOLS broom shovels

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 143 Sheet 1 of 1	DATE	WORK UNIT Tons

DESCRIPTION — WEDGE NON-HARD-SURFACE SHOULDERS WITH BITUMINOUS MATERIAL

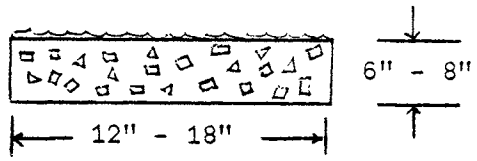
The placing and compacting of bituminous material along the edge of the pavement.

PURPOSE

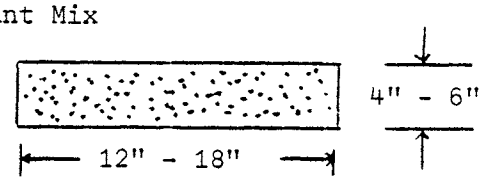
Wedging of non-hard-surface shoulders is beneficial in areas where frequent shoulder work is required because of traffic or erosion displacing shoulder material.

The wedge should be 12" - 18" wide and 4" - 8" deep and may be built up with premix or stone with a seal treatment and sloped to match the shoulder.

Surface Treatment



Plant Mix



Areas most frequently benefitting from a shoulder wedge are:

1. Inside of curves
2. Crest of hills
3. Long grades on roads with marginal surface width.

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. With shop fabricated shoe attached to motor grader blade, cut trench along edge of pavement for wedge.

3. Place material in trench at proper slope —
   a) Place #26 stone and compact followed by seal
   b) Place hot premix and compact

4. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 Foreman 1 motor grader operator 1 roller operator 2 truck drivers 4 persons for handwork	1 motor grader with shoe 1 roller 2 trucks	#26 (Crusher Run) #8 stone #78 stone Asphalt Premix
1 Foreman 1 motor grader operator 3 truck drivers 1 roller operator 3 persons for handwork	1 motor grader with shoe 3 trucks with tailgate spreaders 1 roller 1 asphalt kettle	SMALL TOOLS
		shovels rakes

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 146 Sheet 1 of 1	DATE	WORK UNIT Shoulder Miles

DESCRIPTION — MACHINE NON-HARD-SURFACE SHOULDERS

The machining of high shoulders where surplus material must be loaded and hauled. This activity is to be used in areas where ditching is not required but high shoulders are present.

PURPOSE

High shoulders should be bladed flush with the pavement and at the proper slope to prevent water from ponding on or flowing along the edge of the pavement.

Shoulder material should be cut away when the accumulated buildup exceeds 1" (2" - 3" at guardrail) or immediately if water is not draining properly from the pavement surface.

Spring of the year is the best time for this activity since the presence of moisture will assist the growth of natural vegetation. Reseeding and fertilizing are sometimes necessary to restore grass cover.

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. With motor grader blade at proper slope, windrow material onto edge of pavement.

3. Load material and haul to dump site.

4. Broom surface as required.

5. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 Foreman 1 motor grader operator 3 truck drivers 1 tractor operator 1 Athey operator 2 persons for handwork	1 motor grader 3 trucks (vary to suit haul) 1 tractor broom 1 Athey loader	SMALL TOOLS brooms shovels

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 149 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION — OTHER SHOULDER MAINTENANCE

Work required on shoulders not covered by Activities 141 - 146.

PURPOSE

This activity is intended to cover non-accomplishment maintenance on the shoulder. The shoulder area refers to the region between the pavement edge and the ditch line or the shoulder break in fill sections.

Examples of non-accomplishment work on shoulders are:

1. Patrolling during rainy weather and cutting weep holes through shoulder where necessary.
2. Stabilizing entrances and mailbox turnouts on hard-surface roads.
3. Correcting isolated rutting greater than 2".
4. Correcting isolated low shoulders greater than 1" - 1½" below the edge of pavement.

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. Perform work as required.

3. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 truck driver 1 person	1 truck 1 front end loader (at stockpile)	#21-A stone #26 (Crusher Run)
1 truck driver 1 tailgate operator	1 truck w/ tailgate spreader 1 front end loader (at stockpile)	

SMALL TOOLS
shovels

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 151	DATE	WORK UNIT
Sheet 1 of 1		Ditch Miles

DESCRIPTION - CLEAN AND RESHAPE DITCHES BY MACHINE

The cleaning and reshaping of roadside ditches where the spoil is loaded and hauled.

PURPOSE

Roadside ditches should be maintained with adequate depth, cross section and grade to handle the expected flow of water. They should be cleaned periodically to remove rocks, dirt, debris, tall weeds, brush and leaves which restrict the flow of water.

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. With motor grader, windrow material on shoulder in one or two passes as required, such that it can be picked up with loader.

3. Use loader to put material in trucks.

4. Haul spoil in trucks to waste area, or use material to widen shoulders in fill sections.

5. Use broom tractor to sweep pavement clean.

6. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 Foreman 1 motor grader operator 1 Athey operator 3 truck drivers 1 tractor operator	1 motor grader 1 Athey loader 3 trucks (vary to suit haul) 1 broom tractor	
1 Foreman 1 motor grader operator 1 loader operator 2 truck drivers 1 tractor operator	1 motor grader 1 front end loader 2 trucks (vary to suit haul) 1 broom tractor	SMALL TOOLS
1 Foreman 1 motor grader operator 1 pan operator 1 tractor operator	1 truck 1 motor grader 1 pan 1 broom tractor	shovels
INCLUDE AS REQUIRED		
Additional person(s) for handwork	Additional motor grader(s)	

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 152 Sheet 1 of 1	DATE	WORK UNIT Ditch Miles

DESCRIPTION — CLEAN AND RESHAPE DITCHES BY MACHINE

Cleaning where ditch spoil is used on shoulders or wasted without loading or hauling.

