

**Maryland's  
Erosion and Sediment Control  
Standards and Specifications  
for  
Forest Harvest Operations  
2005 Draft**

**Maryland Department of the Environment  
Maryland Department of Natural Resources  
and the  
State Soil Conservation Committee**



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Erosion And Sediment Control  
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For  
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Draft

June 27, 2005

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- The Association of Forest Industries, Inc.
- The State Soil Conservation Districts
- The Natural Resources Conservation Service

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**INTRODUCTION**

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## LIST OF ABBREVIATIONS USED IN THIS DOCUMENT

BMP	Best Management Practice
COMAR	Code Of Maryland Regulations
DBH	Diameter Breast Height
DNR	Department Of Natural Resources
DNR-FS	Department Of Natural Resources-Forest Service
EPA	United States Environmental Protection Agency
FS	Forest Service
FT	Foot (Measurement)
H:V	Horizontal To Vertical (Slope)
LBS	Pounds
MD	Maryland
MAX	Maximum
MDE	Maryland Department Of The Environment
MDE-WMA	Maryland Department Of The Environment-Water Management Administration
MIN	Minimum
NRCS	Natural Resource Conservation Service
NTW	Nontidal Wetlands
NTWSSC	Nontidal Wetlands Of Special State Concern
P <sup>2</sup>	Pollution Prevention
<i>q.v.</i>	(L. <i>Quod Vide</i> – Which See) See Also
SCD	Soil Conservation District
SF	Square Feet
SF	Silt Fence
SMZ	Streamside Management Zone
SQ FT	Square Feet
USGS	United States Geological Survey
WMA	Water Management Administration

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## **FOREST HARVEST OPERATIONS IN MARYLAND**

### **History Of Maryland's Sediment Control Program**

The General Assembly of Maryland recognized that the state's watersheds are great natural assets and resources. As a result of erosion and sediment deposition on the land and in the waters of the State, these waters are being polluted and despoiled to such a degree that aquatic plants and animals and recreational use of the waters of the State are being affected adversely.

To protect the State's natural resources, especially the waters, the general assembly passed laws requiring the Department Of The Environment to adopt criteria and procedures to implement the soil erosion control program. As created, the sediment control program places ultimate responsibility with the State but allows each county to establish its own local program. The local soil conservation district is designated as the technical expert for its county and as such reviews and approves the erosion and sediment control plans for private and local government projects. Essentially, any non-agricultural, land disturbing activity, is regulated under the sediment control program, including forest harvest operations.

The State's sediment control program recognizes that the failure to fully implement and maintain the approved erosion and sediment control plans has acute and cumulative effects on the environment. The program therefore provides for obtaining immediate compliance with the law when violations occur.

### **Legal Requirements**

This document, the 2005 Maryland Erosion And Sediment Control Standards And Specifications For Forest Harvest Operations, offers guidance for forest harvest operations regarding erosion and sediment control practices required by Maryland law and regulation\*. These practices have been developed to protect, maintain and enhance our natural resources. Any forest harvest operation that disturbs more than 5,000 square feet or 100 cubic yards of soil must have an approved erosion and sediment control plan.

There are four general environmental areas involving forest harvests in Maryland that have legal requirements. These are Erosion and Sediment Control, Nontidal Wetlands (See APPENDICES G.2 AND G.3.), Waterway Construction, (stream crossings, See APPENDIX G.1.), and Chesapeake Bay Critical Areas (See APPENDICES F.1 AND F.2.).

This document will treat in detail only the requirements for erosion and sediment control on forest harvest operations. The remaining three topics are introduced briefly here. For a more detailed explanation of these requirements, contact the local Soil Conservation District, the Department of Natural Resources - Forest Service, or the Maryland Department of the Environment. See the appropriate appendices for the specific contacts, addresses and phone numbers.

**IMPORTANT:** It must be noted here in the opening of this document that both the landowner

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and operator have a legal obligation not to allow erosion and sedimentation to occur as result of their forest harvest operation especially when the situation results in pollution of water of the State.

\*Persons directly affected by these requirements are directed to the latest versions of the Annotated Code Of Maryland (Environment Article, Title 4, Water Management, Subtitle 1 Sediment Control, §4-101 through 4-116) and the Code Of Maryland Regulations, COMAR (26.17.01.01 through 26.17.01.11)

## **Waters Of The State**

The legal definition of waters of the State is fundamental to Maryland's efforts to protect the environment. A complete understanding of the definition is also necessary in order to fully and accurately utilize this document.

Section 4-101.1 (d) of the Environment Article, Annotated Code Of Maryland defines waters of the State as including:

- (1) Both surface and underground waters within the boundaries of this State subject to its jurisdiction, including that part of the Atlantic Ocean within the boundaries of this State, the Chesapeake Bay and its tributaries, and all ponds, lakes, rivers, streams, storm drain systems, public ditches, tax ditches, and public drainage systems within this state, other than those designed and used to collect, convey, or dispose of sanitary sewage; and
- (2) The flood plain of free-flowing waters determined by the Department of Natural Resources on the basis of the 100-year flood frequency.

This definition is broad and deep and is intended to be so. Any activity, anywhere in the state can have a negative impact on waters of the State. Therefore, the laws that regulate potentially polluting activities are binding in locations that the average person might not identify as "water". It became apparent many years ago that it is much more effective to protect water quality at its source than it is to attempt to clean it at its point of discharge. From this insight grew the concept of pollution prevention. Sound pre-harvest planning is an excellent example of pollution prevention. Because the definition of waters of the state is so pervasive, anyone conducting almost any activity must be alert to the possible impact to water quality as a result of their actions.

In addition to its function identifying what locations must be protected for water quality, the definition of waters of the State is used by this document to perform a second function. As you will see, the definition of waters of the State is pressed into service to help determine certain parameters.

No matter how carefully a law, regulation or standard and specification is written, there is always the potential for individual interpretation. The more people that use it, the more interpretations are made. This is complicated in a state such as Maryland. Maryland exhibits diverse physiographic regions. Natural features that are significant in one part of the State may be unknown elsewhere. This also makes crafting standards and specifications that are broadly applicable very difficult. In order to manage this tendency to interpret regulatory

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requirements over a variety of environmental perspectives, it is incumbent upon the regulator to start with a fundamental, universal definition that due to long usage, is understandable to the majority of the regulated community. It is also desirable to ensure that any regulatory requirement has its basis in law (such as the definition of waters of the State). This adds to the requirement's legitimacy. Starting from this legal definition, it is possible, with careful modification of the recognized standard (in this case the definition of waters of the State), to utilize it to establish certain criteria. As you will see, a modified definition of waters of the State is used to determine the extent of the protective buffer areas (now known as Streamside Management Zones) required around bodies of water.

It is not MDE's intent (nor within its authority) to change the legal definition. The complete definition is binding in reference to protecting water quality. We are simply using a portion of a well understood definition to establish the limits of the SMZ.

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## EROSION AND SEDIMENT CONTROL PLANS

### **Obtaining An Approved Erosion and Sediment Control Plan**

Maryland State law and regulations require that an erosion and sediment control plan be developed and approved before undertaking any earth disturbing activity in excess of 5,000 square feet or 100 cubic yards. This requirement applies to construction on residential, commercial, industrial, and institutional sites as well as on timber harvest projects. To assist loggers in meeting this erosion and sediment control requirement, the Maryland Department Of The Environment (MDE) and the Department of Natural Resources (DNR) have developed The Standard Erosion And Sediment Control Plan For Forest Harvest Operations In Maryland (the Standard Plan). This plan is intended to cover the most basic harvest sites and lists the general erosion and sediment control requirements for each harvest and may be obtained at any Soil Conservation District (SCD) office. For sites that exceed the basic limits of the Standard Plan, the applicant must have a Custom Erosion And Sediment Control Plan (the Custom Plan) designed specifically for the site and then submitted to the appropriate plan approval authority (the SCD) for review and approval. Additionally, should the harvest site include removing trees that are adjacent to a stream or other waters of the State, a Streamside Management Zone plan is required. The next four sections help the applicant to select the type of approval(s) needed for his specific site and what each requires.

### **Appropriate Plan Type: Standard Or Custom**

It is anticipated that a significant portion of the forest harvest operations conducted in Maryland can be approved under the Standard Plan. The Standard Plan may be used if all of the following conditions are met:

1. Road cuts/fills are 3 feet or less (5 feet in Garrett, Allegany, Washington, & Frederick counties).
2. Grades for haul roads do not exceed 15 percent.
3. Landings are located on slopes 10 percent or less.
4. Grades for skid trails do not exceed 20 percent.
5. The site has no waters of the State in it or maintains an uncut and undisturbed Streamside Management Zone.

If any of these conditions or any other criteria of the standard plan cannot be met, a Custom Erosion And Sediment Control Plan listing practices necessary to prevent erosion and ensure site stabilization will have to be submitted to the appropriate plan approval authority (the SCD) for review and approval.

### **Requirements Of The Standard Plan Erosion And Sediment Control Plan**

The potential for loss of sediment from a forest harvest site is greatest at three general locations: entrance to the site, forest access system (haul roads, skid trails and landings), and adjacent to watercourses. The Standard Plan, therefore, emphasizes sediment control in these areas. Instructions for installing the required sediment control practices are listed in the

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specification sections of this document (See page to view the Standard Plan content and examples of plans that is based upon actual standard plans that have been reviewed and approved). The primary requirements for these areas are as follows.

1. Site Entrance - Access points to and from the site must be protected. Materials such as stone, wood chips, corduroy logs, wooden mats or other materials are available to minimize the soil or mud being tracked onto the road. It is also necessary to prevent the existing drainage pattern in the roadside ditch from being blocked or damaged by access to the site. A culvert placed underneath the entrance is the most effective way to maintain proper drainage.
2. Trails and Landings - Advanced pre-harvest planning of the location of roads, trails and landings is an effective way to minimize the potential for soil erosion. Locating roads and trails along natural contours and minimizing slopes will reduce the need for substantial cutting and filling operations.

When planning the road system avoid stream crossings whenever possible as they create one of the greatest potentials for sediment pollution. If this cannot be avoided, a permit for a temporary access crossing will be required [Contact Maryland Department of the Environment (MDE) - Water Management Administration. See APPENDICES D and G.1]

3. Waterway Protection - Protecting watercourses from runoff and equipment damage is the most critical aspect of sediment control during harvest operations. Improper stream crossings, soil disturbance adjacent to streams, and logging debris left in streams may result in substantial sediment pollution and flooding.

Use of the Standard Plan requires that uncut and undisturbed streamside management zones (SMZ) be maintained on all sides of any waters of the State. The width of the SMZ is dependent upon the slope of the land adjacent to the watercourse. If a harvest project includes the cutting of timber in the SMZ, additional approval is required. (See the following sections on the Custom Erosion And Sediment Control Plan and the Streamside Management Zone Plan.)

Roads, trails and harvesting equipment are not allowed in the SMZ for projects approved under standard plans, except for access to approved stream crossings. (The appropriate plan approval authority, the SCD, may make exceptions for existing roads in the SMZ. Existing roads, if serviceable and not creating a pollution problem, may be utilized if identified on the plan and approved by the appropriate plan approval authority, the SCD.) A custom erosion and sediment control plan and/or a SMZ plan is required for harvesting in the SMZ because of the high potential for soil compaction, erosion and stream damage.

NOTICE: Additional Requirements - In addition to the practices listed for the above areas, it is necessary to stabilize certain portions of the harvest site with seed and mulch to prevent erosion. This requirement generally applies to roads, trails and landings. (See

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## SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOIL.)

### **Requirements Of The Custom Erosion And Sediment Control Plan**

Situations may arise when it is not possible, even with careful planning, to comply with all the requirements of the Standard Plan. If all the conditions of the Standard Plan cannot be met, it is necessary to have a Custom Erosion And Sediment Control Plan (the Custom Plan) prepared by a Maryland Licensed Forester. The Custom Plan must be reviewed and approved by the appropriate plan approval authority (for forest harvest operations this authority is typically the local soil conservation district).

It is important that two types of information be included in the Custom Plan. The first is the condition where the Standard Plan requirements cannot be met; and the second is the specific erosion and sediment control measure to be used. The location of this condition is to be described on a sketch of the job site (or whatever map is required by the appropriate plan approval authority, the SCD). Once this area has been identified, it is necessary to describe the practice or measure utilized to ensure adequate erosion and sediment control. For example, if road grades are to exceed fifteen percent, and turnouts are to be used to drain water from the road, the location of the turnouts will be noted on the plan sketch. To prevent water from the turnout from creating side bank erosion it may be necessary to install stone at the point where the water is discharged. The location of the stone will also be identified on the plan sketch.

Another example would be a landing that must be located on a slope exceeding ten percent. It may be necessary to install a silt fence or a straw bale dike on the downslope side of the landing to act as a sediment barrier. In this case, the location of sediment controls and the type of final stabilization to be used at the landing will be noted on the plan.

The appropriate plan approval authority (the SCD) may require certification of the Custom Plan by a professional engineer, land surveyor, landscape architect, architect, or Maryland Licensed Forester registered in the state that the plan has been designed in accordance with the appropriate erosion and sediment control ordinances, regulations, standards, and criteria.

The appropriate plan approval authority (the SCD) has the option to require a specific design if a particular situation demands it. (As an example, a haul road exceeds the maximum limits set in the specification. Under such a situation the appropriate plan approval authority (the SCD) may require a site specific design that demonstrates that the road will function as intended and remain stable.)

In summary, the important thing to remember is that it is necessary to identify the location and describe the specific erosion and sediment controls to be used wherever the Standard Plan requirements cannot be met.

### **Requirements of the Streamside Management Zone And SMZ Plan**

It has long been accepted that the undisturbed forest is the best erosion and sediment control

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measure for timber harvest activities. In such an area, it is anticipated that rainfall runoff exists in sheet flow condition and that any sediment laden runoff caused by the timber harvest operation will flow across the width of undisturbed forest, causing the suspended sediment to settle out before it reaches waters of the State.

Accordingly, the requirement to establish a Streamside Management Zone (SMZ) is intended for areas where harvestable timber exists right up to the edge of waters of the State. The SMZ is required around all waters of the State (with very limited exceptions explained below) in lieu of structural measures such as silt fence, diversion dikes and sediment traps.

Limited harvesting is allowed within the SMZ provided that a SMZ Plan is prepared by a Maryland Licensed Forester and approved by the appropriate plan approval authority (the SCD). The SMZ plan needs to be very specific in describing which trees are to be cut, what precautions for sediment control will be taken, and where the sediment controls will be located. The location of any harvesting within a SMZ must be identified on a sketch of the SMZ. The sediment controls to be used for waterway protection and topography within the SMZ must also be identified on this sketch. If a SMZ plan is required, it will be used in conjunction with The Standard Plan if all other Standard Plan criteria are met. If other conditions of the harvest necessitate a custom plan, requirements for harvesting within the SMZ will be made a part of that plan. (See SPECIFICATIONS FOR STREAMSIDE MANAGEMENT ZONE.)

The requirements for the SMZ are intended to be broadly applicable across the State. It is recognized that there may be unusual circumstances where the conditions necessitating a SMZ may not exist and strict adherence to the requirements will cause undue hardship to the timber harvester and the landowner and the intended purpose of the requirement will not be met. In order to address this specific circumstance, a separate specification has been developed. It outlines the specific conditions where a SMZ may not be required and lists the alternative erosion and sediment control measures that must be implemented in lieu of the SMZ. Timber harvests conducted in proximity to waters of the State greatly increase the potential for sediment pollution from the harvest activity. The potential for violation of erosion and sediment control and pollution laws, enforcement action and penalties increases as well. If you intend to harvest timber adjacent to waters of the State and the location does not require a SMZ, please pay careful attention to the alternative erosion and sediment control measures that are required.

Each site must be evaluated on its own individual characteristics and limitations. See APPENDIX A for a sample SMZ Plan.

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Table 1 - Summary Of Erosion And Sediment Control Plan Approval Options

Harvesting specifications	Plan to Use
<ul style="list-style-type: none"> <li>• Road cuts/fill 3 feet or less (5 feet in Garrett, Allegany, Washington, &amp; Fredrick)</li> <li>• Haul road grades do not exceed 15%</li> <li>• Landings on slopes of 10% or less</li> <li>• Skid trail slopes do not exceed 20%</li> <li>• Uncut and undisturbed Streamside Management Zone</li> </ul>	Standard Plan
<ul style="list-style-type: none"> <li>• Harvests involving a NTW</li> <li>• Harvest involving a SMZ</li> <li>• Harvests involving haul roads with slopes between 15% and 20% for a maximum of 200', skid trails with slopes between 20% and 25% for a maximum of 200', or road cuts/fills greater than 3/5 feet.</li> <li>• In general any proposed activity that exceeds the limits set in the standard plan</li> </ul>	Custom Plan
<p>Harvests involving haul roads with slopes greater than 20%, skid trails with slopes greater than 25% and landings with slopes greater than 10%</p>	Custom Plan with specific BMP design as directed by the Appropriate Plan Approval Authority (the SCD)
<ul style="list-style-type: none"> <li>• Harvesting involving silvicultural activities within a SMZ</li> </ul>	Custom Plan (including SMZ issues) Or Standard Plan Plus SMZ plan

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## RELATED EROSION AND SEDIMENT CONTROL INFORMATION

### **Seven/Fourteen Day Stabilization Requirement**

COMAR provides that each erosion and sediment control plan, including those pertaining to forest harvest operations, contain language outlining site stabilization requirements. Briefly, this means that following completion of installation of all perimeter erosion and sediment controls and all cut and fill slopes steeper than 3:1 (H:V) stabilization must be accomplished within seven calendar days. For all other disturbance, stabilization must be accomplished within fourteen calendar days following completion of the activity.

### **Responsible Personnel Certification (The “Green Card”) Training**

The Annotated Code Of Maryland and COMAR require that the logger responsible for the installation and maintenance of erosion and sediment control measures complete a training course known as the Responsible Personnel Certification also called the “Green Card”. The purpose of this training is to:

- Instruct loggers in the proper implementation and maintenance of erosion and sediment control practices
- Provide for a better understanding of the necessity to control pollution of waters of the State that results from the harvest operation

(For information on obtaining this required certification, contact the Maryland Forest Service. See APPENDIX E.)

### **Delegation of Inspection and Enforcement Authority**

The State of Maryland offers each county the ability to enforce the minimum requirements of these laws and regulations within their own county system. This is referred to as delegation of enforcement authority. Some counties have increased the requirements contained in their standard plan in order to further reduce the impact of soil erosion and sedimentation on the environment from forest harvest operations. If you do not know the requirements of a particular county, contact the SCD office for that county or the local DNR Project Forester. For a list of county SCD office locations and phone numbers See APPENDIX C. Unless a county has requested and received delegation of enforcement authority, MDE has the responsibility to ensure these requirements are met.

### **Landowner Responsibility**

When a harvest is planned on private property, it is necessary to go to the local SCD office to obtain the Standard Plan or have the Custom Plan approved. Harvests on State and Federal land require plan approval by MDE. A provision of the plan requires that the landowner also agrees to follow the erosion and sediment control requirements by signing the application. Assistance in preparing plans may also be obtained from the DNR - Forest Service offices. (See APPENDIX E. Also, see APPENDIX A to view the Standard Plan content and examples of a standard and a custom plan that are based on actual plans that have been reviewed and approved.)

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## WETLAND CONSIDERATIONS

### **Nontidal Wetlands (NTW)**

The Maryland Nontidal Wetlands Protection Act and Regulations require the use of Best Management Practices (BMP) when logging in NTW. An approved erosion and sediment control plan for forest harvest operations in Maryland is required for forest harvest operations in NTW. When filing the Standard or Custom Erosion And Sediment Control Plan for a forest harvest operation in NTW, BMP must be included that will protect the wetland hydrology. The use of these BMP is necessary in the areas where soil conditions (saturated or inundated) are unable to support logging equipment without compacting or rutting the soil to the point of affecting the soil hydrology.

An applicant or a consultant must determine the presence of NTW on a site. This may be done by using county soil surveys to identify hydric soils, and consulting the Nontidal Wetlands Guidance Maps and aerial photographs. When walking the site, clues may include the observance of saturated soil conditions, drainage ways, ponded water or prevalence of wetland vegetation.

Forestry activities do not require a NTW permit from the Maryland Department of the Environment (MDE) if the land use remains as forestry. The regulations do require a person conducting forestry activities in NTW to implement BMP to protect NTW. These BMP must be incorporated into the Standard or Custom Erosion And Sediment Control Plan prepared by a Maryland Licensed Forester.

Forestry activities are the planting, cultivating, thinning, harvesting or any other activity undertaken to use the forest resources or to improve their quality or productivity. Activities that change NTW to another land use, including but not limited to agriculture or development, are not forestry activities.

### Procedure for Forestry Activities

After December 31, 1990, a person conducting a non-exempt forestry activity in a NTW shall:

1. Submit to the local Soil Conservation District (SCD) or other appropriate plan approval authority an erosion and sediment control plan for forest harvest operations (the Standard or Custom Plan) prepared by a Maryland Licensed Forester that includes BMP that comply with the regulations before beginning the harvest;
2. Request that the SCD delineate or review and approve the delineation of the extent of NTW; and
3. Comply with the requirements of the approved plan.

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## Best Management Practices

The NTW regulations state that for forest harvest and regeneration practices, BMP include but are not limited to:

1. Designing stream crossings to have the shortest distance feasible.
2. Locating roads and log decks to minimize adverse wetland impacts.
3. Harvesting with specialized equipment when NTW soils and hydrology will be adversely affected.
4. Using mats or similar temporary structures to reduce compaction or rutting.

For more detailed information regarding forest harvests in NTW, contact the MDE - Water Management Administration - Wetlands and Waterways Program. This program issues the tidal and nontidal wetland authorizations commonly needed for forest harvest projects. (See APPENDICES D, G.2 AND G.3.)

### **Nontidal Wetlands Of Special State Concern (NTWSSC)**

In Maryland, certain wetlands with rare, threatened, or endangered species or unique habitat receive special attention. The Maryland Department of the Environment (MDE) is responsible for identifying and regulating these areas that are designated as NTWSSC.

As with nontidal wetlands (NTW) not of special state concern noted above, forest harvests do not require a NTWs permit to work in NTWSSC. However, Best Management Practices (BMP) must be implemented. As part of the BMP strategy, a primary protection area may be established, in which no disturbance will occur. This protected area will be determined by a team consisting of: MDE and Department of Natural Resources staff, the Maryland Licensed Forester, and the landowner. When necessary, a secondary protection area will also be established, in which forest management practices are restricted to maintain the integrity of the primary protection area. (See APPENDIX G.2 and G.3.)

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## RELATED ISSUES

### **Waterway Construction Permits**

The best practice in planning a timber harvest is to avoid having to cross any streams. If a stream crossing is unavoidable, as of December 1, 1997, the Maryland Department of the Environment - Water Management Administration (MDE – WMA), requires a Waterway Construction Permit for all stream crossings, regardless of drainage area or stream class, unless the stream channel and its 100 year floodplain can be bridged or spanned. Therefore, a Waterway Construction Permit is required for all in stream culvert or pipe installations.

The General Waterway Construction Permit (General Permit) is a simplified permit that may apply to stream crossings for a forest harvest operation except those designated as a Wild and Scenic River by the Department of Natural Resources. If a stream crossing has been identified on the harvest site, then a General Permit is required and Best Management Practices must be applied to that crossing. This permit is in addition to the requirement to obtain an approved erosion and sediment control plan from the appropriate plan approval authority (the SCD).

Temporary construction activities must satisfy the conditions contained in COMAR 26.17.04.10. A. And B. Information concerning these permits and construction activities may be obtained by calling the MDE - WMA, Wetlands and Waterways Program. (See APPENDICES D, and G.1.)

### **County Permits**

Some counties in Maryland may not require a permit for forest harvest operations. In those counties, all that is necessary is to obtain an approved erosion and sediment control plan from the local Soil Conservation District office and any necessary stream crossing permits from the Maryland Department of the Environment - Water Management Administration. Some counties do, however, require that a county permit be obtained prior to the harvest. Procedures among the counties for obtaining this type of permit may vary and contact with the local county permitting office is necessary to determine what is needed.

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## FORESTRY PRACTICES

### Introduction

A Best Management Practice (BMP) is any method or measure used to protect and preserve water quality including, but not limited to, control of water caused erosion. This document is intended to assist foresters, landowners and timber contractors in applying erosion control methods, measures or practices while harvesting and regenerating forests in Maryland.

Water quality problems caused by forestry operations can result from any of the following:

1. Access roads and skid trails associated with timber harvest and delivery.
2. Timber harvesting in progress or recently completed.
3. Site preparation.
4. Staging areas where harvested trees and other forest products are taken for processing or loading on trucks, barges or rail cars.
5. Forest fire control.
6. Trash, debris, oils, fluids from equipment and vehicle maintenance.

Forestry Bumps in Maryland encompass six basic goals in order to protect water quality.

1. To minimize surface runoff, soil erosion and sedimentation originating from any type of forestry-related soil disturbance.
2. To maintain the integrity of all stream beds and banks.
3. To prevent deposition of logging debris in stream beds.
4. To establish and maintain Streamside Management Zones (SMZ) along waters of the State that filter sediment from overland flow thereby minimizing sediment pollution to waters of the State.
5. To provide for rapid re-vegetation of all exposed mineral soil areas through natural processes supplemented by artificial re-vegetation where necessary.
6. To prevent chemicals, pesticides, fertilizers or petroleum products from entering or degrading (directly or indirectly) streams, ground water or surface water.

### Forestry Activities – Water Quality Relationships

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## Facts About Forest Soil Erosion

In an undisturbed forest, energy is dissipated from raindrops as they hit the ground. Forest litter, organic matter and roots absorb this energy and prevent soil particles from being detached and transported to streams. An undisturbed, litter-covered forest floor and root mat serve to absorb rainfall energy that otherwise could erode the land and pollute streams. The forest floor, with a root system intact, covered by litter and forest debris is the best protection against erosion and resulting sedimentation. However, disturbance of the forest litter layer exposes mineral soil and compaction reduces infiltration. This results in an increased potential for erosion.

Because of exposed mineral soil, erosion problems arise from logging road and skid trail systems and from the removal of residual forest material during site preparation. Under these conditions, rainfall energy is not absorbed by the bare mineral soil. Research indicates that rain falling on scattered small patches of bare soil will not deliver sediment to streams unless these patches form unbroken pathways over long downhill distances. Correct silvicultural practices prevent formation of these unbroken pathways.

Anytime the intended harvest results in a disturbance to the litter covered forest floor and root mat, the natural erosion and sediment control measures are no longer adequate. The logger then is responsible for installing alternative erosion and sediment control measures (structural and / or procedural) to protect waters of the State from logging site runoff.

On logged forest land the highest erosion rates are most likely to occur on improperly located and maintained haul roads and skid trails. The expense of establishing a well designed road system pays off by providing an adequately drained road with moderate grades. Hauling time and the costs of equipment wear and repair are reduced. A well planned permanent road system enhances land value by providing easy access for recreation, fire suppression, and forestry and wildlife management activities. By increasing accessibility, the system will lower costs of future timber sales.

The first step in reducing erosion rates is informing the landowner and logger of measures that will reduce erosion and sedimentation from forestry activity. A well planned, permanent access system is a sound method of reducing erosion in areas that require frequent access.

## **Pre-Harvest Considerations**

### Definition

Pre-harvest planning is the collection of information about the area to be harvested. Use of this information can determine the best time and method used to harvest. An effective pre-harvest plan will take into consideration all aspects of a timber harvest which may lead to water quality degradation and plan for the implementation of Best Management Practices (BMP) that will minimize the adverse effects of the operation. Elements of pre-harvest planning must consider the need for obtaining all approvals and permits for the project.

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## Purpose

This exercise provides a plan prior to harvest that identifies an efficient harvest operation and maintains water quality through the use of one or a combination of BMP.

## Condition Where Practice Applies

This practice applies where forest products are to be harvested.

## Specifications

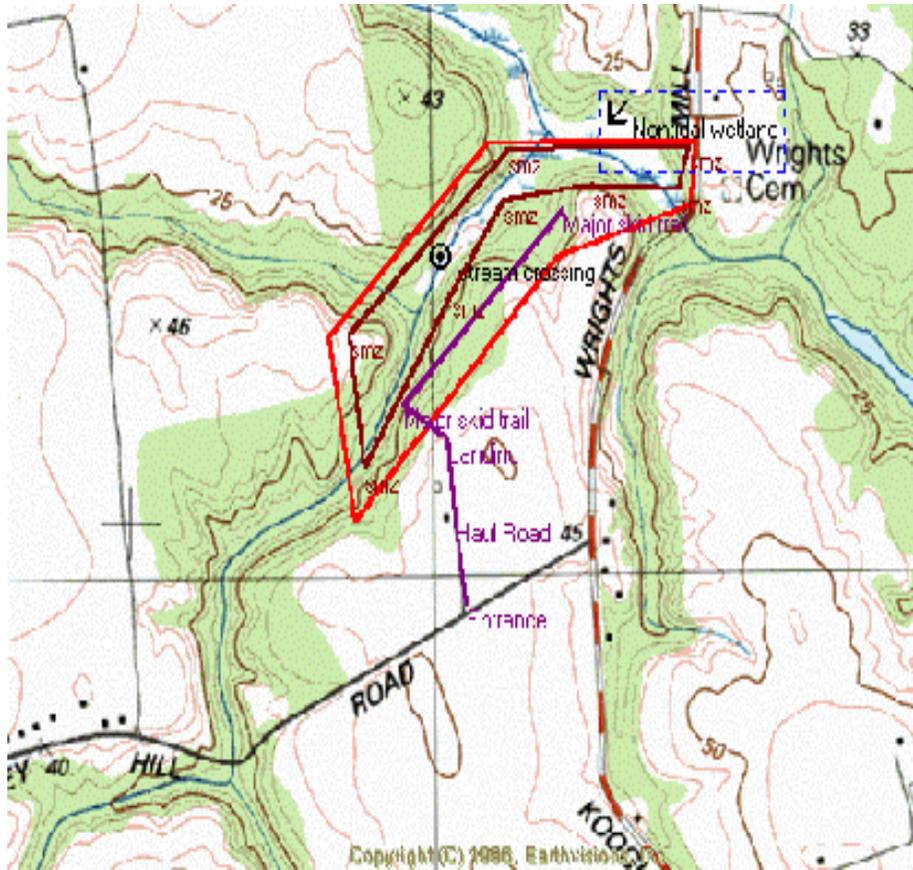
The objective of pre-harvest planning is for the forester, landowner/manager and the logger to determine, based on conditions found on the site to be harvested, which BMP are necessary to protect water quality and how those BMP will be implemented. Depending on the site and nature of the harvest, the plan should include any or all of the following: property boundaries, streams and drainages, soil restrictions, slope, environmental concerns, approximation of main haul road and skid trail locations, potential log landings, portable sawmill locations, stream or drainage crossings, and Streamside Management Zone (SMZ). Timing of harvest and timber sale contract specifications should be included.

A walk through the harvest area with a topographic map will provide the operator greater insight to existing ground conditions. A site review will aid in determining potential road location, log landings, streams and wet areas. Obtain assistance with site review and contract provisions from the Department of Natural Resources - Forest Service. (See APPENDIX E.)

In some situations, such as existing roads adjacent to streams, the best practice to control sedimentation may not be covered by the standard practices in this document. In this case, a pre-harvest plan is to be discussed with a Maryland Licensed Forester and an alternative erosion control strategy developed prior to harvest. Contact the authorized inspection agency seven working days prior to beginning harvest to schedule an on-the-ground inspection of the property.

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Diagram 1.0 – Pre-Harvest Map



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## Maryland's Erosion And Sediment Control Standards And Specifications For Forest Harvest Operations

### INTRODUCTION TO THE USE OF SPECIFICATIONS

The pages that follow contain nineteen specifications for best management practices (BMP) intended for use on forest harvest operations. Five of the specifications (cross road drainage, general waterway crossing, and temporary bridge, culvert and ford) are drawn from general construction practices and are broadly applicable to many activities including forest harvest operations. Four more (harvest entrance, straw bale dike, silt fence and re-vegetation of disturbed soil) are derived from agricultural and urban erosion and sediment control practices and the remaining ten specifications are tailored to forest harvest operations.

Regardless of the origin of these nineteen specifications, they are all well proven with long years of successful use. When conscientiously implemented and maintained they meet the intent of Maryland's erosion and sediment control program and will keep your harvest site in compliance with the approved erosion and sediment control plan.

In order to become comfortable with the use of these specifications it is necessary to understand how they fit into the overall plan approval process. Primarily, the specifications are utilized by the Maryland Licensed Forester and the staff at the local soil conservation districts (SCD). The forester selects the specifications that are appropriate for the site in question and the SCD staff confirm these choices during the plan review and approval process.

Once the plan is approved, the on-site personnel who actually conduct the harvest will use the specification (as contained on the approved plan) to assist in proper BMP construction and maintenance. The inspection staff (local or state) will use the specifications to verify proper BMP implementation and maintenance. Both the on-site personnel and the inspector are restricted to what is outlined on the approved plan. If something more is needed the forester and the SCD review staff should become involved again.

By definition, specifications contain the established criteria that define how a BMP will be used. Having these defined criteria guides the use of the BMP by on-site personnel and serves to eliminate the potential for arbitrary use of the specifications by the regulatory staff. Once a specification is selected by the forester and approved by the SCD staff, there are only the issues of implementation and maintenance left for the on-site personnel. These issues are addressed in the conditions of the standard plan or in the sequence of construction of the approved custom plan.

A sound working relationship between the on-site personnel and the inspector allows time to review the plan and to agree on how it requires that the harvest be conducted. If a difference of interpretation develops, the specification will, in most cases, clarify the situation.

Each specification is made up of components that allow the on-site personnel to tailor the

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BMP to a particular harvest site. A specification may contain references to circumstances that do not exist on your particular site. Practice and experience with the specifications will allow you quickly to become comfortable with correctly utilizing the applicable components of a specification as it relates to your site. It is your obligation to be aware of how a specification will be applied to your site. Likewise, it is your right to point out to the regulatory staff (plan reviewers or inspectors) how the required components of a specification relate to your site.

The specification for the stabilized harvest entrance provides an excellent example of how to utilize the specifications. Once the approved plan includes an entrance, the on-site personnel are obligated to implement it. The specification does however offer options that allow the on-site personnel latitude in selecting the material used to construct the entrance. The specification is designed to allow the on-site personnel to economically utilize the material on hand. The specification offers the choice of an aggregate pad (with an additional choice of stone or recycled concrete); mats (with additional choice of mat material); or wood chips (if acceptable to the appropriate plan approval authority, the SCD). Following this line of reasoning, once the type of entrance is selected there are requirements related to that choice. For instance, if the aggregate pad is selected, the stone must be two to three inches in size and laid down six inches thick over class SE geotextile.

The harvest entrance specification contains the additional contingency for maintaining existing drainage. Again, learning how to use the specification allows you to correctly disregard requirements that do not relate to your particular site. Maintenance of existing drainage is a legitimate component of the harvest entrance specification; however, if the location of your entrance does not cross a ditch you are not required to implement this aspect of the specification.

Throughout all nineteen specifications, you can find such components that are site specific. Common sense dictates whether or not a component of a specification is relevant to your site. Given the varying site conditions likely to be encountered, inclusion of a component in a specification is not by itself a sufficient basis for requiring that it be implemented.

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## SPECIFICATIONS FOR STABILIZED HARVEST ENTRANCE

### Definition

A stabilized harvest entrance provides a pad or mat and drainage protection at any point where equipment will be entering or leaving a harvest site onto a public right-of-way.

### Purpose

This practice reduces tracking of sediment onto roads and public rights-of-way and protects existing drainage patterns. Also provides a stable area for entrance into or exit from the site.

### Condition Where Practice Applies

This practice applies any place where access to a forest harvest joins a public right-of-way.

### Specifications

Each of the following practices provides acceptable stabilized entrances. Select the practice best suited to the particular harvest and availability of materials:

#### Aggregate Pad

1. Use two inch to three inch stone, or reclaimed or recycled concrete or its equivalent placed to a thickness of at least six (6) inches.
2. Geotextile Class "SE" shall be placed beneath the stone. The use of paper mill felts as underlayment may be substituted with the approval of the appropriate plan approval authority (the SCD).

#### Mats

1. Corduroy mats made from on-site material of six (6) inch minimum diameter.
2. Steel mats designed to support heavy equipment on the existing base.
3. Wooden pads or mats designed to support the equipment on the existing base. These may be constructed by cabling, nailing, or bolting together rough sawn timber that is two inch to eight inches thick. (See SPECIFICATIONS FOR LOGGING MATS.)

#### Minimum Size of Stabilized Entrances

1. Width shall be a ten (10) foot minimum, and shall be flared at existing road to provide a turning radius for any equipment using the entrance.
2. Length shall be a fifty (50) foot minimum.

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## Drainage Protection

1. Existing public road drainage shall not be blocked or damaged by access construction. Pipe culverts or a bridge shall be installed if necessary to maintain existing drainage.
2. The drainage pattern shall be restored to its original condition and stabilized upon completion of the harvest.

## Exceptions

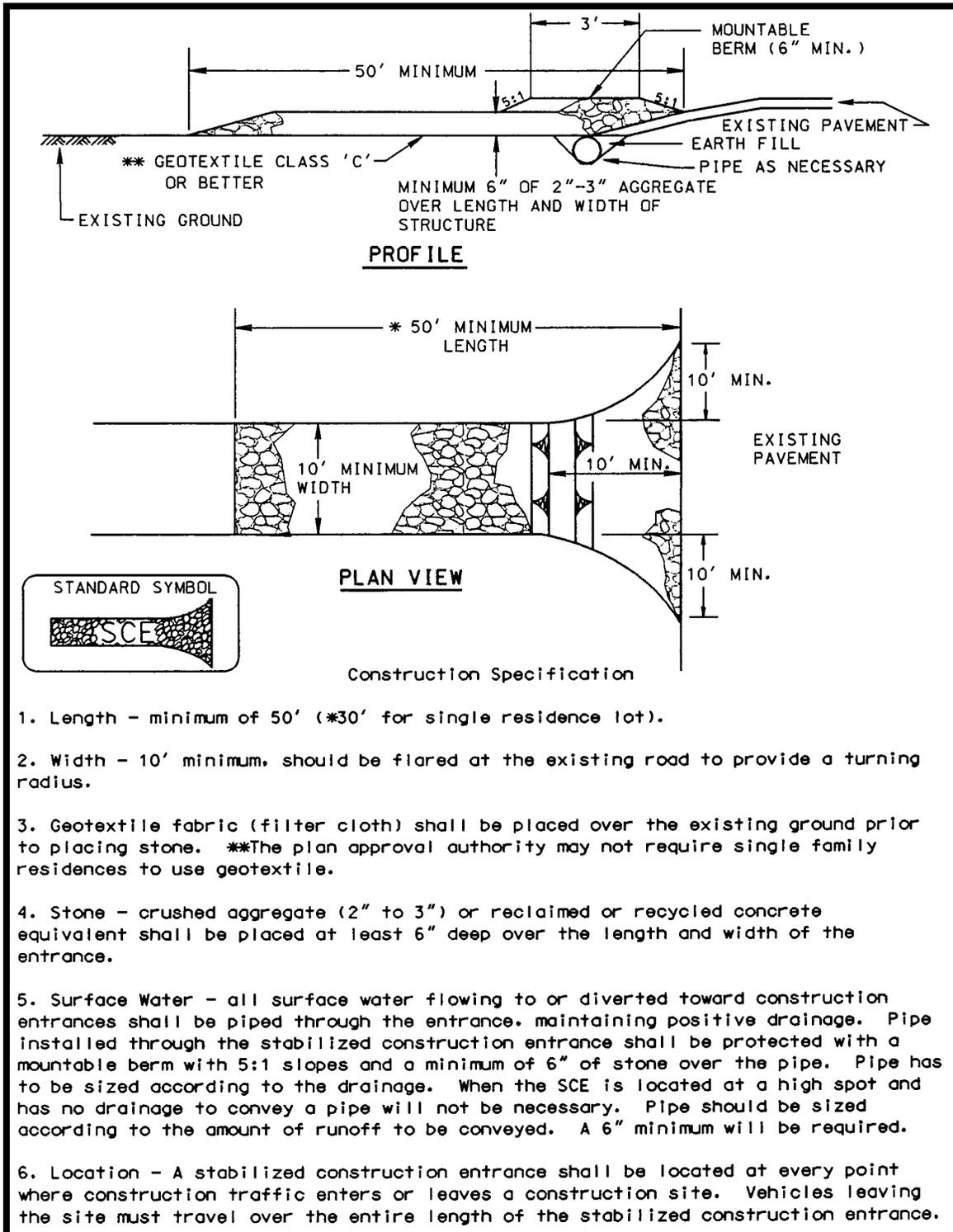
1. State and local jurisdictions may have requirements that exceed these minimum requirements for entrance to a public road. A grading or entrance permit may be required for a new entrance onto a county or State road. Obtain details from the plan approval or permitting authority.
2. Alternate materials and methods, such as wood chip entrances, may be used if they accomplish the objectives and are approved by the appropriate plan approval authority (the SCD).