PURPOSE

Roadside ditches must be maintained with adequate depth, cross section and grade to handle the expected flow of water. They should be cleaned periodically to remove rocks, dirt, debris, tall weeds, brush and leaves which restrict the flow of water.

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. On non-hard-surface roads, blade surface stone past the center of road.
3. Pull material from drainage ditch.
4. Blade material to shape of road or shoulder.
5. On non-hard-surface roads, blade surface stone back at proper slope.
6. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 motor grader operator	1 motor grader	
2 motor grader operators	2 motor graders	
1 motor grader operator 1 truck driver 1 person	1 motor grader 1 truck and pull type grader	
INCLUDE AS REQUIRED		SMALL TOOLS
Additional person(s) for handwork	Additional truck	shovels

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 153 Sheet 1 of 1	DATE	WORK UNIT Linear Feet

DESCRIPTION – HAND CLEAN DITCHES

To include all hand ditch work not related to activities 151 and 152.

PURPOSE

The outlet ditches, inlet ditches and tailditches should be checked, by a drive-by inspection where possible, during the rainy season. The cross section of the ditch should be of adequate area to handle the expected flow of water and be free of debris and silt such that water will not back up or pond. Care should be taken to ditch only as far as is necessary to protect the roadway.

Areas around inlet ends of pipes should be maintained to limit the growth of vegetation and permit the free flow of water.

Drainage ditches should be corrected when erosion is evident by the addition of silt barriers, riprap or check dams.

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. Remove silt and debris to restore the ditch to original cross section.
3. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 Foreman 1 truck driver prison labor	1 truck	
1 Foreman (optional) 1 truck driver 3 persons for handwork	1 truck with crew cab or cab carrier	
1 truck driver 1 person	1 truck	
		SMALL TOOLS
		shovels

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 154 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION — CLEAN AND REPAIR MINOR DRAINAGE STRUCTURES

Includes maintenance and repair of all unnumbered drainage structures. On the Primary System — all structures and pipes of less than 20 sq. ft. opening. On the Secondary System — all structures and pipes of less than 36 sq. ft. opening.

PURPOSE

Culverts shall be kept clean and unobstructed. Any sediment deposits or obstructions should be promptly removed.

When a culvert has been broken or damaged or is out of proper alignment due to settling or heaving, the repair should be made as soon as scheduling permits. If the invert of a metal or concrete pipe has corroded or worn through it may be repaired with concrete grout. When concrete pipes settle and the joints pull apart, repair may be made with concrete grout. In the case of major settlement, corrosion, or damage the pipe should be scheduled for replacement under Activity 423.

Footing and headwalls should be inspected for scour and erosion and the repair should be made promptly.

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. Clean or repair drainage structure as required.

3. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 Foreman 1 truck driver prison labor	1 truck	
1 truck driver 1 person for handwork	1 truck with water tank and pump (for flushing out sediment)	
1 truck driver 2 persons for handwork	1 truck	
		SMALL TOOLS
		shovels jack (for crushed pipe)

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 159 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION — OTHER DRAINAGE CARE

Cleaning curb and gutter, mechanical cleaning of minor outlet and inlet ditches.

PURPOSE

Critical areas, particularly those where backed up water would cause property damage, should be patrolled during periods of severe storms. Any evidence of drainage problems should be corrected immediately.

Curb and gutter, paved ditches, drop inlets, and curbs constructed along the shoulder should be cleaned when the collected debris impedes the flow of water. Damage to or settling of roadside curbs or gutters that adversely affects the efficiency of the drainage item should be promptly repaired.

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. Perform work as required.

3. Recover traffic control devices.

	PERSONNEL	EQUIPMENT	MATERIALS
Wet Weather Patrol	1 truck driver 1 person	1 truck	
Clean Ditches	1 Foreman (optional) 2 operators 2 truck drivers	1 gradall 2 trucks	
Curb and Gutter	1 operator 1 person	1 street sweeper	SMALL TOOLS
	1 truck driver 2 persons	1 truck	shovels brooms
	1 Foreman 1 truck driver prison labor	1 truck	

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 161 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION — REPAIR EROSION AND MINOR STORM DAMAGE

Repairing cut slopes, fill slopes, washouts, and removing minor slides. This activity is intended to cover all work associated with water caused damage.

PURPOSE

Earth slides present a serious problem to maintenance and a hazard to the travelling public. Slide material should be removed promptly with consideration being given to what will happen to the area above the slide when the material is removed.

Drainage ditches should be cleaned when the collected rocks and debris prevent proper functioning of the ditch.

Other work charged to this activity includes:

1. High-water signing.
2. Removing trees that have fallen as a result of a storm.
3. Repairing of cut and fill slopes.
4. Repairing washouts of non-hard-surface roads.

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. Perform work as required.

3. Recover traffic control devices.

4. Schedule reseeding of disturbed areas.

	PERSONNEL	EQUIPMENT	MATERIALS
Slides	1 Foreman 1 loader operator 3 truck drivers 1 dump person 2 persons for handwork	1 front end loader 3 trucks	#26 (Crusher Run)
Trees	1 truck driver 1 loader operator (if required) 1 person	1 truck 1 front end loader (if required)	
Signing	1 truck driver 1 person	1 truck w/ high-water signs	SMALL TOOLS
Washouts	1 Foreman 1 motor grader operator 3 truck drivers 1 loader operator	1 motor grader 3 trucks 1 front end loader	shovels chain saws

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 162 Sheet 1 of 1	DATE	WORK UNIT Miles of right-of-way

DESCRIPTION — CLEAN RIGHT-OF-WAY

Cleaning major portion of right-of-way of paper, bottles, cans, and debris.

PURPOSE

All roadside areas on the Interstate and Primary Systems shall have litter and debris picked up at least once per year or more frequently as required to assure that the roadside presents a neat, clean, and attractive appearance. A full-scale litter pickup shall be scheduled on the Interstate and Primary Systems each spring just prior to Garden Week.

On the Secondary System litter and debris should be picked up as frequently as necessary to assure that the roadside presents an appearance commensurate with the class and use of the road.

Any litter or debris deposited on the roadway which constitutes a traffic hazard shall be removed immediately after being reported or observed. See Section 9.110 of the Maintenance Division Policy Manual.

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. On undivided highways, pick up trash on only one side of the roadway at a time. On divided highways pick up trash on both sides of the roadway (shoulder and median) for one direction of travel at a time. Place trash in litter bags and place on the shoulder.

3. Make a pass with truck to load bags into truck and dispose of contents at proper location.

4. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 Foreman 1 truck driver prison labor	1 truck	
1 Foreman (optional) 5 persons	1 truck with crew cab or cab carrier	
		SMALL TOOLS
		litter bags

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 163 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION — DEAD ANIMAL AND LITTER PATROL

Daily or weekend patrol for dead animals and litter.

PURPOSE

All dead animals on the right-of-way shall be removed and buried as soon as possible after being reported or observed.

SCHEDULING FREQUENCY

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

PROCEDURE

Patrol all Interstate routes at least once per day on Saturdays, Sundays and holidays throughout the year. Patrol all Arterial and Primary "bare pavement" routes once on one day only of each weekend between April 1 and October 1. Bury all dead animals and remove debris which is a road hazard; service all picnic areas and waysides which do not have custodians.

Promptly bury all dead animals discovered on the right-of-way, when the owners of the dead animals are not known. The animals may be buried on the right-of-way or permission may be secured to bury them on private property. Where large animals are concerned, it may be possible to arrange with the nearest renderer for disposal. See Sections 9.121 and 9.122 of the Maintenance Division Policy Manual.

	PERSONNEL	EQUIPMENT	MATERIALS
NORMAL PATROL	1 truck driver	1 truck	
FOR LARGE ANIMALS	1 loader operator 1 truck driver	1 loader 1 truck	

SMALL TOOLS
shovels

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 165	DATE	WORK UNIT
Sheet 1 of 2		None

DESCRIPTION — PICNIC AREAS, WAYSIDES, AND REST AREAS

Care and replacement of picnic tables and benches; painting and minor repairs to shelters, custodian's quarters, and rest rooms; includes utilities and custodian's salaries.

PURPOSE

The appearance and cleanliness of picnic areas, waysides and rest areas are major factors in the traveling public's opinion of the highways and the state. It is essential that a schedule of regular maintenance attention be given to these facilities in order that they present a neat, clean and attractive appearance at all times.

SCHEDULING FREQUENCY

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

PROCEDURE

PICNIC TABLES

Between April 1 and November 15, check all picnic tables daily and clean as necessary. During the remainder of the year, check the areas at least once per week.

Keep all tables and benches in a good state of repair and repaint as required.

Provide an adequate number of trash cans. Use polyethylene liners in the trash cans and treat the trash cans to prevent flies and reduce odors.

Eradicate poison ivy, poison oak and similar plants around picnic tables.

WAYSIDES

Where no custodian is provided, check waysides daily during the time of the year they are open to the public.

Keep picnic tables, benches, outdoor grills, fireplaces, shelters and other structures in good repair and repaint as required. Provide an adequate number of conveniently located trash cans at the wayside. Use polyethylene liners in the trash cans and treat the trash cans to prevent flies and reduce odors.

Clean and service rest rooms daily or more often as required during weekends and holidays.

Maintain facilities such as drinking fountains and water sources such that mud puddles or other undesirable conditions do not exist.

PERSONNEL	EQUIPMENT	MATERIALS
Staff as required		
		SMALL TOOLS

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 165 (Continued) Sheet 2 of 2	DATE	WORK UNIT None

WAYSIDES (Continued)

Maintain driveways, parking areas, roads, sidewalks and footpaths in good condition.

Mow grassed areas of the wayside before the grass reaches a height of 6 inches and mow no shorter than 2 inches. Eradicate poison ivy, poison oak, and similar plants in the wayside area.

REST AREAS

Keep rest areas open 24 hours a day on a year-round basis. Have a uniformed custodian on duty at each area generally from 6:00 a.m. to 10:00 p.m. Some variation in these hours may be necessary due to the useage of an area.

Maintain rest areas in accordance with the policies and instructions found in Chapters 2 and 3 of the Rest Area Custodian's Manual.

COMMISSION RULES AND REGULATIONS FOR WAYSIDES AND REST AREAS

Conspicuously post copies of the Commission Rules and Regulations for Waysides and Rest Areas at all Waysides and Rest Areas. A copy of the Rules and Regulations is found in Appendix 9-1 of the Maintenance Division Policy Manual.

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY (Continued) Sheet ____ of ____	DATE	WORK UNIT

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 166 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION — ROADSIDE STRUCTURES

Repair and maintenance of sidewalks, retaining walls, riprap, right-of-way markers, curb and gutter, and similar structures.

PURPOSE

Sidewalks	Irregularities caused by settlement, blowups or other causes should be promptly repaired. The sidewalk surface shall be kept firm, smooth, and free of holes or other defects which may cause pedestrian injuries. See Section 9.300 and 9.310 of the Maintenance Division Policy Manual.
Retaining Walls	All retaining walls shall receive an inspection twice per year. Routine maintenance will include keeping weep holes open and walls free of trees and brush. See Section 9.610 of the Maintenance Division Policy Manual.
Curb and Gutter	Traffic islands and paved ditch should be inspected annually and vegetation growth removed. Repairs should be made as required and line and grade restored as necessary.
Riprap	Normally requires no maintenance; however, the areas with riprap should be inspected after heavy rains and the riprap replaced as required.