## Maintenance

1. The entrance shall be maintained in a condition that will minimize tracking of sediment onto a public road. This may require periodic additional top dressing of aggregate or other material.
2. All sediment, spilled, dropped or tracked onto a public right-of-way must be removed immediately and returned to the site.
3. When necessary, truck wheels must be cleaned to remove sediment prior to exiting onto a public right-of-way.

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Diagram 2.0 – Stabilized Harvest Entrance



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## SPECIFICATIONS FOR TRUCK HAUL ROADS

### Definition

Truck haul roads are part of a road system, temporary or permanent, installed for transportation of wood products from the harvest site by truck. Usually this is an unsurfaced, single lane road with turnouts (wide spots) and is installed by grading with a bulldozer or other mechanical equipment where cuts and fills may be needed.

### Purpose

An efficient transportation system is necessary to effectively protect the forestland and water quality when removing forest products from the harvest site, developing the forest for recreation, accessing the area for forest fire suppression, or implementing other needed forest management activities. Properly located and constructed roads will provide safety, higher vehicle speeds and longer operating periods while reducing operating and maintenance costs.

### Condition Where Practice Applies

This practice applies where the area to be cut and volume per acre makes it necessary and economically feasible for an operator to install a road system.

### Specifications

1. Sound pre-harvest planning allows placement of the haul roads on the flattest ground available and avoids the problems associated with road building on extreme slopes. Roads shall follow the contour as much as possible. Normally, grades shall remain between 2% and 15%. However, grades are permitted to be as steep as 20% for distances not exceeding 200 feet. If steeper grades are necessary, practices must be approved and used to prevent concentrated water flow that causes gullies.

Water diversion by cross drainage (interception of surface water on the road) is often needed to keep excess water off the steeper grades. (See SPECIFICATIONS FOR CROSS ROAD DRAINAGE)

2. Cross intermittent or perennial streams as close to a right angle to the stream as possible, using bridges, culverts or rock fords. Structures shall be sized and placed so as not to impede fish passage or stream flow. (See SPECIFICATIONS FOR TEMPORARY STREAM CROSSINGS.).
3. Install water turnouts prior to a stream crossing to direct runoff to undisturbed areas of the Streamside Management Zone (SMZ). Road gradients approaching water crossings are changed to disperse surface water at least 25 feet from the stream. Locate roads outside of the SMZ (with the exception of stream crossings). (See SPECIFICATION FOR SMZ.) (Use of fords is only acceptable as described in the

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## Specification For Temporary Stream Crossings.)

4. Outslope the entire width of the road where road gradient and soil type will permit. Usually inslope the road toward the bank as a safety precaution on sharp turns, road gradients of 15%, and on clay, or slippery soils. Use cross road drainage on insloped or crowned roads to limit travel distance of runoff water.
5. Where roads are insloped or crowned, broad-based or rolling dips shall be placed within the first 25 feet of upgrade if gradients begin to exceed 2% for more than 200 feet.
6. Place roads on side slope to avoid level ridge tops. Avoid wet floodplain soils where drainage is difficult to establish.
7. On truck haul roads that intersect main highways, gravel, wooden mats or other means shall be used to keep mud off the highway. (See SPECIFICATIONS FOR STABILIZED HARVEST ENTRANCE.)
8. Provide a minimum width of 10 feet for a single track road. Increase width as necessary at curves and turnouts.
9. Vertical road bank cuts normally are not to exceed three (3) feet in height. This restriction on vertical road bank cuts is increased to five (5) feet in Garrett, Allegany, Washington, and Frederick counties. Any cuts that exceed these limits require special measures to ensure that the created slopes remain stable. These special measures shall be approved by the appropriate plan approval authority (the SCD).  
  
Road bank cuts more than five feet high are normally sloped to at least a 3:1 ratio, but shall in no case exceed a 2:1 ratio, and are stabilized, in accordance with the 7/14 day requirements, to prevent erosion.
10. Good road drainage shall be maintained. Ensure good road drainage with use of properly constructed and spaced turnouts, broad-based dips, rolling dips, culverts or bridges. Turnouts will be constructed so water will be dispersed and will not cut channels across the SMZ. (See SPECIFICATIONS FOR WATER TURNOUTS.)
11. For cross drains install riprap or native stone, if suitable, at the outlets of culverts or dips to dissipate velocity and to limit the disturbance.
12. If necessary to ensure that roads dry out, cut trees alongside of the road to allow sunlight to reach the wet surface. This practice is known as “daylighting”.

Maintenance

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1. Restrict traffic on roads during wet conditions. Use of wooden mats and gravel may allow operations during wet soil conditions. Haul only during dry weather on wet soils, erodible soils, or road gradients exceeding 10% that do not have erosion protection.
2. Keep roads free of obstructions, ruts, and logging debris to allow free flow of water from road surface.
3. Control the flow of water on the road surface by keeping drainage systems open at all times during logging operations.
4. Inspect the road at regular intervals to detect and correct maintenance problems.
5. When all silvicultural activities are completed, re-shape the roadbed to ensure that drainage systems are open.
6. Upon completion of the operation, depending upon slope, all haul roads with exposed soil must either be: graded or backdragged; or graded or backdragged and seeded and mulched (See SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOIL.).

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## SPECIFICATIONS FOR SKID TRAILS

### Definition

A skid trail is an unsurfaced, single lane, trail or narrow road usually narrower and sometimes steeper than a truck haul road.

### Purpose

This practice allows logs, tree lengths, or other roundwood products to be transported from the stump to a common landing or concentration area.

### Conditions Where Practice Applies

This practice is used where harvesting products requires centralization for sawing or loading on trucks or trailers and where topography and size of operation make skidding the primary and most economical means of collecting trees, logs or other roundwood products.

### Specifications

1. Locate log landings first and lay out skid trail approaches with grades 20% or less. Sound pre-harvest planning allows the location of major skid trails so as to avoid the problems associated with trail building on extreme slopes, minimize damage to the residual stand, reduce erosion and sedimentation, and provide the most economical method for skidding products.
2. Normally, gradients shall not exceed 20%. However, grades are permitted to be as steep as 25% for distances not greater than 200 feet. If steeper grades are necessary, practices must be approved and used to prevent concentrated water flow that causes gullies.
3. Typically, skid trails will be located outside the Streamside Management Zone (SMZ). If any equipment will be used in the SMZ (other than for stream crossings with an approved Waterway Construction Permit) a Custom Erosion And Sediment Control Plan or a SMZ Plan, prepared by a Maryland Licensed Forester, and approved by the appropriate plan approval authority (the SCD) will be required. Skid trails located within the SMZ shall be utilized so as to minimize disturbance to the humus layer. Skid trails located within the last 50 feet (adjacent to the body of water) shall be used only a limited number of times. Repair of damage to humus layer and stabilization shall be in accordance with the requirements set by this manual. (See SPECIFICATIONS FOR SMZ AND REVEGETATION OF DISTURBED SOILS).
4. Where crossings are needed, cross drains (culverts) are used to protect banks and water quality. Use methods such as layers of poles (corduroy) along the approach to provide temporary bank protection.

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5. Cross perennial or intermittent streams, or drainage ditches that lead to natural drainage ways with bridges or culverts of acceptable design. Use of fords is only acceptable as described in the specifications for temporary stream crossings. Logs shall not be skidded through intermittent or perennial streams. Stream crossings will require a Waterway Construction Permit. Contact Maryland Department of the Environment - Water Management Administration for permitting information (See APPENDIX D.). Bridges are the preferred method for crossing streams.
6. Approaches to water crossings shall be as near to right angles to the stream direction as possible.
7. Avoid long steep grades; climb upslope on a slant or zigzag pattern.
8. Upon completion of skidding, the areas subject to erosion shall have water bars or other cross drainage structures installed immediately (See SPECIFICATIONS FOR WATER BARS.).
9. Any exposed soil resulting from the construction of the skid trail shall be stabilized in accordance with the 7/14 day criteria. This includes cut and fill slopes steeper than 3:1 and any perimeter slopes and sediment controls (See SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOIL.)
10. Upon completion of the operation, depending upon slope, all skid trails with exposed soil must either be: graded or backdragged; or graded or backdragged and seeded and mulched (See SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOIL.)

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## SPECIFICATIONS FOR LOG DECKS AND LANDINGS

### Definition

Decks and landings are areas where logs are collected at the end of skid trails and haul roads. Also included are concentration yards near mills.

### Purpose

This practice establishes a centralized location where harvested timber products are collected for sorting and/or loading on trucks.

### Condition Where Practice Applies

This practice applies where harvest area is large enough to necessitate concentrating materials for loading.

### Specifications

1. This practice generally results in disturbance of the soil surface. Properly locate decks, landings and portable mill sites to minimize the chances of erosion or sedimentation.
2. Locate decks and portable mill sites in advance of road construction.
3. Locate portable mills and decks at least 50 feet from the upper limit of the Streamside Management Zone.
4. Sound pre-harvest planning will allow placement of landings and decks on optimal slopes and avoid the problems associated with building in extreme locations. Decks and yards must be located on reasonably level, (3 to 10 percent) well drained ground. If the site does not have any area with a slope of at least 3 percent, landings shall be located on the maximum slope of the site. If grades steeper than 10% are necessary, practices must be approved and used to prevent concentrated water flow that cause gullies.
5. Provide for adequate drainage on approach roads and trails so that surface water does not drain onto the deck area and cause ponding.
6. Provide a diversion ditch around the uphill side of decks to intercept the flow of surface water and direct it away from the deck.
7. Locate residue piles (sawdust, slabs, etc.) outside of wet weather drainages so that water from residue will not drain into adjacent streams or bodies of water.
8. Upon completion of the operation, depending upon slope, all decks, landings and

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portable mill locations with exposed soil must either be: graded or backdragged; or graded or backdragged and seeded and mulched (See SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOIL.).

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## **STREAMSIDE MANAGEMENT ZONE (SMZ)**

Two options are available to govern forest harvest operations in the streamside management zone. The first is valid statewide. The second is for use only in the lower four counties of the Eastern Shore and then only under specific conditions.

Please review the options carefully relative to the specific circumstances of you harvest and select the option best suited them.

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## **SPECIFICATIONS FOR STREAMSIDE MANAGEMENT ZONE (SMZ) – STATEWIDE**

### Definition

A streamside management zone is an area of 50 feet or more, based on steepness of adjacent slopes, on both banks of any waters of the State. The SMZ provides extra precautions when carrying out forest harvests and protects stream bank stability and water quality.

### Purpose

The purpose of the SMZ is to provide a relatively undisturbed zone to trap, settle and filter out suspended sediments before these particles reach the stream.

### Conditions Where Practice Applies

This practice applies along all waters of the State throughout Maryland.

PLEASE NOTE: If a forest harvest operation occurs in Dorchester, Somerset, Wicomico, or Worcester counties see the next specification and utilize the specification best suited to the individual circumstances of the harvest.

### Specifications

1. SMZs shall be marked and maintained on all sides of waters of the State. For the purposes of establishing the limits of the SMZ, waters of the State shall not include the 100 year floodplain and natural and manmade systems that convey stormwater runoff only in direct response to precipitation events.

Waters of the State shall typically include all perennial streams and intermittent streams. Perennial and intermittent streams are streams whose flow includes a permanent, seasonal, or temporary groundwater component (i.e. the base level of the stream is at or below the local water table). Such streams flow for days, weeks, or months after the most recent rainfall, or flow year round. Many, but not all such features are identified on United States Geological Survey 7.5 Minute Series (Topographic) maps as solid and dotted-dashed blue lines (i.e. Blue Line Streams). Any erosion and sediment control plan for a site that includes a blue line stream must provide for a SMZ on the stream.

It is possible that perennial and intermittent streams exist that are not shown as blue line streams on the topographic maps. Perennial and intermittent streams that exist on a forest harvest site but are not shown as blue line streams also must have a SMZ installed and maintained during the harvest. In cases where streams exist but are not mapped, the Maryland Licensed Forester, in conjunction with the appropriate plan

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approval authority (the SCD) must identify these streams, show them on the SMZ plan, and provided the appropriate width management zone. The topographic maps are generally accurate enough to identify the larger valleys associated with unmapped perennial and intermittent streams.

The minimum width of the zone shall be 50 feet. This applies to adjacent land with no slope; where sloping land is encountered, the SMZ width shall be established using the formula presented later in this section.

2. No new roads are permitted in the SMZ except to access a stream crossing authorized by an approved Waterway Construction Permit. If the only activity in the SMZ is the installation of an approved waterway crossing and its approaches, a SMZ plan is not required.

The appropriate plan approval authority (the SCD) may make exceptions for existing roads that are located within the SMZ. Existing roads, if serviceable and not creating a pollution problem, may be utilized if identified on the SMZ plan and approved by the appropriate plan approval authority (the SCD).

3. Skid trails are permitted within the SMZ. Skid trails within the SMZ shall be utilized so as to minimize disturbance to the humus layer. Skid trails located within the last 50 feet (adjacent to the body of water) shall be used only a limited number of times. Repair of damage to the humus layer within the SMZ and stabilization of the SMZ following the harvest shall be in accordance with the requirements set by this manual. (See SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOILS).
4. Certain activity is permitted in the SMZ if authorized by a SMZ plan designed in accordance with the following criteria:
  - a. The SMZ plan will be prepared by a Maryland Licensed Forester.
  - b. A sketch showing the location of needed erosion and sediment control measures will be provided.
  - c. Stream crossings shall be avoided where possible. When needed the crossings shall be shown on the sketch.
  - d. The sketch of the SMZ shall show any road leading to the SMZ and skid trails within the SMZ.
  - e. Damage to the humus layer will be minimized. Damage is defined as the impairment of the usefulness of the humus layer in controlling sediment laden stormwater runoff caused by the harvest operations.
  - f. Damage to the humus layer will be repaired immediately and stabilized. Damage is defined as the impairment of the usefulness of the humus layer in controlling sediment laden stormwater runoff caused by the harvest operations. Repair is defined as returning the humus layer to pre-harvest conditions.
  - g. Exposed soil within the SMZ, resulting from the harvest operation, will be stabilized with seed and mulch within 7 days of the disturbance.
  - h. Fertilizer shall not be used.

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- i. Use of logging equipment will be limited; dispersal skidding and use of low ground pressure equipment are encouraged.
  - j. SMZ plans may provide for harvesting within the last 50 feet (adjacent to the body of water). Felled timber shall be removed by cable, non-vehicular means, extended reach equipment, or by skidder using a limited number of passes. Limited number of passes is defined as ceasing the use of a skid trail before the humus layer is compacted or otherwise disturbed. The use of low ground pressure equipment is strongly encouraged.
  - k. The objective of the SMZ is to maintain an effective wooded buffer. The basal area will not be reduced below 60 square feet per acre of trees 6 inches or greater in diameter measured at 4.5 feet above the ground (diameter breast height, dbh). Where there is a sound silvicultural basis, the SMZ may be clearcut. The clearcut must be part of the SMZ plan prepared by a Maryland Licensed Forester and approved by the appropriate plan approval authority (the SCD). When a clear cut is authorized, the SMZ Plan shall specify that perimeter controls be implemented as close to the body of water as practical prior to the start of and maintained during the harvest. Acceptable perimeter control includes silt fence, straw bale dike, approved vegetated buffer of a specified width, or an earth berm. Other practices may be approved by the appropriate plan approval authority.
  - l. All harvested tree limbs and tops will be removed from the stream to prevent stream blockage. Material originating outside of the SMZ shall not be deposited within the SMZ.
  - m. Individual trees to be cut will be marked at eye level and also where the mark will remain on the stump after cutting. (This requirement does not apply to clearcut operations.)
  - n. The method of harvest to ensure sufficient regeneration will be specified in the SMZ plan.
  - o. Harvesting restrictions will be implemented during adverse weather conditions.
  - p. Trees shall be felled away from the stream banks.
5. Sawmill sites and decks shall be located outside the SMZ.
  6. Energy dissipaters such as riprap at cross drain culvert outlets or discharge points shall be installed where needed. Do not block water flow when using these structures.
  7. To intercept and properly discharge runoff waters from truck roads and skid trails leading to an SMZ, refer to individual specifications for drainage structures (See SPECIFICATIONS FOR BROAD BASED DIP, ROLLING DIP, WATER BARS, AND CROSS ROAD DRAINAGE).
  8. Stream crossings shall be constructed in accordance with the specifications provided later in this document. (See SPECIFICATIONS FOR TEMPORARY STREAM CROSSINGS AND APPENDIX G.1.)

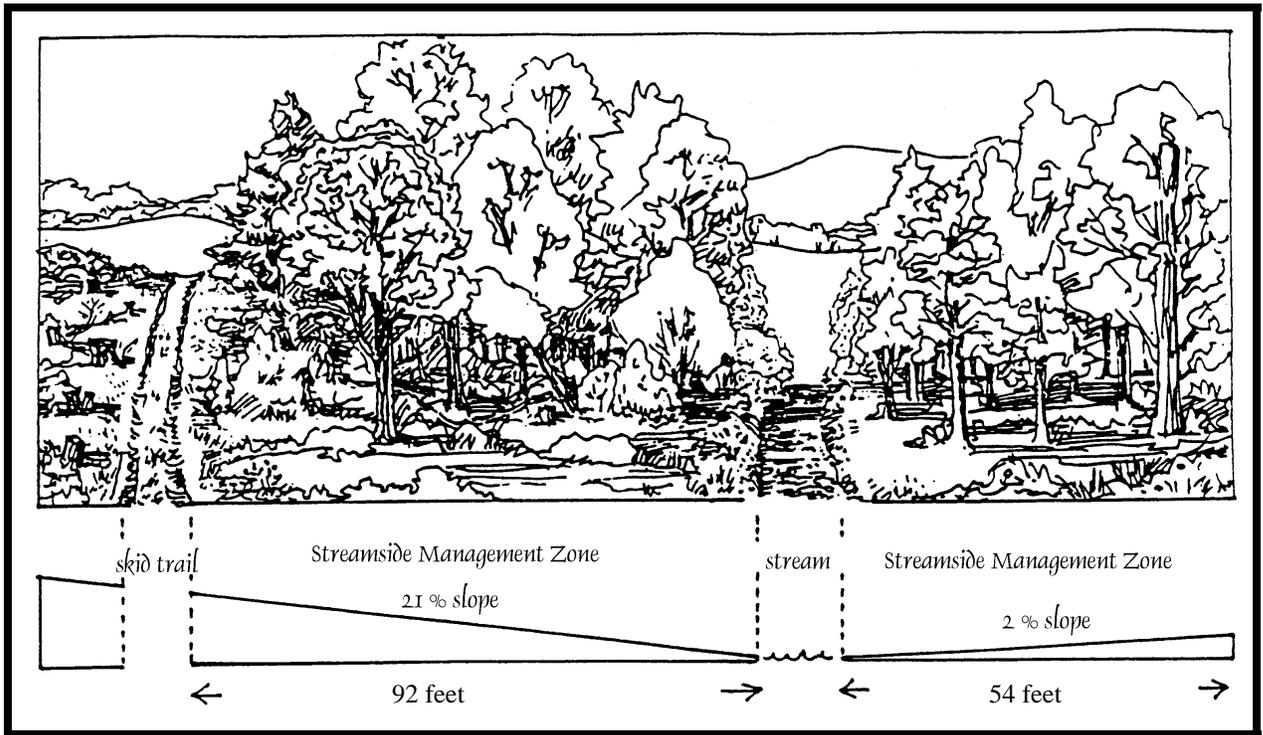
# DRAFT

9. Any proposed activity within the SMZ shall not contaminate the watercourse with sediment or any other pollutant (e.g. equipment fluids).