Curb and gutter, paved ditch, and traffic islands should have debris cleaned when the accumulation impedes proper drainage or presents a hazard to traffic.

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. Perform work as required.

3. Recover traffic control devices.

	PERSONNEL	EQUIPMENT	MATERIALS
Cleaning	1 truck driver 2 persons	1 truck	Riprap Class 1 concrete
Cleaning	1 Foreman 1 truck driver prison labor	1 truck	
Paved Ditch	2 truck drivers 1 loader operator 3 persons for handwork	2 trucks 1 front end loader	
			SMALL TOOLS
Riprap	2 truck drivers 1 loader operator 3 persons for handwork	2 trucks 1 front end loader	brooms shovels

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 167 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION — FENCES

Maintenance and repair of right-of-way and access control fences.

PURPOSE

The Department has constructed many miles of fence on the Interstate and other fully controlled access routes. These fences were constructed to discourage unauthorized entry on limited access portions of the right-of-way; and if the fences are to serve their intended purpose, they must be inspected regularly and be promptly repaired as required.

SCHEDULING FREQUENCY

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

PROCEDURE

Maintain all fences which are the responsibility of the Department for maintenance in such condition as to assure that the fences will serve their intended purpose and in such manner as to promote a long service life.

Inspect fences at least twice each year, particularly after windstorms which may have blown tress across the fences.

Promptly correct all breaks, vertical misalignment, and broken or missing posts.

Correct erosion under the fence since this may be used as an entry point.

Correct trash or limbs on the fence or soil washed around the fence since these may be used as a stile.

Remove weeds or vines growing on the fence since these will accelerate rust or rotting of the fence material and, when dry, become a fire hazard.

PERSONNEL	EQUIPMENT	MATERIALS
1 truck driver 2 persons	1 truck	fence wire posts staples
INCLUDE AS REQUIRED		
Additional person (s) for handwork	Additional truck	
		SMALL TOOLS
		hammers posthole digger fence stretcher

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 171 Sheet 1 of 6	DATE	WORK UNIT Acres

DESCRIPTION — TRACTOR MOWING

Includes tractor mowing with sickle bar and rotary mowers.

PURPOSE

The objective of the Department is to maintain the vegetation on all highways commensurate with the need for safety, erosion control and aesthetics of each segment of the highway system through a planned and coordinated program.

To aid in accomplishing this objective, four priorities of highways have been extablished 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 maintained between a height of approximately 4" and approximately 10". Areas to be mowed are shown in Figures 1 and 2. The remainder of the right-of-way accessible to mowing equipment and not covered by the above shall be mowed two times per year where required by the condition of adjacent property. Infield areas of interchanges may be mowed if necessary for aesthetic purposes.

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 proper cutting height.
   a. Sickle bars will need two shoes attached — one on each end of the bar.
   b. Bushhog type mowers will need a sled attached to the bottom on each side.
   c. Low profile tires will need to be replaced with larger tires.
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 8 mower operators 1 truck driver	8 mowers 1 truck (signs)	
3 mower operators 1 truck driver	3 tractor mowers 1 truck (signs)	
		SMALL TOOLS

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 171 (Continued) Sheet 2 of 6	DATE	WORK UNIT Acres

PRIORITY NO. 1

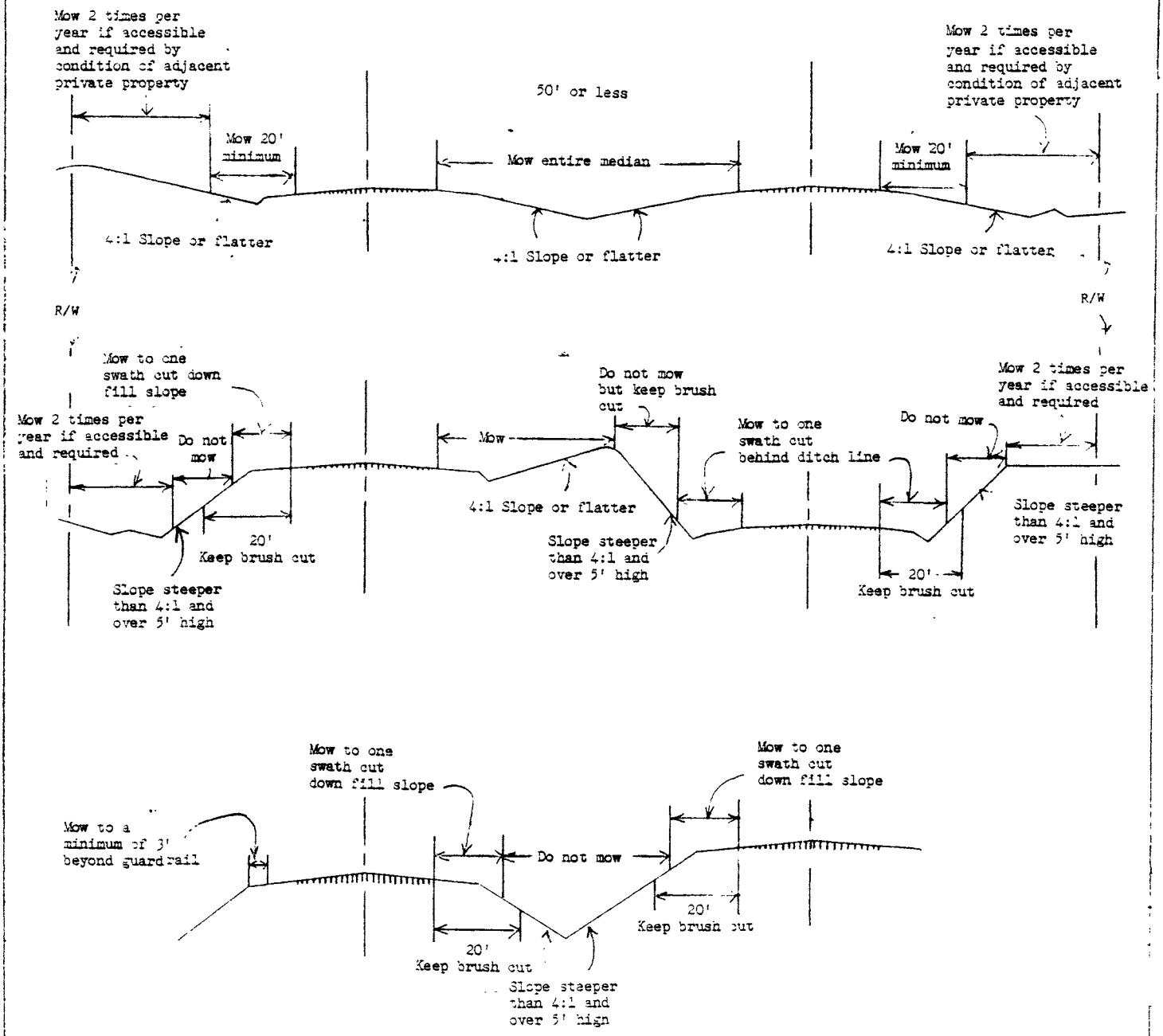


Figure 1. Median and roadside mowing areas for medians 50' wide or less under Priority No. 1

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 171 (Continued) Sheet 3 of 6	DATE	WORK UNIT Acres

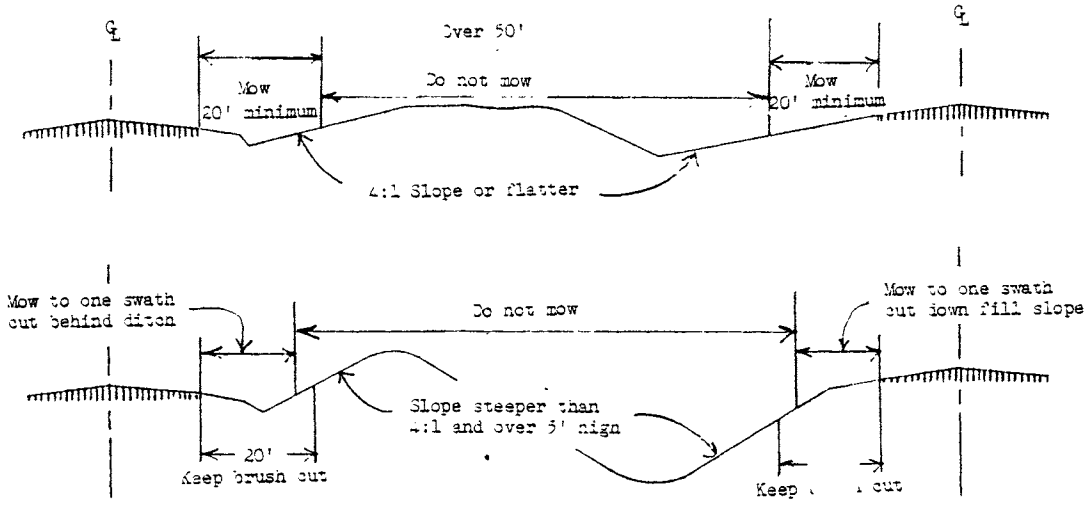


Figure 2. Median mowing areas for medians over 50' wide under Priority No. 1.

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 4" and a maximum height of 18". Mowing shall not be started until vegetation reaches a height of approximately 10". The remainder of the right-of-way (which is accessible to mowing equipment and where mowing is required) shall be mowed once per year in early fall or more frequently as necessary. See Figure 5 for slope areas under Priority No. 2 where mowing is prohibited.

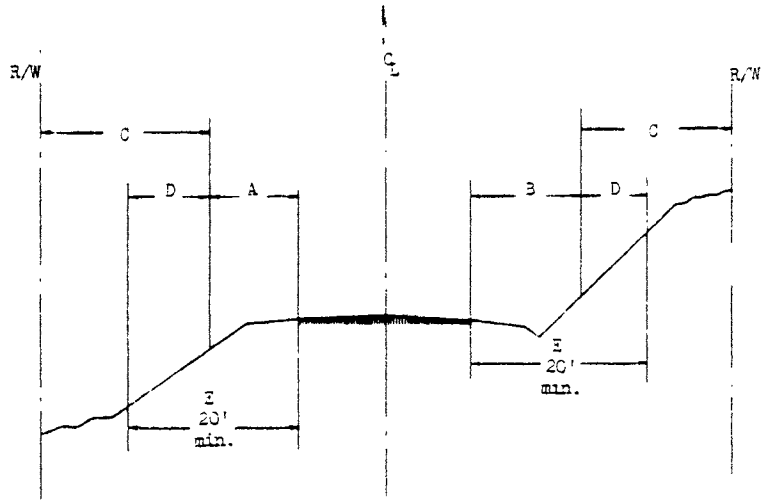
VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 171 (Continued) Sheet 4 of 6	DATE	WORK UNIT Acres

PURPOSE



A — Mow from edge of pavement to one swath cut from down fill slope.

B — Mow from edge of pavement to one swath cut beyond ditch line.

C — Mow once per year in early fall if area is accessible and if mowing is required. Do not mow slopes steeper than 4:1 in this area.

D — Keep brush cut within a minimum distance of 20' from the edge of pavement on areas not accessible to mowing equipment.

E — Mow a minimum of 20' from the edge of the pavement where the cut or fill slope is less than 5' in height or the slopes are not steeper than 4:1.

Figure 3. Roadside mowing areas under Priority No. 2.