A recommended SMZ plan form immediately follows the diagram of the SMZ in this specification. It may be used to apply for a SMZ plan. Other formats may be required by the appropriate plan approval authority (the SCD).

# DRAFT

**Diagram 3.0 – Streamside Management Zone, Statewide**



SMZ horizontal width is measured in linear feet from the edge of the pond, lake, or stream bank to the upper limit of the zone.

The SMZ widths shall be maintained during the entire harvest operation. They are determined by the following formula established by forest researchers for effective SMZ widths:

$$50 \text{ feet} + (2 \text{ feet} \times \% \text{ slope}) = \text{SMZ width}$$

(To A Maximum Of 150 Feet)

Examples: (See diagram above)		
21% slope		2% slope
$50' + (2' \times 21\%) = 50' + 42' = 92' \text{ SMZ}$		$50 + (2' \times 2\%) = 50' + 4' = 54' \text{ SMZ}$

# DRAFT

## **SMZ Plan Form**

The form on the following page is an example of one acceptable type. Other types are permissible. Check with the appropriate plan approval authority

# DRAFT

## STREAMSIDE MANAGEMENT ZONE (SMZ) PLAN

Landowner's Name: \_\_\_\_\_

Address: \_\_\_\_\_

Location: \_\_\_\_\_

(Attach a map indicating the location of streamside management zone, waterways, planned stream crossings, roads, main skid trails, and landings)

Area in streamside management zone (SMZ): \_\_\_\_\_ acres.

Width of SMZ (each side of stream):

Range (min. – max. width) \_\_\_\_\_ feet; Average Width \_\_\_\_\_ feet.

Boundary of SMZ is marked with \_\_\_\_\_ (color) \_\_\_\_\_ (paint or flagging).

Predominant species: \_\_\_\_\_

Percent of loblolly pine \_\_\_\_\_%; Virginia pine \_\_\_\_\_%; yellow-poplar \_\_\_\_\_%.

Current stocking density (basal area):

Range (min. – max.) \_\_\_\_\_ sq. ft./acre; Average \_\_\_\_\_ sq. ft./acre.

Average stocking to be retained: \_\_\_\_\_ sq. ft./acre. (Normally > 60 sq. ft. in trees > 6" dbh.)

Trees to be harvested are marked with \_\_\_\_\_ color paint at eye level and on base.

Type of harvest within SMZ: \_\_\_\_\_

Thinning, Selection, Shelterwood, Clearcut (Clearcutting allowed if stand is >25% Loblolly or Va. Pine, or Yellow-Poplar)

Regeneration will be from: \_\_\_\_\_

Advanced reproduction, seed, sprouts, planted seedlings, or N/A

This SMZ Plan is used in conjunction with the "Standard Erosion and Sediment Control Plan" for this operation. All limitations for harvesting timber within a SMZ, as described in "Specifications for Streamside Management Zone (SMZ)", will be followed. Additional comments may be attached.

=====

Prepared by: \_\_\_\_\_

(MD Licensed Forester)                      Printed Name                      Signature                      Date

Agreed to by: \_\_\_\_\_

(Landowner)                      Printed Name                      Signature                      Date

Approved by: \_\_\_\_\_

(Soil Conservation Dist.)                      Printed Name                      Signature                      Date

# DRAFT

## **SPECIFICATIONS FOR STREAMSIDE MANAGEMENT ZONE (SMZ) – RESTRICTED TO THE LOWER EASTERN SHORE**

### Definition

A streamside management zone is an area on both banks of any waters of the State. As discussed in this specification, the zone is typically 50 to 60 feet wide. The SMZ provides extra precautions when carrying out forest harvests and protects stream bank stability and water quality.

### Purpose

The purpose of the SMZ is to provide a relatively undisturbed zone to trap, settle and filter out suspended sediments before these particles reach the stream.

### Conditions Where Practice Applies

This practice is restricted to certain waters of the State that are located in Dorchester, Somerset, Wicomico, or Worcester counties.

PLEASE NOTE: If a forest harvest operation occurs in any other county there may be different SMZ requirements. See the previous specification and utilize the specification that is appropriate to the individual circumstances and location of the harvest.

### Specifications

1. SMZs shall be marked and maintained on all sides of waters of the State. For the purposes of establishing the limits of the SMZ under this specification, waters of the State shall not include the 100 year floodplain, man-made ditches created and managed under a public drainage association, or natural and man-made systems that convey stormwater runoff only in direct response to precipitation events. Other man-made ditches (see definition in the Glossary) may, under specific circumstances, be granted a variance from the requirement for a SMZ. In order to protect water quality, any such man-made ditch that is granted a variance from the SMZ requirement shall have erosion and sediment control measures installed prior to and maintained during the harvest. The variance and associated erosion and sediment control measures shall be approved by the appropriate plan approval authority (the SCD).

Waters of the State shall typically include all perennial streams and intermittent streams, unless otherwise explicitly granted a variance and approved by the appropriate plan approval authority (the SCD). Perennial and intermittent streams are streams whose flow includes a permanent, seasonal, or temporary groundwater component (i.e. the base level of the stream is at or below the local water table). Such streams flow for days, weeks, or months after the most recent rainfall, or flow year round. Many, but not all such features are identified on United States Geological Survey 7.5 Minute Series

# DRAFT

(Topographic) maps as solid and dotted-dashed blue lines (i.e. Blue Line Streams). Any erosion and sediment control plan for a site that includes a blue line stream must provide for a SMZ on the stream unless explicitly granted a variance in accordance with this specification. Certain blue line streams shown on the topo maps may in fact be Public Drainage Association ditches and consequently are not subject to SMZ requirements.

It is possible that perennial and intermittent streams exist but are not mapped. In cases where such streams exist but are not mapped, the Maryland Licensed Forester, in conjunction with the appropriate plan approval authority (the SCD) must identify these streams. The topographic maps are generally accurate enough to identify the larger valleys associated with these unmapped streams. Once identified these streams must be either:

- Documented as meeting the criteria for a variance from the SMZ requirement, or
- Provided with a SMZ of the appropriate width.

Areas adjacent to waters of the State determined not to require a SMZ, in accordance with this specification, shall be identified on the standard erosion and sediment control plan or custom erosion and sediment control.

The minimum width of the zone shall be 50 feet. This applies to land with no slope; where sloping land is encountered, the SMZ width shall be established using the formula presented later in this section.

2. No new roads are permitted in the SMZ except to access a stream crossing authorized by an approved Waterway Construction Permit. If the only activity in the SMZ is the installation of an approved waterway crossing and its approaches, a SMZ plan is not required.

The appropriate plan approval authority (the SCD) may make exceptions for existing roads that are located within the SMZ. Existing roads, if serviceable and not creating a pollution problem, may be utilized if identified on the SMZ plan and approved by the appropriate plan approval authority (the SCD)

3. Skid trails are permitted within the SMZ. Skid trails within the SMZ shall be utilized so as to minimize disturbance to the humus layer. Skid trails located within the last 50 feet (adjacent to the body of water) shall be used only a limited number of times. Repair of damage to the humus layer within the SMZ and stabilization of the SMZ following the harvest shall be in accordance with the requirements set by this manual. (See SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOILS).
4. Certain activity is permitted in the SMZ if authorized by a SMZ plan designed in accordance with the following criteria:
  - a. The SMZ plan will be prepared by a Maryland Licensed Forester.
  - b. A sketch showing the location of needed erosion and sediment control measures will be provided.

# DRAFT

- c. Stream crossings shall be avoided where possible. When needed the crossings shall be shown on the sketch.
- d. The sketch of the SMZ shall show any road leading to the SMZ and skid trails within the SMZ.
- e. Damage to the humus layer will be minimized. Damage is defined as the impairment of the usefulness of the humus layer in controlling sediment laden stormwater runoff caused by the harvest operations.
- f. Damage to the humus layer will be repaired immediately and stabilized. Damage is defined as the impairment of the usefulness of the humus layer in controlling sediment laden stormwater runoff caused by the harvest operations. Repair is defined as returning the humus layer to pre-harvest conditions.
- g. Exposed soil within the SMZ, resulting from the harvest operation, will be stabilized with seed and mulch within 7 days of the disturbance.
- h. Fertilizer shall not be used.
- i. Use of logging equipment will be limited; dispersal skidding and use of low ground pressure equipment are encouraged.
- j. SMZ plans may provide for harvesting within the last 50 feet (adjacent to the body of water). Felled timber shall be removed by cable, non-vehicular means, extended reach equipment, or by skidder using a limited number of passes. Limited number of passes is defined as ceasing the use of a skid trail before the humus layer is compacted or otherwise disturbed. The use of low ground pressure equipment is strongly encouraged.
- k. The objective of the SMZ is to maintain an effective wooded buffer. The basal area will not be reduced below 60 square feet per acre of trees 6 inches or greater in diameter measured at 4.5 feet above the ground (diameter breast height, dbh). Where there is a sound silvicultural basis, the SMZ may be clearcut. The clearcut must be part of the SMZ plan prepared by a Maryland Licensed Forester and approved by the appropriate plan approval authority (the SCD). When a clear cut is authorized, the SMZ Plan shall specify that perimeter controls be implemented as close to the body of water as practical prior to the start of and maintained during the harvest. Acceptable perimeter control includes silt fence, straw bale dike, approved vegetative buffer of a specified width, or an earth berm. Other practices may be approved by the appropriate plan approval authority.
- l. All harvested tree limbs and tops will be removed from the stream to prevent stream blockage. Material originating outside of the SMZ shall not be deposited within the SMZ.
- m. Individual trees to be cut will be marked at eye level and also where the mark will remain on the stump after cutting. (This requirement does not apply to clearcut operations.)
- n. The method of harvest to ensure sufficient regeneration will be specified in the SMZ plan.
- o. Harvesting restrictions will be implemented during adverse weather conditions.

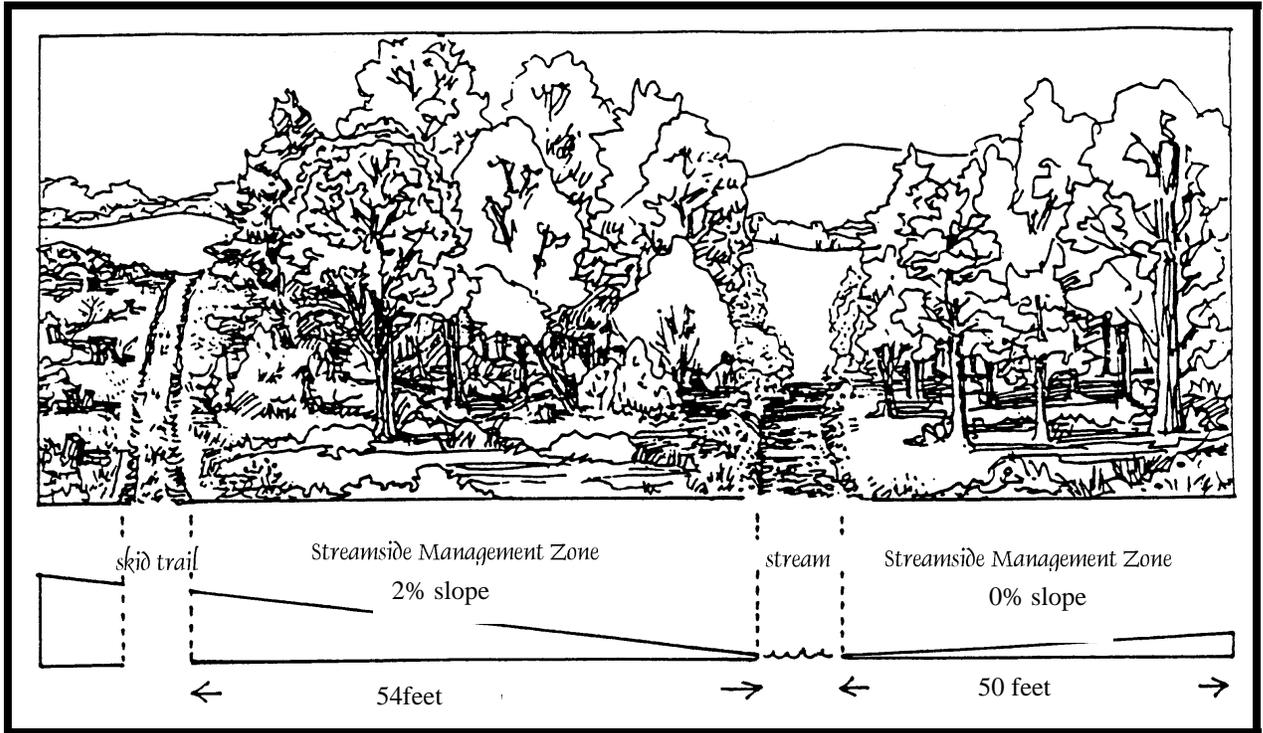
# DRAFT

- p. Trees shall be felled away from the stream banks.
- 5. Sawmill sites and decks shall be located outside the SMZ.
- 6. Energy dissipaters such as riprap at cross drain culvert outlets or discharge points shall be installed where needed. Do not block water flow when using these structures.
- 7. To intercept and properly discharge runoff waters from truck roads and skid trails leading to an SMZ, refer to individual specifications for drainage structures (See SPECIFICATIONS FOR BROAD BASED DIP, ROLLING DIP, WATER BARS, AND CROSS ROAD DRAINAGE).
- 8. Stream crossings shall be constructed in accordance with the specifications provided later in this document. (See SPECIFICATIONS FOR TEMPORARY STREAM CROSSINGS AND APPENDIX G.1.)
- 9. Any proposed activity within the SMZ shall not contaminate the watercourse with sediment or any other pollutant (e.g. equipment fluids).

A recommended SMZ plan form immediately follows the diagram of the SMZ in this specification. It may be used to apply for a SMZ plan. Other formats may be required by the appropriate plan approval authority (the SCD).

# DRAFT

**Diagram 4.0 – Streamside Management Zone, Restricted To Lower Eastern Shore**



SMZ horizontal width is measured in linear feet from the edge of the pond, lake, or stream bank to the upper limit of the zone.

The SMZ widths shall be maintained during the entire harvest operation. They are determined by the following formula established by forest researchers for effective SMZ widths:

$$50 \text{ feet} + (2 \text{ feet} \times \% \text{ slope}) = \text{SMZ width}$$

(To A Maximum Of 150 Feet)

Examples: (See diagram above)		
2% slope		0% slope
$50' + (2' \times 2\%) = 50' + 2' = 54' \text{ SMZ}$		$50 + (2' \times 0\%) = 50' + 0' = 50' \text{ SMZ}$

# DRAFT

## **SMZ Plan Form**

The form on the following page is an example of one acceptable type. Other types are permissible. Check with the appropriate plan approval authority

# DRAFT

## STREAMSIDE MANAGEMENT ZONE (SMZ) PLAN

Landowner's Name: \_\_\_\_\_

Address: \_\_\_\_\_

Location: \_\_\_\_\_

(Attach a map indicating the location of streamside management zone, waterways, planned stream crossings, roads, main skid trails, and landings)

Area in streamside management zone (SMZ): \_\_\_\_\_ acres.

Width of SMZ (each side of stream):

Range (min. – max. width) \_\_\_\_\_ feet; Average Width \_\_\_\_\_ feet.

Boundary of SMZ is marked with \_\_\_\_\_ (color) \_\_\_\_\_ (paint or flagging).

Predominant species: \_\_\_\_\_

Percent of loblolly pine \_\_\_\_\_%; Virginia pine \_\_\_\_\_%; yellow-poplar \_\_\_\_\_%.

Current stocking density (basal area):

Range (min. – max.) \_\_\_\_\_ sq. ft./acre; Average \_\_\_\_\_ sq. ft./acre.

Average stocking to be retained: \_\_\_\_\_ sq. ft./acre. (Normally > 60 sq. ft. in trees > 6" dbh.)

Trees to be harvested are marked with \_\_\_\_\_ color paint at eye level and on base.

Type of harvest within SMZ: \_\_\_\_\_

Thinning, Selection, Shelterwood, Clearcut (Clearcutting allowed if stand is >25% Loblolly or Va. Pine, or Yellow-Poplar)

Regeneration will be from: \_\_\_\_\_

Advanced reproduction, seed, sprouts, planted seedlings, or N/A

This SMZ Plan is used in conjunction with the "Standard Erosion and Sediment Control Plan" for this operation. All limitations for harvesting timber within a SMZ, as described in "Specifications for Streamside Management Zone (SMZ)", will be followed. Additional comments may be attached.

=====

Prepared by: \_\_\_\_\_  
(MD Licensed Forester)                      Printed Name                      Signature                      Date

Agreed to by: \_\_\_\_\_  
(Landowner)                                      Printed Name                      Signature                      Date

Approved by: \_\_\_\_\_  
(Soil Conservation Dist.)                      Printed Name                      Signature                      Date

# DRAFT

## SPECIFICATIONS FOR BROAD-BASED DIP

### Definition

This structure is a dip and reverse slope in a road surface with an out slope in the dip for natural cross drainage.

### Purpose

This practice provides cross drainage on insloped truck roads. This prevents buildup of excessive surface runoff and subsequent erosion.

### Conditions Where Practice Applies

This practice applies where truck haul roads and heavily used skid trails have a gradient of 10% or less. This practice is not for use for cross draining spring seeps, or intermittent or perennial streams.

Broad-based dips are very effective in gathering surface water and directing it safely off the road. Dips are placed across the road in the direction of water flow. This type of structure allows normal truck speeds without adding stress to the vehicle.

### Specifications

1. Installation takes place following basic clearing and grading for roadbed construction.
2. Begin construction by locating the discharge point; usually a low point in the road grade.
3. Compact the area and cover the dip with 3 inches of #2 stone (nominal dimension 2 inches) for conveyance of stormwater runoff and roadbed protection. The stone is not necessary if the roadbed is composed of shale or bedrock.
4. Place stone at the discharge point of water being channeled from the road surface.
5. All side cast material shall be stabilized with seed and mulch.
6. A 20-foot long, 3% reverse grade is constructed into the existing roadbed by cutting from upgrade of the dip location.
7. The cross drain outslope will be 3% maximum.
8. To reduce water velocity use an energy dissipater such as riprap or in most cases, a level area at the outfall of the dip where the water can spread.

# DRAFT

9. Spacing of broad-based dips will be determined by the following formula:

$$\text{Spacing} = 400' / \text{Slope \%} + 100' \text{ (Note: Refer to spacing table.)}$$

For example:  $400 \text{ ft.} / 8\% + 100' = 50 \text{ ft.} + 100 \text{ ft.} = 150 \text{ ft.}$  apart  
Or see Table 2.