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 171 (Continued) Sheet 5 of 6	DATE	WORK UNIT Acres

PURPOSE

PRIORITY NO. 3

Priority No. 3 normally will include a majority of the Secondary System. That portion of the right-of-way accessible to mowing equipment shall be mowed once per year or more frequently as necessary. See Figure 5 for slope areas under Priority No. 3 where mowing is prohibited.

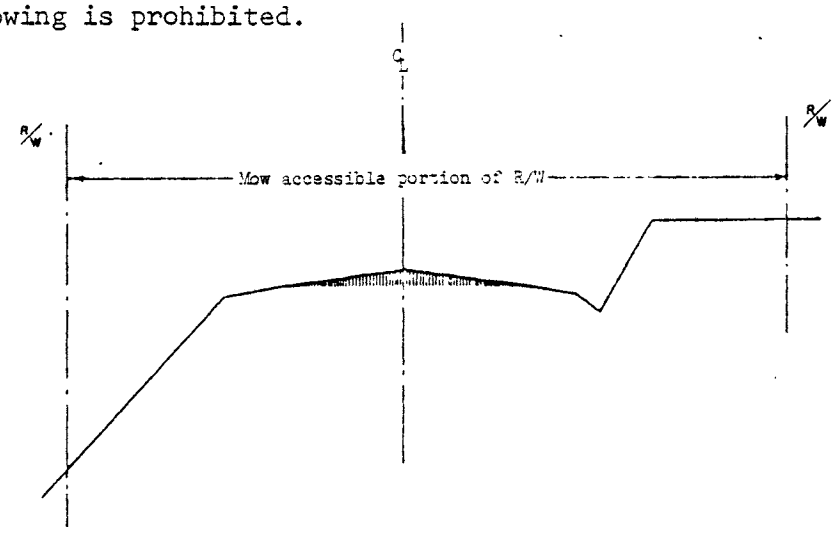


Figure 4. Roadside mowing areas under Priority No. 3

PRIORITY NO. 4

Priority No. 4 normally will 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. See Figure 5 for slope areas under Priority No. 4 where mowing is prohibited.

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 171 (Continued) Sheet 6 of 6	DATE	WORK UNIT Acres

PURPOSE

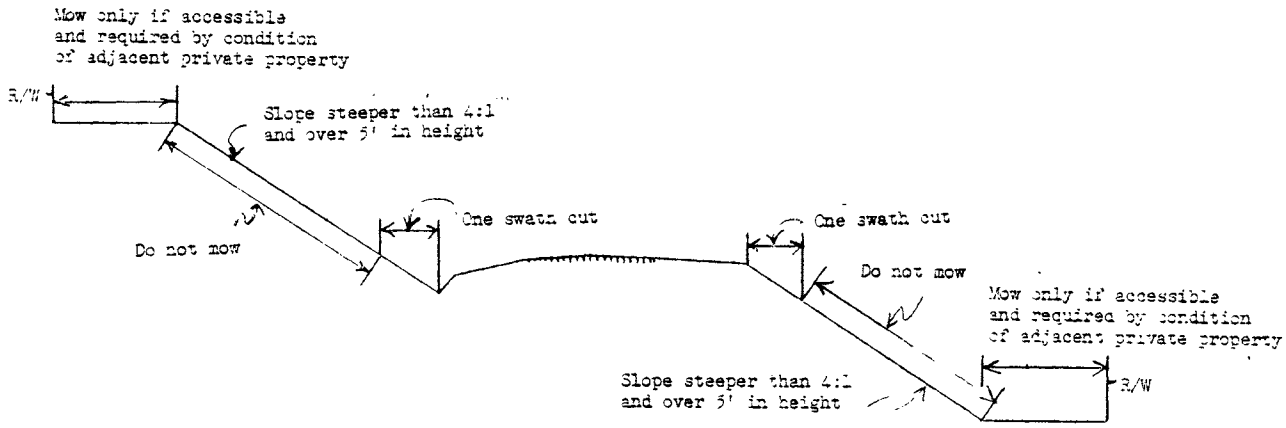


Figure 5. Slope areas under Priority Nos. 2, 3, and 4 where mowing is prohibited.

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VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY (Continued) Sheet _____ of _____	DATE	WORK UNIT

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 172 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION — HAND MOWING

Hand mowing using scythes, weed eaters, sickles, power hand mowers and using power equipment such as Railbird around guardrails.

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 roadside 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
1 truck driver 2 mower operators	1 truck (service) 1 slope mower 1 Railbird	
1 truck driver 1 mower operator 1 person	1 truck 1 slope mower 1 hand mower 1 weed eater	
1 truck driver 1 person	1 truck 2 hand mowers	SMALL TOOLS hand sickles hand scythes
1 Foreman 1 truck driver prison labor	1 truck	

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 173 Sheet 1 of 2	DATE	WORK UNIT Acres

DESCRIPTION — BRUSH CUTTING

Cutting and removal of brush.

PURPOSE

All undesirable brush shall be kept cut within a minimum distance of 20' from the edge of pavements on areas not accessible to mowing equipment, with the following exceptions.

1. Vegetation, such as pines, in area "D" shall be topped rather than cut (see Figure 1 on sheet 2).

2. Desirable flowering shrubs, trees or any other vegetation as may be designated by the Environmental Quality Division which are located in area "C" shall not be cut (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 and trees shall be cut or trimmed where possible 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.

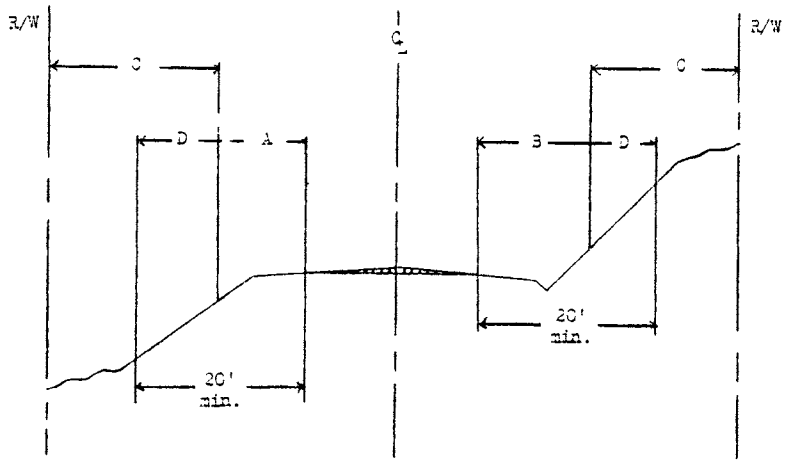
PERSONNEL	EQUIPMENT	MATERIALS
1 Foreman 2 truck drivers (if required) prison labor	1 truck 1 truck and Brush Chipper (if required)	
1 truck driver 1 person	1 truck	
1 truck driver 1 operator	1 truck 1 tractor mower or motor grader with side mounted bush hog	SMALL TOOLS bush axes chain saws

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 173 (Continued) Sheet 2 of 2	DATE	WORK UNIT Acres



A — Mow from edge of pavement to one swath cut down fill slope.

B — Mow from edge of pavement to one swath cut beyond ditch line.

C — Mow once per year in early fall if area is accessible and if mowing is required. Do not mow slopes steeper than 4:1 in this area.

D — Keep brush cut within a minimum distance of 20' from the edge of pavement on areas not accessible to mowing equipment.

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

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY (Continued) Sheet ____ of ____	DATE	WORK UNIT

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 174 Sheet 1 of 1	DATE	WORK UNIT Gallons of Spray

DESCRIPTION — SPRAYING BRUSH, WEEDS OR GRASS

Control of brush and 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 sign posts, 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 herbicide is to be 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 brush, 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

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VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 175 Sheet 1 of 2	DATE	WORK UNIT None

DESCRIPTION — TRIMMING AND REMOVING TREES

PURPOSE

Only trees which fall into one or more of the following groups shall be cut from the right-of-way.

1. Those that are dead or dying.
2. Those that are diseased.
3. Those inclined to fall across the right-of-way.
4. Those that are a definite traffic hazard.
5. Those restricting clear view of signs.

All low, overhanging limbs which interfere with traffic or restrict adequate sight distance as noted in Figure 1 shall be removed.

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.

   a. When removing dead or undesirable trees, cut flush with the ground.

   b. When removing live trees, spray the stumps with a herbicide combination product of 2-4 D, MCTP and Dicamba (Trimec) to prevent future sprouting.

   c. Remove tree limbs with a saw, making flush cuts and painting cuts in excess of 1".

   d. Remove or dispose of all brush, laps, stumps, logs, etc., as the work progresses for safety and appearance. In no case should the material removed be disposed of on private property without the consent of the property owner. Chippers are available in most districts to mulch the brush and laps.

      In general, cut trees in the winter to avoid criticism.

3. Recover traffic control devices.

PERSONNEL	EQUIPMENT	MATERIALS
1 truck driver 2 persons	1 truck 1 brush chipper (if required)	
2 truck drivers 1 loader operator 2 persons	2 trucks 1 loader 1 brush chipper (if required)	
2 truck drivers 2 persons	2 trucks 1 brush chipper (if required)	SMALL TOOLS
		chain saws

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 175 (Continued) Sheet 2 of 2	DATE	WORK UNIT Acres

PURPOSE

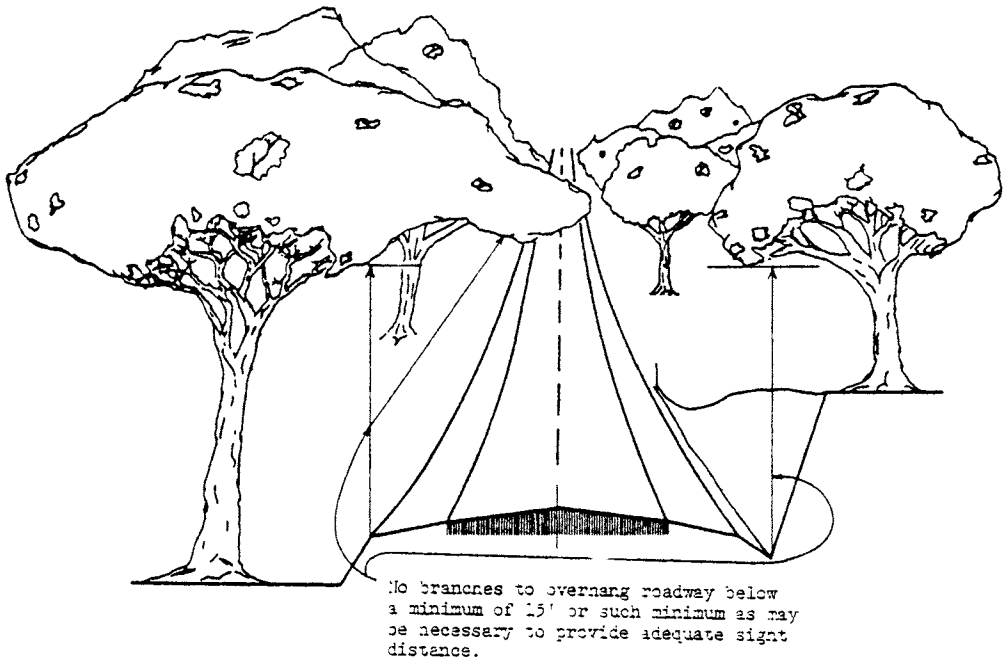

Figure 1. Removal of brances which overhang roadway.

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY (Continued) Sheet ____ of ____	DATE	WORK UNIT

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 181 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION – SIGNS

Replacing, cleaning, repairing, clear coating, repainting or resetting signs. (Use Activity 193 for installation or maintenance of historical markers.)