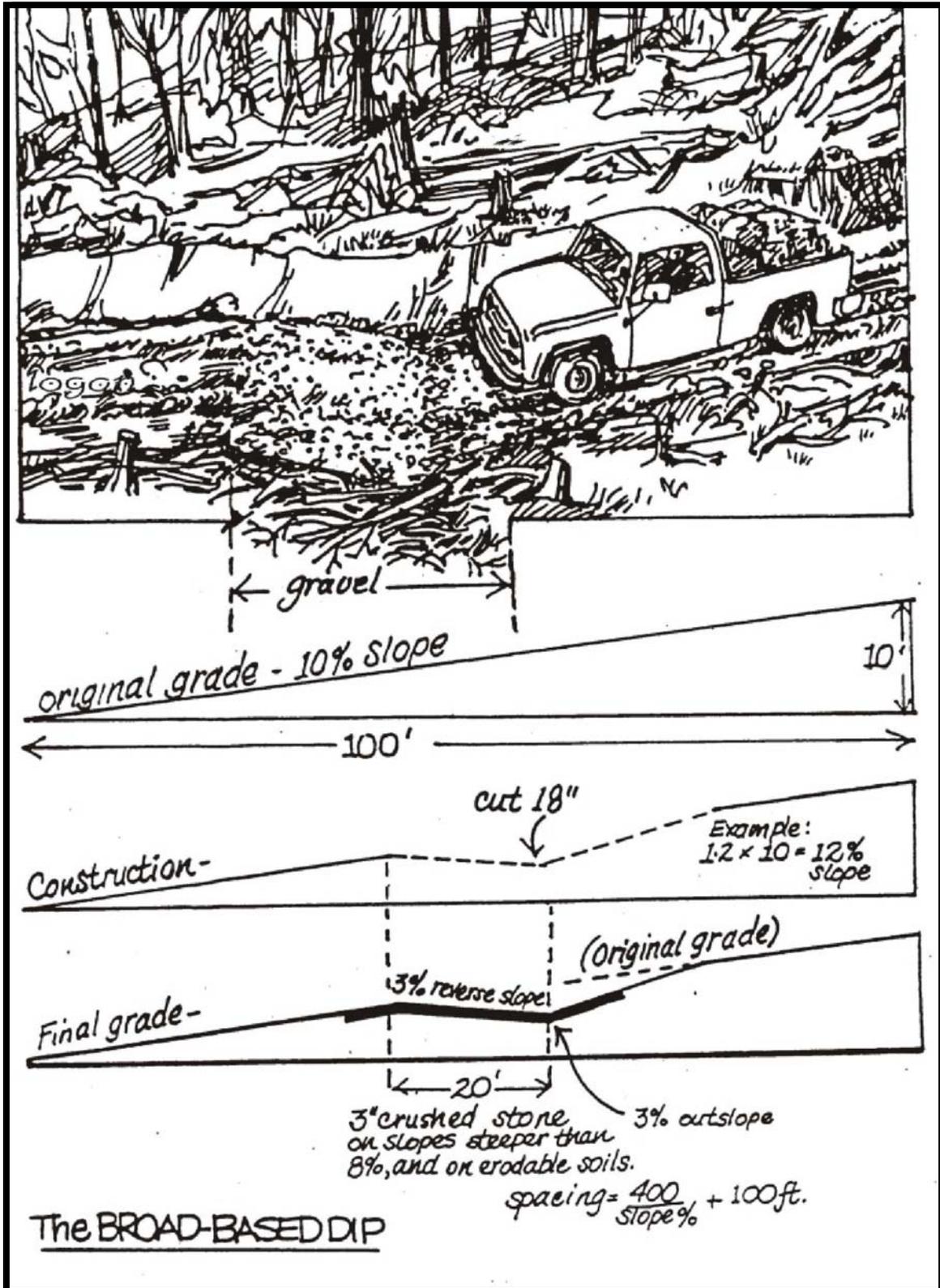
Table 2 – Broad Based Dip Spacing vs. Road Grade

Road Grade (Percent)	Spacing Between Dips (feet)
2	300
3	235
4	200
5	180
6	165
7	155
8	150
9	145
10	140
12	135

An inherent problem in construction of a broad-based dip is recognizing that the roadbed consists of two planes rather than one unbroken plane. One plane is the 20-foot reverse grade toward the uphill road portion and outlet. Another plane is the grade from the top of a hump or start of a downgrade to the outlet of the dip. Neither the dip nor the hump is to have a sharp, angular break but is to be rounded to allow a smooth flow of traffic. These dips do not damage loaded trucks, or slow vehicle speed. Dips require minimal annual maintenance and continue to function years after abandonment. Only the dip is outsloped to provide sufficient break in grade to turn the water.

# DRAFT

Diagram 5.0 – Broad-based Dip



# DRAFT

## SPECIFICATIONS FOR ROLLING DIP

### Definition

This structure is a dip and reverse slope in a road surface with an outslope in the dip for natural cross drainage. This structure is to be used on roads that are too steep for broad-based dips.

### Purpose

This practice provides cross drainage on insloped truck roads. This prevents excessive surface runoff and subsequent erosion.

### Conditions Where Practice Applies

This practice applies where truck haul roads and heavily used skid trails have a gradient of 15% or less. This practice is not for use for cross draining spring seeps, or intermittent or perennial streams.

### Specifications

1. Installation takes place following basic clearing and grading for roadbed construction on skid trails.
2. A 10-foot to 15-foot long, 3% to 8% reverse grade is constructed into the existing roadbed by cutting from upgrade to the dip location and using cut material to build up the mound for the reverse grade.
3. Spacing of rolling dips will be determined by the following formula:

Spacing of broad-based dips will be determined by the following formula:

$$\text{Spacing} = 400' / \text{Slope \%} + 100' \text{ (Note: Refer to spacing table.)}$$

$$\text{For example: } 400 \text{ ft.} / 8\% + 100' = 50 \text{ ft.} + 100 \text{ ft.} = 150 \text{ ft. apart}$$

Or see Table 3.

Table 3 – Rolling Dip Spacing vs. Road Grade

Grade of Road (Percent)	Distance Between Rolling Dips (feet)
2 – 5	180
5 – 10	150
10 – 15	135

# DRAFT

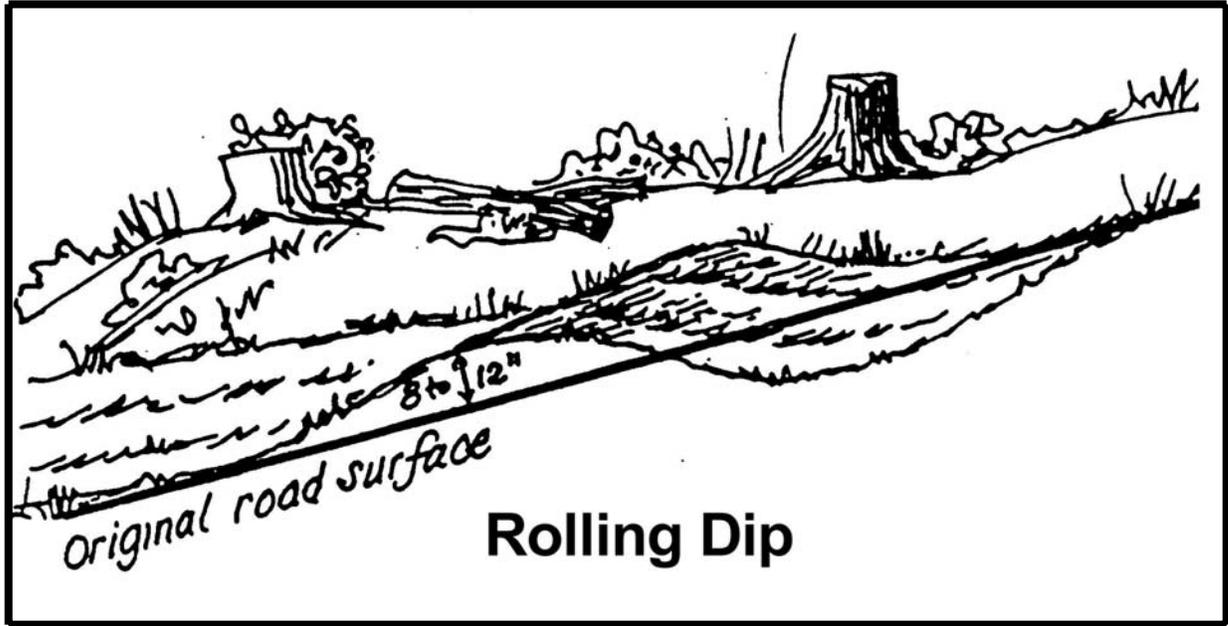
15 +

|

120

# DRAFT

Diagram 6.0 – Rolling Dip



# DRAFT

## SPECIFICATIONS FOR WATER BARS

### Definition

A water bar is a post-harvest trench and berm constructed across a road or trail. On sandy soils, the trench is usually reinforced with a pole. This structure can also be called a water break.

### Purpose

This is a post-harvest practice. It is used to intercept and divert side-ditch and surface runoff from roads or trails that will not have vehicular traffic. This practice is used to minimize erosion and provide conditions suitable for natural or artificial re-vegetation.

### Conditions Where Practice Applies

This is a practice for use on road or trail grades where surface water runoff causes erosion of the exposed soil. Use only where there will not be any vehicular traffic. If there is a potential for vehicular traffic, use rolling dips.

### Specifications

1. Determine proper spacing between water bars using the following formula:

$$1000 \div (\% \text{ grade} + 2.5) = \text{water bar spacing}$$

Table 4 – Water Bar Spacing vs. Road Grade

Grade of Road (%)	Approximate Distance Between Water Bars (ft)
2	230
5	135
10	80
15	60
20+	45

2. Water bars are to be at an angle of 30 to 45 degrees downslope to turn surface water off the road or trail.
3. Excavate a trench 3 to 4 inches below the surface of the road or trail with a 1 foot berm on the downhill side of the trench. Use spoil materials to develop the bar height.
4. The uphill end of the bar shall extend beyond the side ditch line of the road and tie into

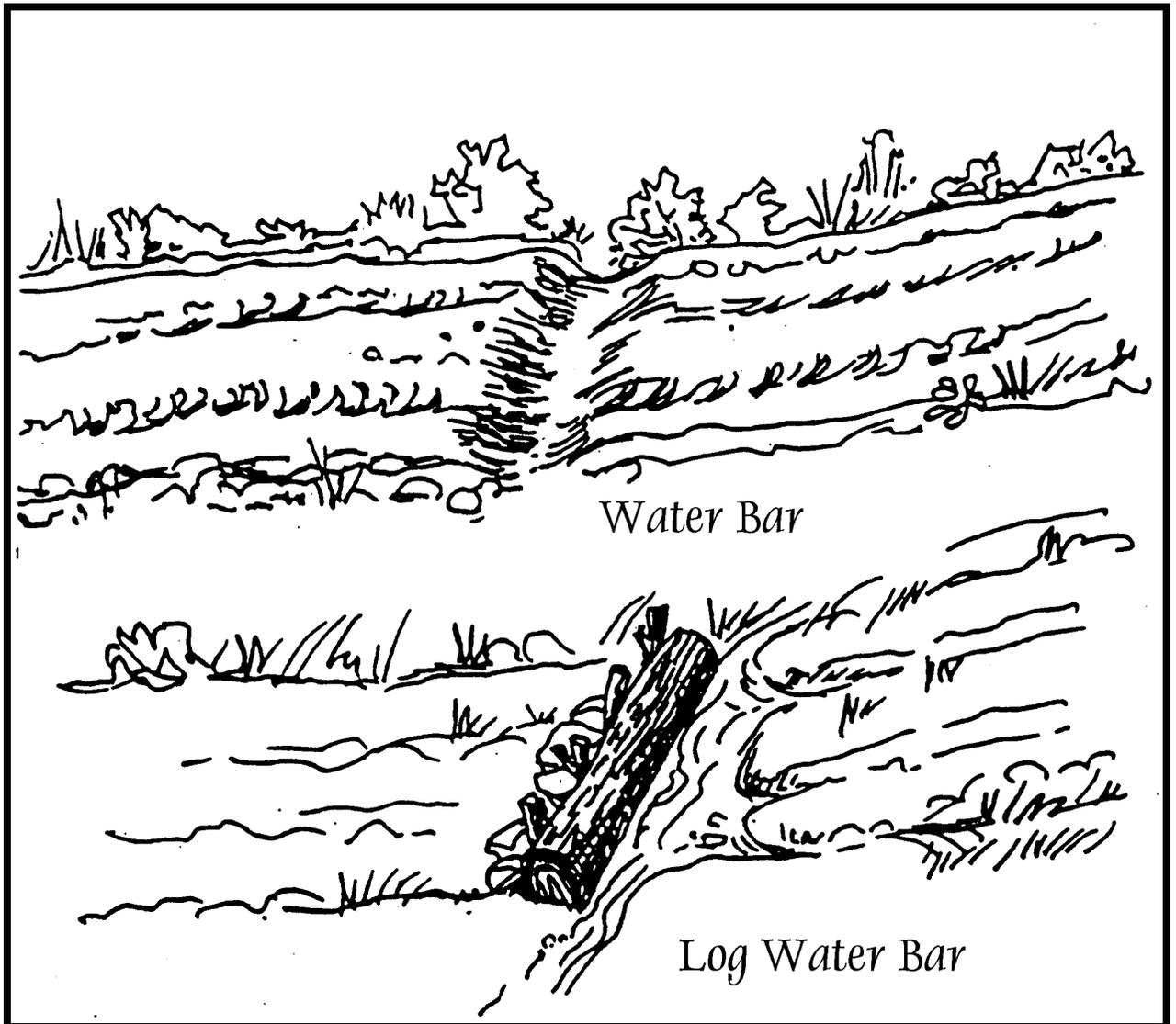
# DRAFT

the bank to fully intercept any ditch flows.

5. The outflow end of the bar is to be fully opened and extend far enough beyond the edge of the road or trail to safely disperse runoff water onto the undisturbed forest floor.
6. On sandy soils, a five to eight inch diameter pole shall be placed in the full length of the trench. This pole shall be pegged and covered with soil on the downslope side.
7. Ensure that the outlet is open and consider the need for energy dissipating water spreaders at or below drain outlet on sensitive areas.
8. Upon completion of the operation, exposed soil resulting from the creation of water bars must be seeded and mulched in accordance with the stabilization requirements for a haul road or skid trail. (See SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOIL)

# DRAFT

Diagram 7.0 – Water Bars



# DRAFT

## SPECIFICATIONS FOR WATER TURNOUTS

### Definition

A water turnout, or diversion ditch, is a structure installed to move water away from the road and/or side ditch.

### Purpose

This practice collects and directs road surface runoff from one side of the road away from the road and into undisturbed areas.

### Conditions Where Practice Applies

This practice applies to any road or trail section where water could accumulate. The water shall be diverted into undisturbed areas so the volume and velocity is reduced on slopes.

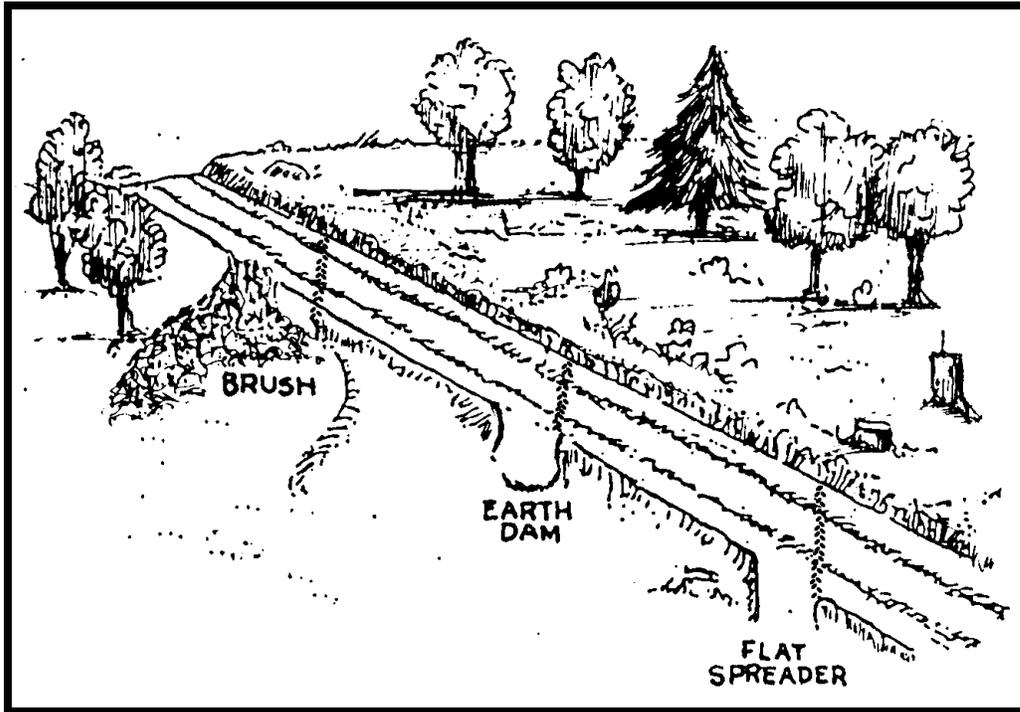
### Specifications

1. The turnout shall intersect the ditch line at an equal depth and be outsloped 1 to 3 percent.
2. On sloping roads, the turnout shall be 30 degrees to 45 degrees downslope.
3. Turnouts shall be spaced to allow the roadbed to dry out and reduce the volume and velocity of side ditch waters.
4. Runoff water shall be spread at the outlet of the turnout.
5. Turnouts shall not feed directly into adjacent drainages or channels.

A buildup of drainage water in roadside ditches can gnaw at roadbeds, scour the road ditch itself, and transport soil particles downslope. Water turnouts will channel the water away from these roadside ditches and disperse it in areas adjacent to the road.

# DRAFT

Diagram 8.0 – Water Turnouts



# DRAFT

## SPECIFICATIONS FOR CROSS ROAD DRAINAGE

### Definition

This structure consists of corrugated metal pipe, wooden open top culvert, or other suitable material installed under truck haul roads or major skid trails to convey stormwater runoff and seeps from the roadside ditch to the adjacent forest floor.

### Purpose

This practice collects and transmits water flows safely from side ditches or seeps under haul roads and skid trails without eroding drainage systems or road surfaces. These structures are to be used to control stormwater only and normally will be dry. If working with continuous flows, See SPECIFICATIONS FOR TEMPORARY STREAM CROSSINGS.

### Conditions Where Practice Applies

Use culverts for any size operation where cross drainage of stormwater is needed for truck haul roads or major skid trails. In some cases, a temporary culvert is necessary for drainage crossing a smaller skid trail. Inspect permanent installations for obstructions prior to the close of a timber sale.

### Specifications

#### Pipe Culvert

1. Pipe length shall be long enough so both ends extend at least one foot beyond the side slope of fill material.
2. A culvert shall be placed on a 2 percent to 4 percent grade to prevent clogging.
3. Installation shall be skewed 30 degrees to 45 degrees downgrade.
4. Where erosion occurs either upstream or downstream of the culvert, erosion protection shall be provided. This protection shall be in the form of riprap, filter cloth, soil stabilization matting, large stone, etc.
5. Culverts shall be firmly anchored and earth compacted at least halfway up the side of the pipe to prevent water from leaking around it. A minimum of half the culvert diameter (but not less than one foot) of fill shall be placed above the culvert. Erosion protection measures shall be employed on any earthen fill.

# DRAFT

## Open-Top Box Culvert

1. Open top box culverts shall not be used for handling intermittent or live streams or skid trail cross drainage.
2. Box culvert shall be installed flush or just below road surface and skewed at an angle of 30 degrees to 45 degrees downgrade.
3. Upper end shall be at grade with the side ditch and the lower side extended into the toe of upslope bank.
4. Outfall shall extend beyond the road surface with adequate riprap or other material to dissipate water velocity and to assure no erosion of fill material.
5. Cleanout maintenance is necessary to remove sediments, gravel and logging debris and allow normal flow of runoff water through the structure at all times.

## Cross Road Drainage Spacing

Spacing = 400 ft. / Slope % + 100 ft. (Note: refer to broad-based dip spacing table.)