PURPOSE

All highway signs shall be fabricated and erected in accordance with the Virginia Manual on Traffic Control Devices or deviations approved by the Traffic and Safety Engineer.

SCHEDULING FREQUENCY

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

PROCEDURE

Keep all signs properly erect, clean and legible at all times.

Do not allow vegetation to obscure any sign.

Replace or repair warning signs that are damaged or otherwise disturbed immediately upon discovery. Correct all other damaged or disturbed signs as soon as practical.

Inspect signs a minimum of twice per year, with one inspection being a night inspection.

To promote legibility and to extend the life of signs, wash all signs with a detergent at least once per year or more often if required for legibility. In addition, clear coat all scotchlite signs every four or five years. Submit to the District a record of the dates of inspection and maintenance performed.

Check all illuminated signs frequently to assure proper illumination.

Keep nongalvanized steel and existing painted wooden sign posts painted and in a good general state of repair. New sign posts will not be painted.

Inspect galvanized posts annually and make appropriate repairs.

Mark all signs with the date of erection.

See Sections 10.133 through 10.135 of the Maintenance Division Policy Manual for additional information.

PERSONNEL	EQUIPMENT	MATERIALS
Staff as required		
		SMALL TOOLS

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY 191 Sheet 1 of 1	DATE	WORK UNIT Feet of Guardrail

DESCRIPTION — REPAIR OR RESET GUARDRAIL

PURPOSE

The increased use of guardrail in recent years has promoted the maintenance of these facilities from a minor item to one of major importance. The proper maintenance of guardrail is important in providing maximum protection to the travelling public and for the general appearance of the roadway. Damaged or broken guardrail posts will not effectively serve their intended purpose and will also bring an adverse public criticism since they represent an obvious maintenance need.

Guardrail shall be maintained as near as possible to original or subsequently improved condition.

SCHEDULING FREQUENCY

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

PROCEDURE

1. Immediately repair to restore the effectiveness and appearance of any broken or damaged guardrail.

2. Paint guardrail requiring painting as frequently as necessary to preserve its structural quality and appearance. (Charge guardrail painting to Activity 192.)

3. Keep cable guardrail at the proper tension at all times for maximum effectiveness.

4. Keep shoulders under and around guardrail and guide posts free of vegetation or mowed sufficiently close to prevent obstructing the guardrail. (Charge to applicable activity under Vegetation Control.)

5. Maintain all reflectors, reflectorized sheeting or reflectorized paint in such condition as to promote maximum nighttime visibility.

PERSONNEL	EQUIPMENT	MATERIALS
Staff as required		
		SMALL TOOLS

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITIES 203 through 219 Sheet 1 of 1	DATE	WORK UNIT

DESCRIPTION — SNOW & ICE CONTROL ACTIVITIES

203 Snow Removal Expendable Equipment
211 Standby & Patrol for Snow & Ice Control by State Forces & Equipment
212 Standby for Snow & Ice Control by Hired Equipment
213 Snow Fence
214 Other Snow & Ice Control Support
215 Snow Removal & Ice Control by State Forces
216 Snow Removal & Ice Control by Hired Equipment
217 Availability Fee
218 Snow Removal Supervision

PURPOSE

The prompt and efficient removal of snow and ice from the highways is necessary for year-around use of the highways. Inadequate snow and ice removal results in an economic loss to the Department, the business community and the road user, and may cause serious injury or death to the travelling public and employees of the Department.

In order to promote safe travel on the highways of the Commonwealth and to protect the investment in our highways, it shall be the objective of the Department to provide snow and ice control services commensurate with the needs of all segments of the highway system and within the Department's ability to finance these operations.

SCHEDULING FREQUENCY

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

PROCEDURE

Begin snow and ice control operations in the summer months with the planning of operations, development of facilities and acquisition of personnel, equipment and materials. No other item of maintenance requires more planning and preparation than snow and ice control. In no other maintenance operation is inadequate planning and preparation more apparent than in snow and ice control. The fact that snow and ice control operations are emergencies and take precedence over all other operations should be reflected in planning.

To aid in the development of plans for snow and ice control and the implementation of these plans, see Sections 11.100 through 11.216 of the Maintenance Division Policy Manual and the Maintenance Division publication "Planning Chemical and Plowing Routes" (MT-11-67) for the policies and standards governing the priorities for the various routes in the highway system and the service to be rendered under each priority.

To aid in the training of personnel for snow and ice control see the following Maintenance Division publications:

1. MT-66 "Chemical Spreaders (Use and Maintenance)"
2. MT-12-66 "Spreading Chemicals"

PERSONNEL	EQUIPMENT	MATERIALS
Staff as required		
		SMALL TOOLS

VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION

MAINTENANCE DIVISION

STANDARD

ACTIVITY — 221 & 222 Sheet 1 of 1	DATE	WORK UNIT None

DESCRIPTION — 221 REPAIR SUBSTRUCTURES

Making minor repairs to, repainting, and replacing that part of the structure recognized as substructure, i.e., from the bridge seat down; removal of drift and ice floes.

— 222 REPAIR SUPERSTRUCTURES

Making minor repairs, repainting and replacing that part of the structure recognized as the superstructure, i.e., above the bridge seat; includes the replacement of handrails and other parts damaged by traffic.

PURPOSE

The general objective of the Department is to maintain all structures as initially constructed or subsequently improved.

SCHEDULING FREQUENCY

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

PROCEDURE

Make all minor repairs promptly upon discovery of defects. Examples of minor repairs are: tightening bolts and replacing isolated planks in a wooden deck; repairing broken handrails or posts; correcting settlement in approaches; cleaning and painting; and correcting minor washouts or erosion.

PERSONNEL	EQUIPMENT	MATERIALS
Staff as required		
		SMALL TOOLS