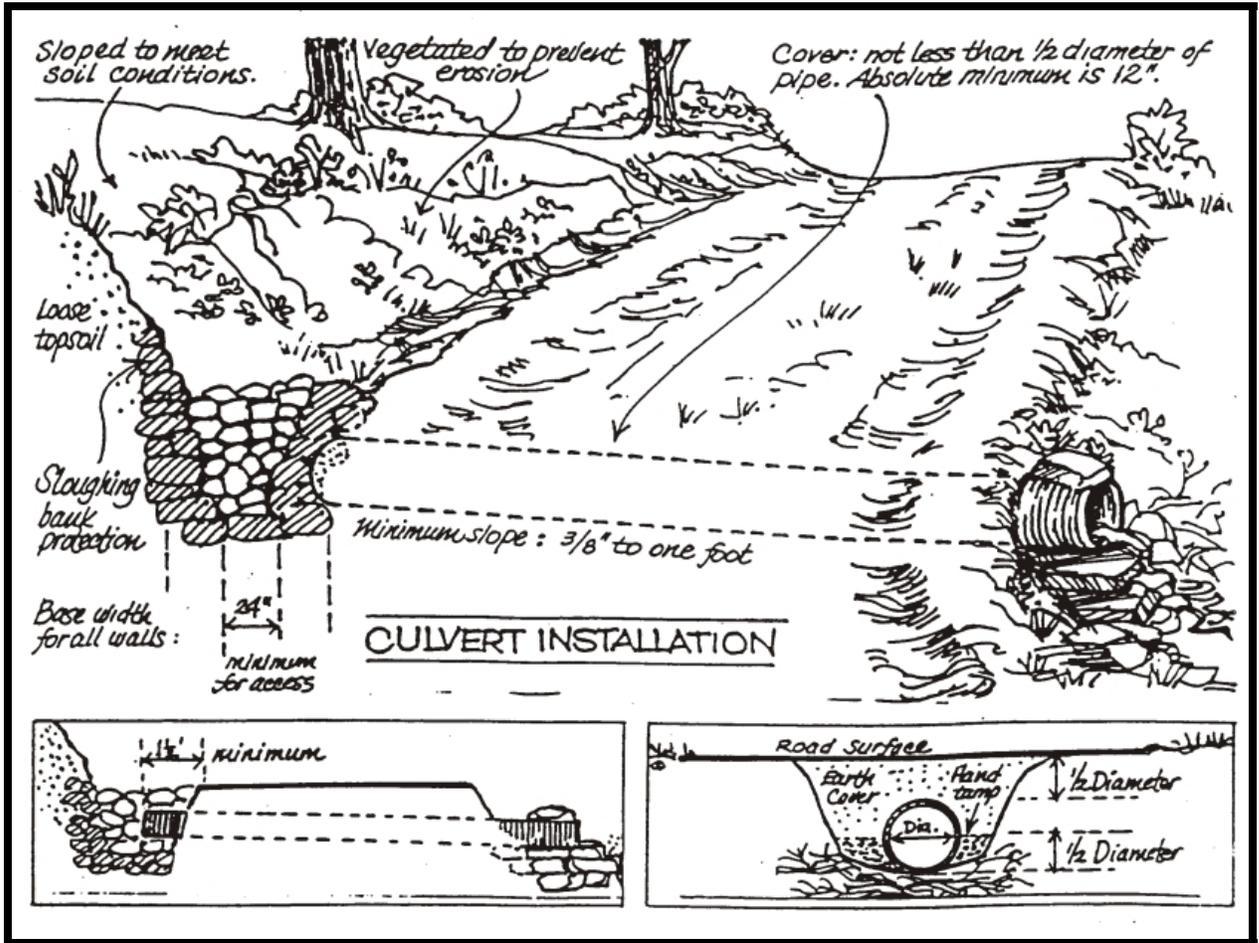
For example: 400 ft. / 8% + 100 ft. = 50 ft. + 100 ft. = 150 ft. apart

Table 5 – Cross Road Drainage vs. Road Grade

Grade Of Road %	Approximate Distance Between Structures
2	300
3	235
4	200
5	180
6	165
7	155
8	150
9	145
10	140
12	135

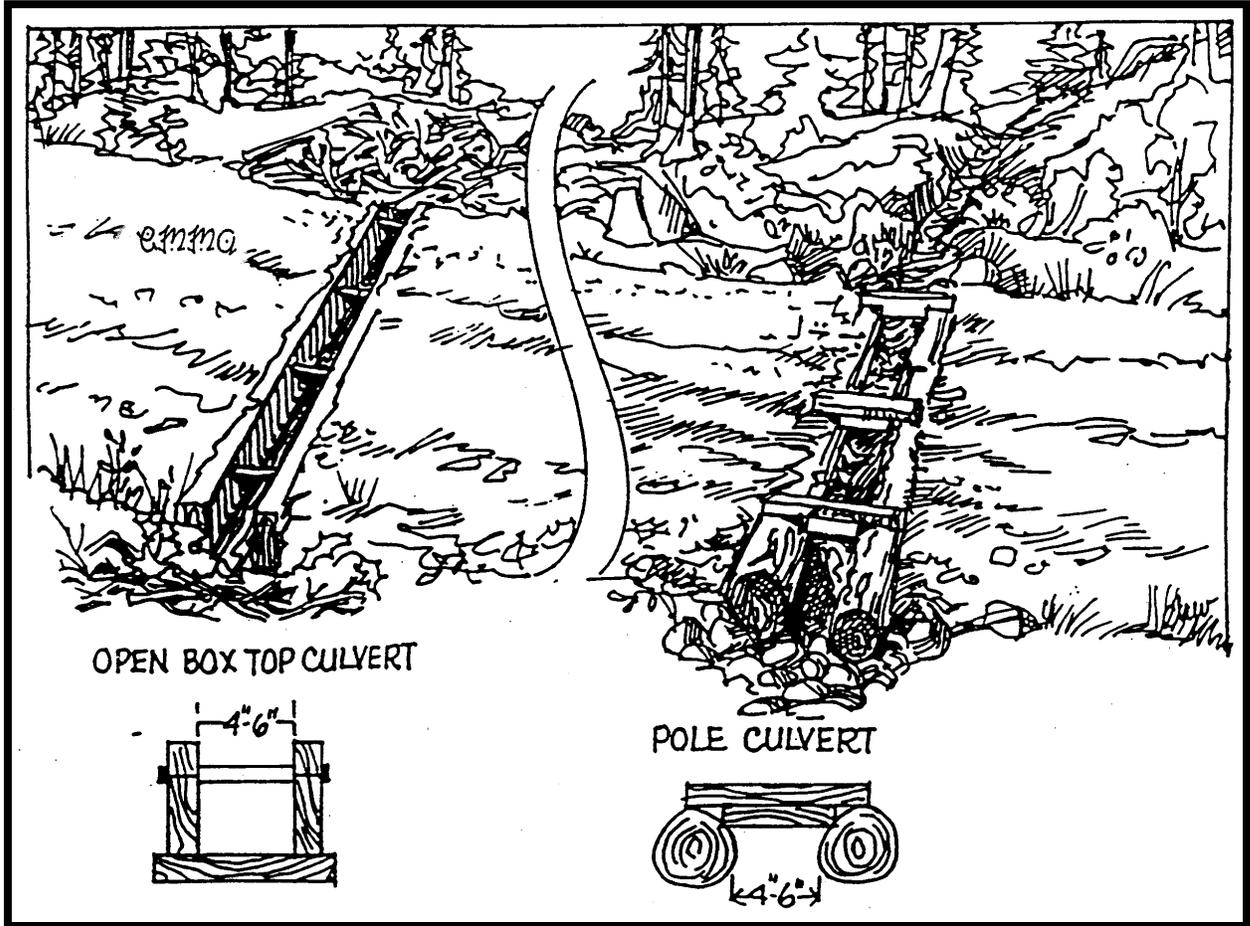
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Diagram 9.0 – Pipe Culvert Installation



# DRAFT

Diagram 9.1 – Open Top Box And Pole Culverts



# **DRAFT**

## **TEMPORARY WATERWAY CROSSINGS**

**GENERAL REQUIREMENTS**

**BRIDGE**

**CULVERT**

**FORD**

# DRAFT

## **SPECIFICATIONS FOR TEMPORARY WATERWAY CROSSINGS – GENERAL REQUIREMENTS**

### Definitions

A temporary access waterway crossing is a structure placed across a waterway to provide access for harvest purposes for a period of less than one year. Temporary access crossings shall not be utilized to maintain traffic for the general public.

### Purpose

The purpose of the temporary access waterway crossing is to provide safe, pollution free access across a waterway for harvest equipment by establishing minimum specifications for the design, construction, maintenance, and removal of the structure. Temporary access waterway crossings are necessary to prevent equipment from damaging the waterway, blocking fish migration, and tracking sediment and other pollutants into the waterway. Sound pre-harvest planning will allow crossings to be in service for the shortest practical period of time and removed as soon as their function is completed.

### Condition Where Practice Applies

Any temporary access crossing shall conform to the technical requirements of these specifications as well as any specific requirements imposed by the MDE WMA Wetlands And Waterways Program permit (SEE APPENDICES D and G.1). The following specifications for temporary access waterway crossings are applicable in non-tidal waterways. The principle consideration for development of these specifications is concern for soil erosion and sediment control. Structural integrity and safety must also be considered when designing temporary access waterway crossings to withstand expected loads. The three types of temporary access waterway crossings are bridges, culverts, and fords.

### General Specifications

1. In-stream excavation shall be limited to only that necessary to allow installation and removal of the practices as presented below and in the individual practice sections.
2. The construction of any specific crossing practice shall not cause a significant water level difference between the upstream and downstream water surface elevations. The order of preference for use of the individual practices is the bridge first (spanning the entire stream including its floodplain), next is the single pipe or pipe bundle culvert and the least preferred measure is the rock ford. Other practices are possible but shall be approved by the appropriate plan approval authority on a case by case basis.
3. The temporary waterway crossing shall be at right angles to the stream.

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4. The centerline of both roadway approaches shall coincide with the crossing alignment centerline for a minimum distance of 50 feet from each bank of the waterway being crossed. If physical or right of way restraints preclude the 50 foot minimum, a shorter distance may be provided. All fill materials associated with the roadway approach shall be limited to a maximum height of 2 feet above the existing floodplain elevation. To the extent possible, the work on the approaches primarily within the floodplain shall be limited to grading to keep the road close to the existing grades.
5. A water diverting structure shall be constructed across the roadway on both roadway approaches at a 50 foot maximum on either side of the waterway crossing. This will prevent roadway surface runoff from directly entering the waterway. The 50 feet is measured from the top of the waterway bank. SEE SPECIFICATIONS FOR WATER TURNOUTS.
6. All crossings shall have one traffic lane. The minimum width shall be 12 feet with a maximum width of 20 feet.
7. Materials:
  - a. There shall be no earth or soil materials used for construction within the waterway channel. State Highway Administration coarse aggregate designation Number 5, (¾ to 4 inches) also referenced as AASHTO designation Number 1, shall be the minimum acceptable aggregate size for temporary crossings. Larger aggregates will be allowed.
  - b. Geotextile fabric is used to distribute the load, retain fines, allow increased drainage of aggregate, and reduce mixing of the aggregate with the sub grade soil.

## Considerations For Choosing A Specific Practice

1. Select a standard design practice that will least disrupt the existing terrain of the stream reach. Consider the effort that will be required to restore the area after the temporary crossing is removed.
2. Locate the temporary crossing where there will be the least disruption to the soils of the existing waterway banks. When possible locate the crossing at a point receiving minimal runoff.
3. The physical constraints of the site may preclude the selection of certain standard practices.
4. The time of the year may preclude the selection of certain standard practices due to fish spawning or migration restrictions.
5. Vehicular loads, traffic patterns, and frequency of crossings should be considered in choosing a specific practice.
6. The standard practices will require varying amounts of maintenance. The bridge should

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require the least maintenance, whereas the culverts and ford will probably require more intensive maintenance.

7. Ease of removal and subsequent damage to the waterway should be primary factors in considering the choice of a standard practice.

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## **SPECIFICATIONS FOR TEMPORARY ACCESS WATERWAY CROSSING – BRIDGE**

A temporary access bridge is a structure made of wood, metal, or other materials that provides access across an intermittent or perennial stream.

### Considerations

1. This is the preferred practice for temporary access waterway crossings. Normally bridge construction causes the least disturbance to the waterway bed and banks when compared to the other access waterway crossings. Disturbance to the stream banks shall be kept to a minimum.
2. Most bridges can be quickly removed and reused.
3. Temporary access bridges pose the least chance for interference with fish migration and may eliminate the need for additional permits.

### Specifications

1. Construction, use, or removal of a temporary access bridge will not normally have any time of the year restrictions since construction, use, or removal should not affect the stream or its banks unless built with piers(s) in the water.
2. A temporary bridge structure shall be constructed at or above the bank elevation to prevent trapping floating materials and debris.
3. Abutments shall be placed parallel to and on stable banks.
4. Bridges shall be constructed to span the entire channel. If the channel width exceeds 8 feet, as measured from top of bank to top of bank, then a footing, pier, or bridge support may be constructed within the waterway. One additional footing, pier, or bridge support will be permitted for each additional 8 foot width of the channel. However, no footing, pier, or bridge support will be permitted within the channel for waterways less than 8 feet wide.
5. Stringers shall be sawn timber, pre-stressed concrete beams, metal beams, or other approved materials.
6. Decking materials shall be of sufficient strength to support the anticipated load. All decking members shall be placed perpendicular to the stringers, butted tightly, and securely fastened to the stringers. Decking materials must be butted tightly to prevent any soil material that has been tracked onto the bridge from falling into the waterway below.

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7. Run-planking (optional) shall be securely fastened to the length of the span. One run-plank shall be provided for each track of the equipment wheels. Although run-planks are optional they may be necessary to properly distribute loads.
8. Curbs or fenders shall be installed along the outer sides of the deck to prevent tracked sediments from falling over the edge of the bridge.
9. Bridges shall be securely anchored at only one end using steel cable or chain. Anchoring at only one end will prevent channel obstruction in the event that floodwaters float the bridge. Acceptable anchors are large trees, large boulders or driven steel anchors. Anchoring shall be sufficient to prevent the bridge from floating downstream.
10. All areas disturbed during installation shall be stabilized within 7 calendar days of the disturbance.

## Bridge Maintenance Requirements

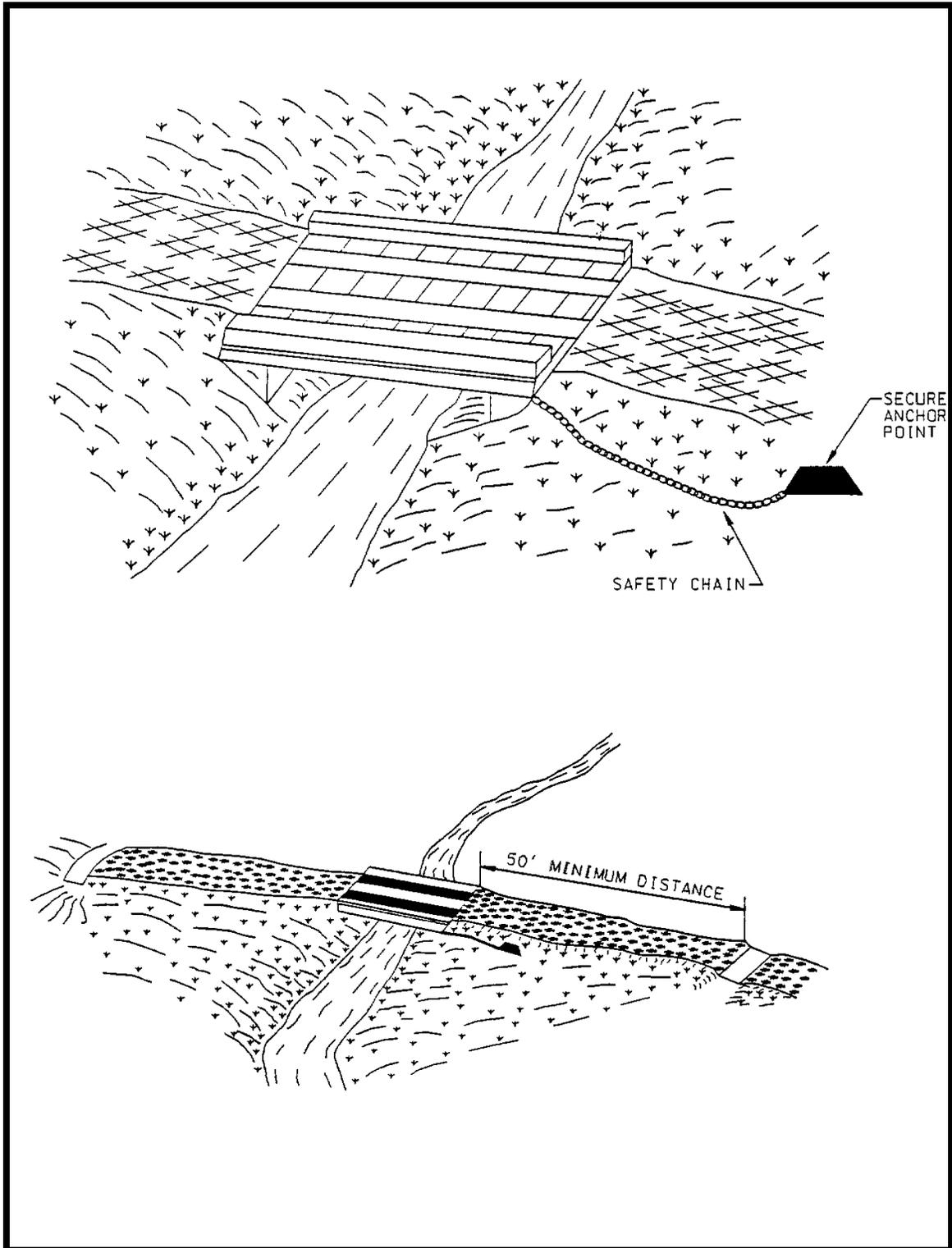
1. Periodic inspection shall be performed by the user to ensure that the bridge, streambed, and stream banks are maintained and not damaged.
2. Maintenance shall be performed as needed to ensure that the structure complies with these specifications. This shall include removal and disposal of any tracked sediment or trapped debris. Sediment shall be disposed of outside of the floodplain and stabilized.

## Bridge Removal And Cleanup Requirements

1. When the temporary bridge is no longer needed all structures including abutments and other bridging materials shall be removed.
2. Final cleanup shall consist of removal of the temporary bridge from the waterway, protection of banks from erosion, and removal of all construction materials. All removed materials shall be stored outside the waterway floodplain.
3. Removal of the bridge and clean up of the area shall be accomplished without construction equipment working in the waterway channel.
4. All areas disturbed during removal shall be stabilized within 7 calendar days of that disturbance.

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Diagram 10.0 – Temporary Access Bridge



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## Diagram 10.1 – Temporary Access Bridge Construction Specifications

### Construction Specifications

1. Restriction - Construction, use, or removal of a temporary access bridge will not normally have any time of year restrictions since construction, use, or removal should not affect the stream or its banks, unless the bridge is built with a pier(s) in the water.
2. Bridge Placement - A temporary bridge structure shall be constructed at or above the bank elevation to prevent the entrapment of floating materials and debris.
3. Abutments - Abutments shall be placed parallel to, and on, stable banks.
4. Bridge Span - Bridges shall be constructed to span the entire channel. If the channel width exceeds 8 feet, (as measured from top-of-bank to top-of-bank), then a footing, pier, or bridge support may be constructed within the waterway. One additional footing, pier, or bridge support will be permitted for each additional 8 foot width of the channel. However, no footing, pier, or bridge support will be permitted within the channel for waterways less than 8 feet wide.
5. Stringers - Stringers shall either be logs, sawn timber, prestressed concrete beams, metal beams, or other approved materials.
6. Deck Material - Decking materials shall be of sufficient strength to support the anticipated load. All decking members shall be placed perpendicular to the stringers, butted tightly, and securely fastened to the stringers. Decking materials must be butted tightly to prevent any soil material tracked onto the bridge from falling into the waterway below.
7. Run Planks (optional) - Run planking shall be securely fastened to the length of the span. One run plank shall be provided for each track of the equipment wheels. Although run planks are optional, they may be necessary to properly distribute loads.
8. Curbs or fenders - Curbs or fenders may be installed along the outer sides of the deck. Curbs or fenders are an option which will provide additional safety.

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## Diagram 10.2 – Temporary Access Bridge Construction Specifications Continued

9. Bridge Anchors - Bridges shall be securely anchored at only one end using steel cable or chain. Anchoring at only one end will prevent channel obstruction in the event that floodwaters float the bridge. Acceptable anchors are large trees, large boulders, or driven steel anchors. Anchoring shall be sufficient to prevent the bridge from floating downstream and possibly causing an obstruction to the flow.

10. Stabilization - All areas disturbed during installation shall be stabilized within 14 calendar days of the disturbance in accordance with the Standard for "Critical Areas Stabilization With Permanent Seeding."

## Diagram 10.3 – Portable Skidder Timber Bridge Design

WIT-02-0061

### A Portable Skidder Timber Bridge Design



The USDA Forest Service San Dimas Technology and Development Center (SDTDC) and the Wood In Transportation (WIT) Program have developed a portable/temporary skidder bridge to cross drainages for field harvesting equipment. Its length is 16 feet, and width is 12 feet. It is constructed using three 4-foot-wide preconstructed laminated panels. The exterior panels have 8-inch wide by 8-inch high curbs making the travelway width 10 feet 8 inches. The bridge is designed to carry a 27,000-pound axle load, which equates to a Caterpillar 525 Skidder with an 8,000-pound grapple load. One major goal of this project was to design a lightweight easy to install bridge that would aid in minimizing erosion and sedimentation at stream crossings.

The panels are preassembled, and field equipment, such as a skidder can be used to install the bridge. The bridge rests on 4-inch by 8-inch sills. Each sill has guide plates to secure the panels in place.

Acceptable species and grades are shown in table 1. Any species of wood may be used providing its unfactored bending strength is at least 875 pounds per square inch. SDTDC evaluated bolted panels, but the panels can be glued or nail laminated (see note 1).

This bridge is structurally adequate for 3- or 5-axle log trucks. However, due to its narrow width, minimal curb system, and large live load deflection, log truck traffic should be limited to occasional trucks operating at low speeds.

Dynamic effects caused by rough approaches, or bumps at the ends of bridges, can significantly increase wear and damage to bridges. Approaches to bridges should be initially graded and maintained at a relatively smooth and level surface.

This project was completed by: James R. Bassel, Project Leader, USDA Forest Service, San Dimas, CA  
Merv Eriksson, Structural Engineer, USDA Forest Service, Missoula, MT

For additional information, visit the Wood In Transportation website at [www.fs.fed.us/na/wit](http://www.fs.fed.us/na/wit), or call the National Wood In Transportation Information Center at (304) 285-1591.



USDA Forest Service



San Dimas Technology  
and Development Center



Wood In Transportation

Diagram 10.4 – Portable Skidder Timber Bridge Design Material List

FIELD EVALUATION

The Homochitto National Forest in Mississippi evaluated this design. The Forest used red oak common to the area. The bridge has been used on three different sales and has carried more than a million board feet of timber. The Forest was pleased that the drainages were not disturbed, and the contractor was able to save time by traveling over the drainages rather than around them.

Two men assembled the bridge panels in two days. Installation of the bridge panels at the site takes two men 30 minutes using standard field equipment.

Approximate Material Cost:

Wood	\$1,500.00
Hardware	150.00
Total	\$1,650.00

Forest Contact:

Lee Dunnan  
National Forests in Mississippi  
Homochitto Ranger District  
Rt. 1, Box 1  
Meadville, MS 39652  
(601) 384-5876

SKIDDER BRIDGE MATERIAL LIST  
For Three Bolted 4-foot Panels using 4-inch by 8-inch Timbers

Timber

Note: The design requires a bridge depth of 8 inches. Any width timbers that have that depth can be used (e.g., 2-in by 8-in, 3-in by 8-in, etc.). SDTDC used 4-inch by 8-inch timbers. Exterior laminations must be 4 inches thick due to countersinking.

- 40 4-in by 8-in by 16 feet rough sawn timber (see Table 1)
- 2 4-in by 8-in by 12 feet rough sawn timber for sills (can use 16 feet length)

Hardware for 4-foot panels

- 24 3/4-inch by 4-foot rods with threads, 6 inches each end
- 48 3/4-inch nuts (heavy hexagon)
- 48 3/4-inch malleable iron washers

Hardware for curbs

- 8 3/4-inch by 18-inch bolts
- 8 3/4-inch nuts (heavy hexagon)
- 16 3/4-inch malleable iron washers

Hardware for sill

- 12 3/4-inch by 10-inch lag bolts
- 12 3/4-inch malleable iron washers

Total Materials for Skidder Bridge

- 42 4-in by 8-in by 16 feet rough sawn timber (using 16 feet for sills)
- 24 3/4-inch by 4-foot rods with threads, 6 inches each end
- 8 3/4-inch by 18-inch bolts
- 56 3/4-inch nuts (heavy hexagon)
- 76 5/8-inch malleable iron washers
- 12 3/4-inch by 10-inch lag bolt

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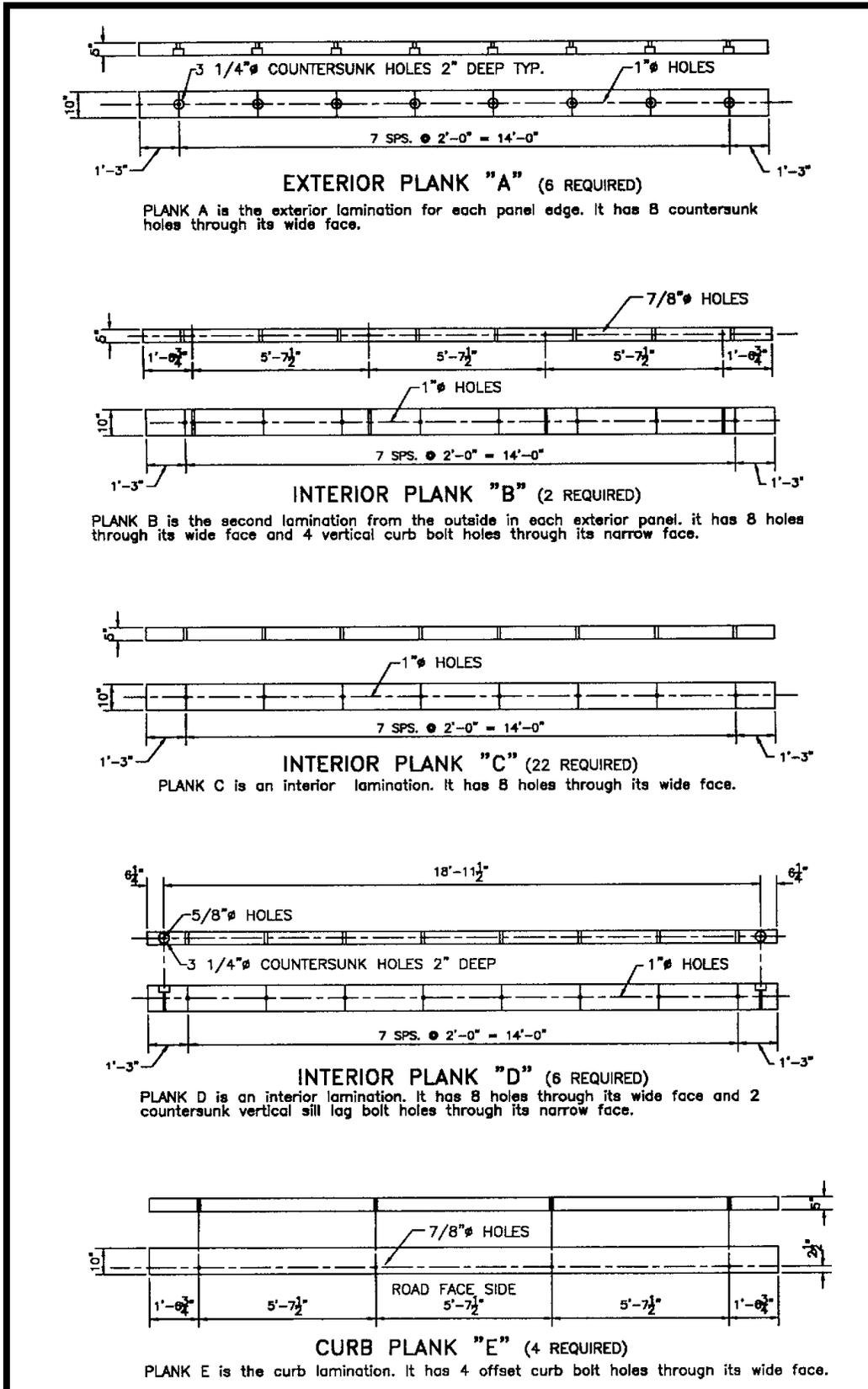
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September 2001



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Diagram 10.6 – Portable Skidder Timber Bridge Design Sections



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## Diagram 10.7 – Portable Skidder Timber Bridge Design Notes

### SKIDDER BRIDGE NOTES:

1. **BRIDGE PANELS:** Three panels, 48 inches wide shall be fabricated from 4-inch thick by 8-inch wide laminations. Exterior panels shall have 8-inch wide by 8-inch high guide curbs as shown. The panels are shown bolted together.

The panels can also be glued laminated or nail laminated. If glued laminated, the panels shall be fabricated in conformance with AASHTO M168 and ANSI/AITC A190.1 and shall be manufactured to an Industrial appearance using wet-use adhesives.

If nail laminated, each lamination shall be nailed using 10-inch deformed shank bridge spikes having a minimum shank diameter of 3/8" in pre-drilled 1/4" diameter holes. The spikes shall be spaced at 12 inches and staggered at 2 inches from the top and bottom of the planks.

2. **WOOD SPECIES AND GRADES :** Any species of wood may be used providing its tabulated, or unadjusted, allowable bending stress is not less than 875 pounds per square inch. Examples of acceptable species and grades are shown in Table 1. Expected use and expected life span should be considered when selecting a species. High volumes of skidded timber may require a hard, high-density species.

3. **PRESERVATIVES:** If the panels are to be used more than 1 or 2 years the timber should be pressure treated with an approved preservative. The timber shall be treated in conformance with AWPA C14 (soil contact) and the Best Management Practices for the Using Treated Wood in Aquatic and Wetland Environments. Insofar as is practical, all lumber shall be cut, drilled, and completely fabricated prior to pressure treatment.

4. **DESIGN LOADS:** These bridges are designed to carry a 27,000-pound skidder axle load. This skidder load corresponds to a Cat 525 with an 8,000-pound grapple load. The bridge will also support an AASHTO Type 3 Truck (3-axle dump truck), an AASHTO Type 3-S2 Truck (5-axle logging truck), an AASHTO HS 20 Truck (highway load vehicle), or a track mounted vehicle having a load, per track, of up to 1,300 pounds per lineal foot. The bridge is designed assuming exclusively the exterior panels carry all wheel and track loads. Larger skidder or track mounted vehicle loads, or overweight trucks, will require redesigned panels or shorter spans.

5. **DESIGN LIMITATIONS:** Although the bridge is structurally adequate for standard highway 3- or 5-axle trucks, because of the narrow width, minimal height curb system, and large live load deflections; truck traffic should be limited to occasional trucks operating at low speeds (10 miles per hour or less).

6. **DYNAMIC LOADING:** Dynamic effects caused by rough approaches, or bumps at the ends of the bridge can significantly increase live loading, resulting in excessive wear and damage to the bridge. Approaches to bridges should be graded, and maintained as a level-riding surface.

7. **HARDWARE:** Malleable iron washers shall be used under all nuts and bolt heads unless the bolts are timber or dome head. Bolts and lag bolts shall comply with the requirements of ANSI/ASME Standard B18.2.1-1981, Grade 2. Any other steel components shall comply with ASTM A36.

8. **INSTALLATION AND REMOVAL:** Bridge panels may be prefabricated or assembled in place. Panels should be placed on, and attached to, the leveling sills as shown. Foundations should be leveled and compacted as necessary to provide a solid bearing surface for the leveling sill. Timber members and panels should be stored and handled so as not to damage the material. If damage does occur, exposed untreated wood should be field treated in accordance with AASHTO M 133.

TABLE 1

SPECIES GROUPS	VISUALGRADE*	EXT. PANEL WEIGHT (Lbs)**
Cottonwood	Select Structural	1,750
Doug Fir/Larch	No. 2	2,200-2,350
Hemlock/Fir	No. 1	1,500-2,150
Red Maple	No. 1	2,450
Southern Pine	No. 2	2,300-2,600
Spruce/Pine/Fir	No. 1	1,750-2,050
Western Woods	Select Structural	1,750-2,350

\* Lumber must be graded.

\*\* Weights assume creosote treatment and 20% moisture content. Weights vary in multiple species groups

These plans are intended for informational purposes only and must be verified by a registered professional engineer prior to construction.

SKIDDER BRIDGE		
Designed By: <i>[Signature]</i>	Date: 2/9/2001	DRAWING NO.
Approved By: .	Date: .	SHEET 2 OF 2

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## **SPECIFICATIONS FOR TEMPORARY ACCESS WATERWAY CROSSING – CULVERT**

A temporary access culvert is a structure consisting of a section of circular pipe, pipe arches, or oval pipes of reinforced concrete, corrugated metal or structural plate that is used to convey flowing water through the crossing.

### Considerations

1. Temporary culverts are used where:
  - a. The channel is too wide for normal bridge construction, or
  - b. Anticipated loading may prove unsafe for single span bridges.
2. This temporary waterway crossing practice is normally preferred over a ford type of crossing since disturbance to the waterway is only during construction and removal of the culvert.
3. Temporary culverts can be salvaged and reused.

### Specifications

1. All culverts shall be strong enough to support their cross sectional area under the maximum expected loads.
2. The size of the culvert pipe shall be the largest pipe diameter that will fit into the existing channel without major excavation of the waterway channel or without major approach fills. If a channel width exceeds 3 feet, additional pipes may be used until the cross sectional area of the pipes is greater than 60% of the cross sectional area of the existing channel. The minimum size culvert that may be used is a 12 inch diameter pipe. In all cases, the pipes shall be large enough to convey normal stream flows.
3. The culverts shall extend a minimum of one foot beyond the upstream and downstream toe to the aggregate placed around the culvert. In no case shall the culvert exceed 40 feet in length.
4. Geotextile fabric shall be placed on the streambed and stream banks prior to placement of the pipe culvert(s) and aggregate. The geotextile fabric shall cover the streambed and extend a minimum six inches and a maximum one foot beyond the end of the culvert and bedding material. Geotextile fabric reduces settlement and improves the crossing stability.
5. The invert elevation of the culvert shall be installed on the natural streambed grade to minimize interference with fish migration (free passage of fish).
6. The culverts shall be covered with a minimum of one foot of aggregate. If multiple

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culverts are used they shall be separated by at least 12 inches of compacted aggregate fill.

7. All areas disturbed during culvert installation shall be stabilized within 7 calendar days of the disturbance.

## Culvert Maintenance Requirements

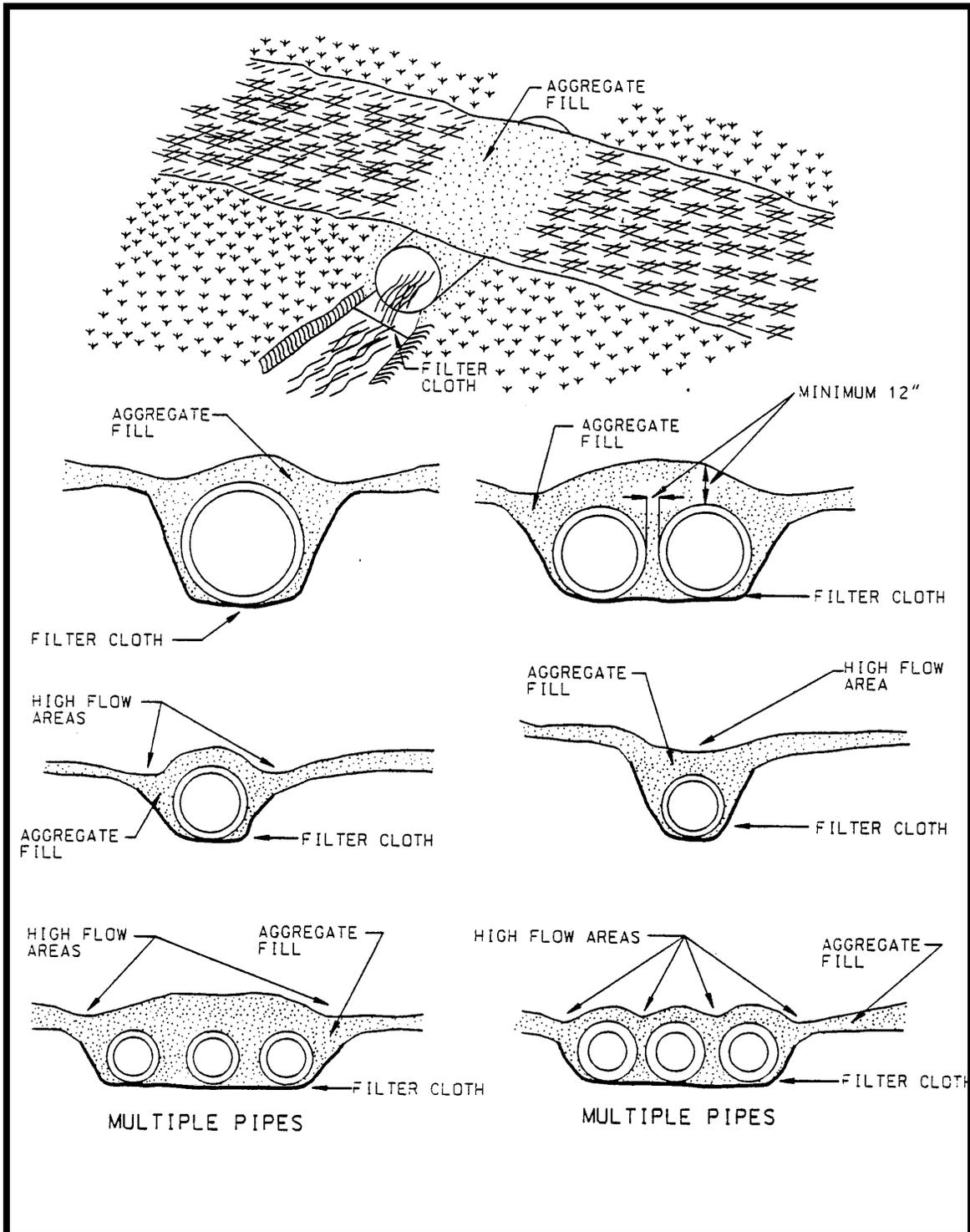
1. Periodic inspection shall be performed to ensure that the culverts, streambed, and stream banks are not damaged and that sediment is not entering the stream or blocking fish passage or migration.
2. Maintenance shall be performed as needed in a timely manner to ensure that structures are in compliance with these specifications. This shall include removal and disposal of any sediment or trapped debris. Sediment shall be disposed of and stabilized outside the waterway floodplain.

## Culvert Removal And Cleanup Requirements

1. When the crossing has served its purpose, all structures including culverts, bedding and geotextile fabric materials shall be removed.
2. Final clean up shall consist of removal of the temporary structure from the waterway, removal of all construction materials, restoration of original stream channel cross section and protection of the stream banks from erosion. Removed material shall be stored outside of the waterway floodplain.
3. Removal of the structure and clean up of the area shall be accomplished without construction equipment working in the waterway channel.
4. All areas disturbed during culvert removal shall be stabilized within 7 calendar days of the disturbance.

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Diagram 11.0 – Temporary Access Culvert



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## Diagram 11.1 – Temporary Access Culvert Specifications

### Construction Specifications

1. Restrictions - No Construction or removal of a temporary access culvert will be permitted between October 1 through April 30 for Class III and Class IV Trout Waters or between March 1 through June 15 for non-trout waterways.
2. Culvert Strength - All culverts shall be strong enough to support their cross sectional area under maximum expected loads.
3. Culvert Size - The size of the culvert pipe shall be the largest pipe diameter that will fit into the existing channel without major excavation of the waterway channel or without major approach fills. If a channel width exceeds 3 feet, additional pipes may be used until the cross sectional area of the pipes is greater than 60 percent of the cross sectional area of the existing channel. The minimum size culvert that may be used is a 12" diameter pipe. In all cases, the pipe(s) shall be large enough to convey normal stream flows.
4. Culvert Length - The culvert(s) shall extend a minimum of one foot beyond the upstream and downstream toe to the aggregate placed around the culvert. In no case shall the culvert exceed 40 feet in length.
5. Filter Cloth - Filter cloth shall be placed on the streambed and streambanks prior to placement of the pipe culvert(s) and aggregate. The filter cloth shall cover the streambed and extend a minimum six inches and a maximum one foot beyond the end of the culvert and bedding material. Filter cloth reduces settlement and improves crossing stability.
6. Culvert Placement - The invert elevation of the culvert shall be installed on the natural streambed grade to minimize interference with fish migration (free passage of fish).
7. Culvert Protection - The culvert(s) shall be covered with a minimum of one foot of aggregate. If multiple culverts are used they shall be separated by at least 12" of compacted aggregate fill. At a minimum, the bedding and fill material used in the construction of the temporary access culvert crossings shall conform with the aggregate requirements cited in Section I.H.1. above.
8. Stabilization - All areas disturbed during culvert installation shall be stabilized within 14 calendar days of the disturbance in accordance with the Standard for "Critical Area Stabilization with Permanent Seeding."

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## **SPECIFICATIONS FOR TEMPORARY ACCESS WATERWAY CROSSING – FORD**

A temporary access ford is a shallow structure placed in the bottom of the waterway over which the water flows while still allowing traffic to cross the waterway.

### Considerations

Temporary fords may be used when bridge or culvert crossings are not possible and the streambed is armored with naturally occurring bedrock or can be protected with an aggregate layer in conformance with these specifications.

### Specifications

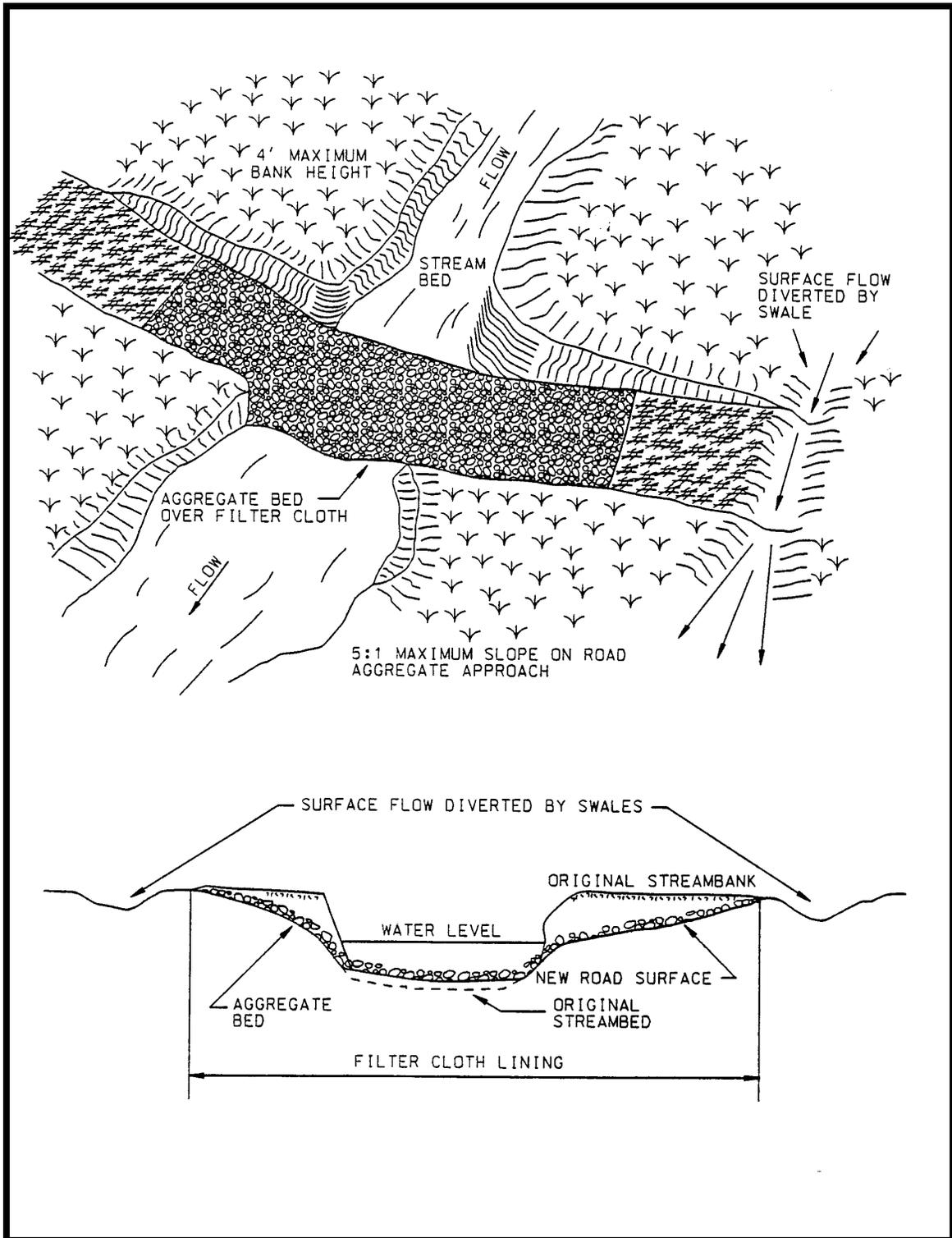
1. The approaches to the structure shall consist of stone pads. Other materials shall be approved by the appropriate plan approval authority (the SCD). The entire ford approach (where banks were cut) shall be covered with geotextile fabric and protected with aggregate to a depth of 4 inches.
2. Fords shall be prohibited when the stream banks are 4 feet or more in height above the invert of the stream.
3. The approach roads at the cut banks shall be no steeper than 5:1. Spoil material from the banks shall be stored out of the floodplain and stabilized.
4. One layer of geotextile fabric shall be placed on the streambed, stream banks and road approaches prior to placing the bedding material on the stream channel or approaches. The geotextile fabric shall extend a minimum of 6 inches and a maximum of 12 inches beyond the bedding material.
5. The bedding material shall be coarse aggregate.
6. All fords shall be constructed to minimize the blockage of stream flow and shall allow free flow over the ford. The placing of any material in the waterway bed will cause some upstream ponding. The depth of this ponding will be equivalent to the depth of the material placed within the stream and therefore should be kept to a minimum height. However in no case shall the bedding material be placed deeper than 12 inches or one half the height of the existing banks whichever is smaller.
7. All areas disturbed during ford installation shall be stabilized within 7 calendar days of that disturbance.

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## Ford Removal And Final Cleanup

1. When the temporary structure has served its purpose it shall be removed completely.
2. Final clean up shall consist of removal of temporary ford materials from the waterway. All material shall be stored outside of the waterway floodplain.
3. The removal shall not create an impoundment or fish passage restriction.
4. Clean up shall be accomplished without construction equipment working in the stream channel.
5. The approach slopes of the cut banks shall not be backfilled.
6. All areas disturbed during ford removal shall be stabilized within 7 calendar days of that disturbance.

Diagram 12.0 – Temporary Access Ford



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## Diagram 12.1 – Temporary Access Ford Specifications

### Construction Specifications

1. Restrictions - Use or removal of a temporary access will not be permitted between October 1 and April 30 for all Class III and Class IV Trout Waters. For other streams, use or removal of a temporary ford will be prohibited from March 1 through June 15 of each year because fish are spawning during this period.
2. The approaches to the structure shall consist of stone pads. The entire ford approach (where banks were cut) shall be covered with filter cloth and protected with aggregate to a depth of 4 inches.
3. Fords shall be prohibited when the stream banks are 4 feet or more in height above the invert of the stream and a bridge or culvert crossing can easily be constructed.
4. The approach roads at the cut banks shall be no steeper than 5:1. Spoil material from the banks shall be stored out of the flood plain and stabilized.
5. One layer of filter cloth shall be placed on the streambed, streambanks, and road approaches prior to placing the bedding material on the stream channel or approaches. The filter cloth shall extend a minimum of 6 inches and a maximum one foot beyond bedding material.
6. The bedding material shall be coarse aggregate or gabion mattresses filled with coarse aggregate.
7. Aggregate used in ford construction shall be SHA Class I.
8. All fords shall be constructed to minimize the blockage of stream flow and shall allow free flow over the ford. The placing of any material in the waterway bed will cause some upstream ponding. The depth of this ponding will be equivalent to the depth of the material placed within the stream and therefore should be kept to a minimum height. However, in no case will the bedding material be placed deeper than 12" or 1/2 the height of the existing banks, whichever is smaller.
9. Stabilization - All areas disturbed during ford installation shall be stabilized within 14-calendar days of that disturbance in accordance with the Standards for Stabilization With Permanent Seeding."

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## SPECIFICATIONS FOR LOGGING MATS

### Definition

A logging mat is a portable fabrication usually of boards or timbers held together by bolts or cable to provide temporary protection of a forest harvest entrance or haul road.

### Purpose

This practice protects the surface soil structure from excessive compaction and rutting.

### Conditions Where Practice Applies

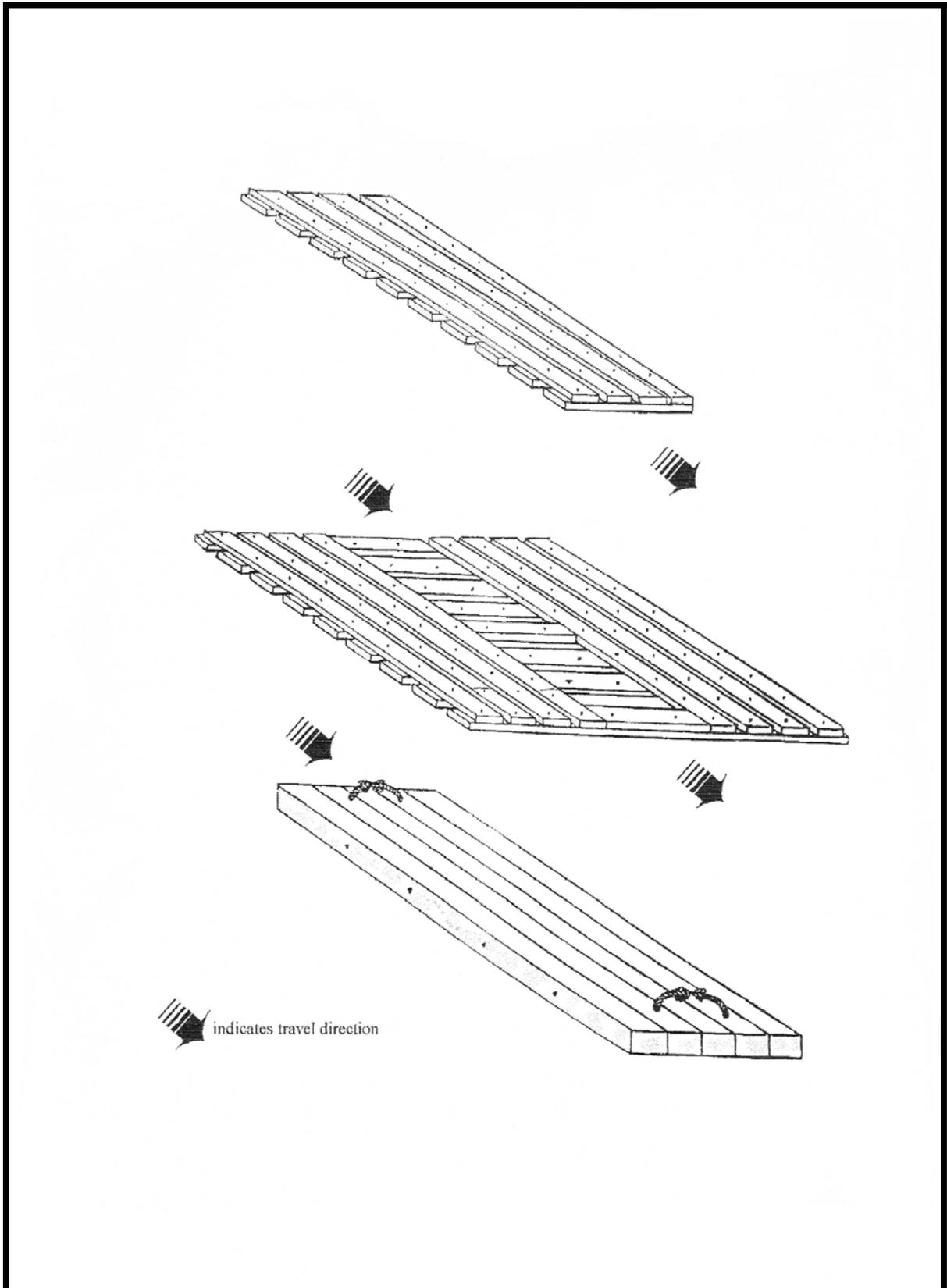
This practice applies to any part of the forest harvest access system where rutting could become an erosion or water handling problem. It is often used as a substitute for stone or other stabilizing materials at the entrance of a forest harvest site and isolated wet areas on haul roads or skid trails.

### Specifications

1. Mats shall be placed end to end to form a continuous span for the entire length of the area to be protected.
2. Mats can be used as a substitute for or in conjunction with stone, gravel, wood chips, culverts, and other stabilizing material at the entrance to the harvest site.
3. Mats shall be inspected frequently and maintained or replaced as necessary to ensure their proper function.

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Diagram 13.0 – Logging Mats



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## SPECIFICATIONS FOR STRAW BALE DIKE

### Definition

A straw bale dike is a temporary barrier of straw or similar material used to intercept sheet flow.

### Purpose

The straw bale dike filters sediment from runoff. The dike also intercepts sheet flow and slows the velocity of the runoff so that deposition of transported sediment can occur. The straw bale dike is used to intercept or direct sediment laden runoff so the deposition of transported sediment can occur. Do not use as a velocity check in ditches, swales, or in places where concentrated flow is intercepted.

### Conditions Where Practice Applies

A straw bale dike is constructed where sediment laden runoff needs to be intercepted at the base of a disturbed slope. This practice is installed only where sheet flow conditions exist. The straw bale dike shall be maintained continuously and remain in place along the downgrade perimeter of disturbed areas until the disturbed areas are permanently stabilized.

The use of this practice is especially important where the forest floor is no longer in an undisturbed condition or the harvest has been granted a variance from the requirement to establish and maintain a Streamside Management Zone. Under these circumstances, structural perimeter control must be installed prior to the start of and maintained during the harvest.

### Specifications

1. Bales shall be placed on the contour and in a row with the ends of each bale tightly abutting the adjacent bales. The straw bale dike shall be positioned to intercept sheet flow only, and shall never be used as velocity checks in areas of concentrated flow.
2. Each bale shall be entrenched in the soil a minimum of 4 inches and placed so the bindings are horizontal.
3. Bales shall be securely anchored in place by either two stakes or re-bars driven through the bale 12 to 18 inches into the ground. The first stake in each bale shall be driven toward the previously laid bale at an angle to force the bales together. Stakes shall be driven flush with the top of the bale.
4. Straw bale dikes shall be inspected frequently and after each rain event and maintenance performed as necessary. Replace bales when deteriorated.

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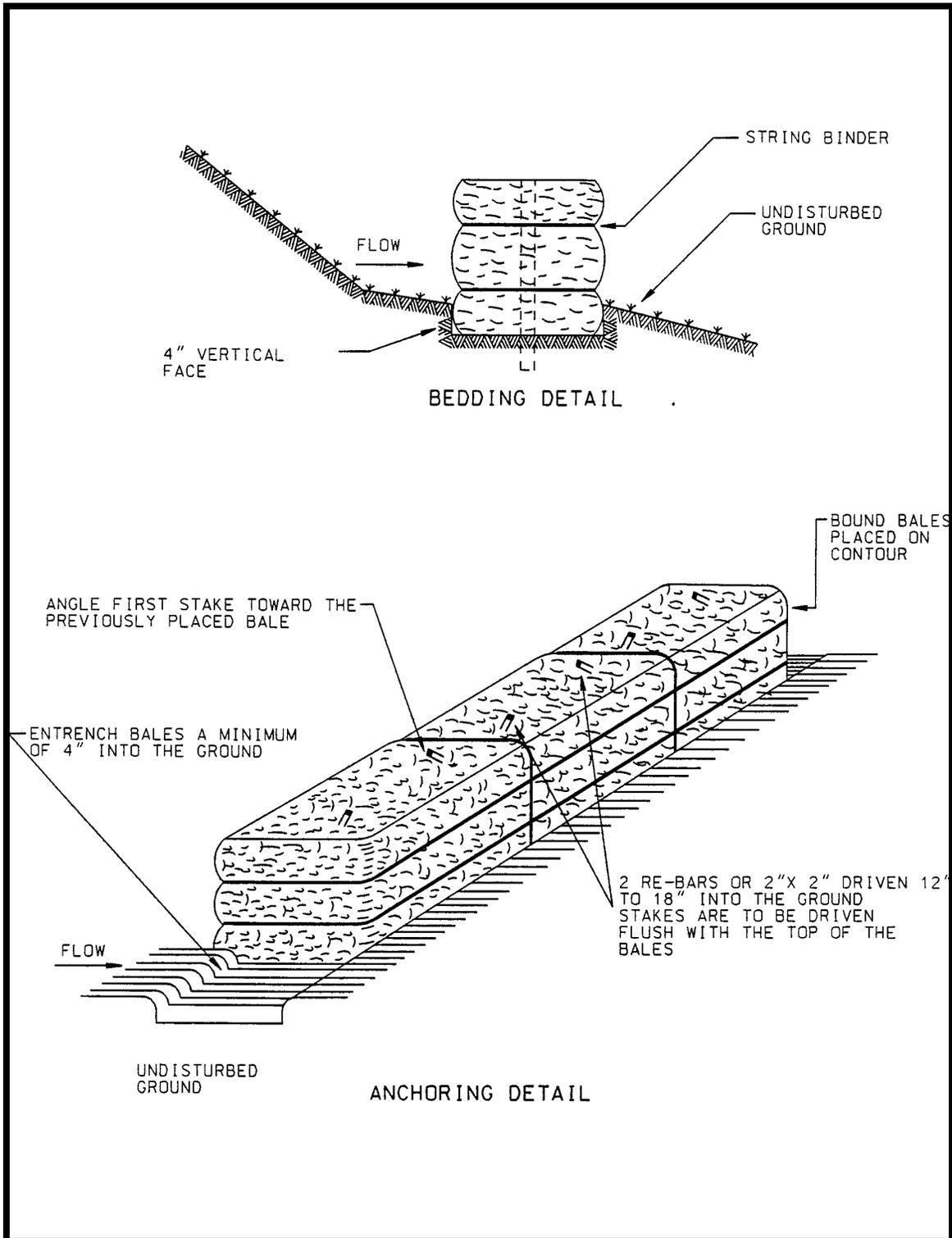
5. All bales shall be removed when the site has been stabilized. However, bales may be left if used as part of the stabilization process. If bales are removed, the trench where the bales were located shall be graded flush and stabilized.
6. Straw Bale Dikes have a normal service life of three months. Replace bales as needed.
7. Straw Bale Dikes shall not be used on slopes exceeding 5:1.
8. The length of Straw Bale Dikes must conform to the criteria in the following table:

Table 6 – Straw Bale Dike Slope Length & Steepness Design Criteria

Slope	Slope Steepness	Slope Length	Dike Length
0% to 2%	Flatter than 50:1	300 Feet	500 Feet
2% to 10%	50:1 to 10:1	125 Feet	500 Feet
10% to 20%	10:1 to 5:1	100 Feet	500 Feet

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Diagram 14.0 – Straw Bale Dike



## Diagram 14.1 – Straw Bale Dike Specifications

### CONSTRUCTION SPECIFICATIONS

1. Bales shall be placed at the toe of a slope, on the contour, and in a row with the ends of each bale tightly abutting the adjacent bales.
2. Each bale shall be entrenched in the soil a minimum of 4 inches and placed so the bindings are horizontal.
3. Bales shall be securely anchored in place by either two stakes or re-bars driven through the bale 12 to 18 inches into the ground. The first stake in each bale shall be driven toward the previously laid bale at an angle to force the bales together. Stakes shall be driven flush with the top of the bale.
4. Straw bale dikes shall be inspected frequently and after each rain event and maintenance performed as necessary.
5. All bales shall be removed when the site has been stabilized. The trench where the bales were located shall be graded flush and stabilized.

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## SPECIFICATIONS FOR SILT FENCE

### Definition

A silt fence is a temporary barrier of woven geotextile fabric used to intercept sheet flow from disturbed areas and to filter surface runoff.

### Purpose

Silt fences filter sediment from runoff. The fence also intercepts sheet flow and slows the velocity of the runoff so that deposition of transported sediment can occur. Silt fences can be used to intercept sheet flow only. Do not use as a velocity check in ditches, swales, or in places where concentrated flow is intercepted.

The use of this practice is especially important where the forest floor is no longer in an undisturbed condition or the harvest has been granted a variance from the requirement to establish and maintain a Streamside Management Zone. Under these circumstances, structural perimeter control must be installed prior to the start of and maintained during the harvest.

### Conditions Where Practice Applies

Silt fence is limited to intercepting sheet flow runoff from limited distances according to slope. Silt fence provides filtering and velocity dissipation to promote gravity settling of sediments.

### Specifications

1. Silt fence shall not be used in rocky soils that prevent trenching.
2. Silt fence shall be placed on the contours.
3. The length of silt fences must conform to the criteria in the following table:

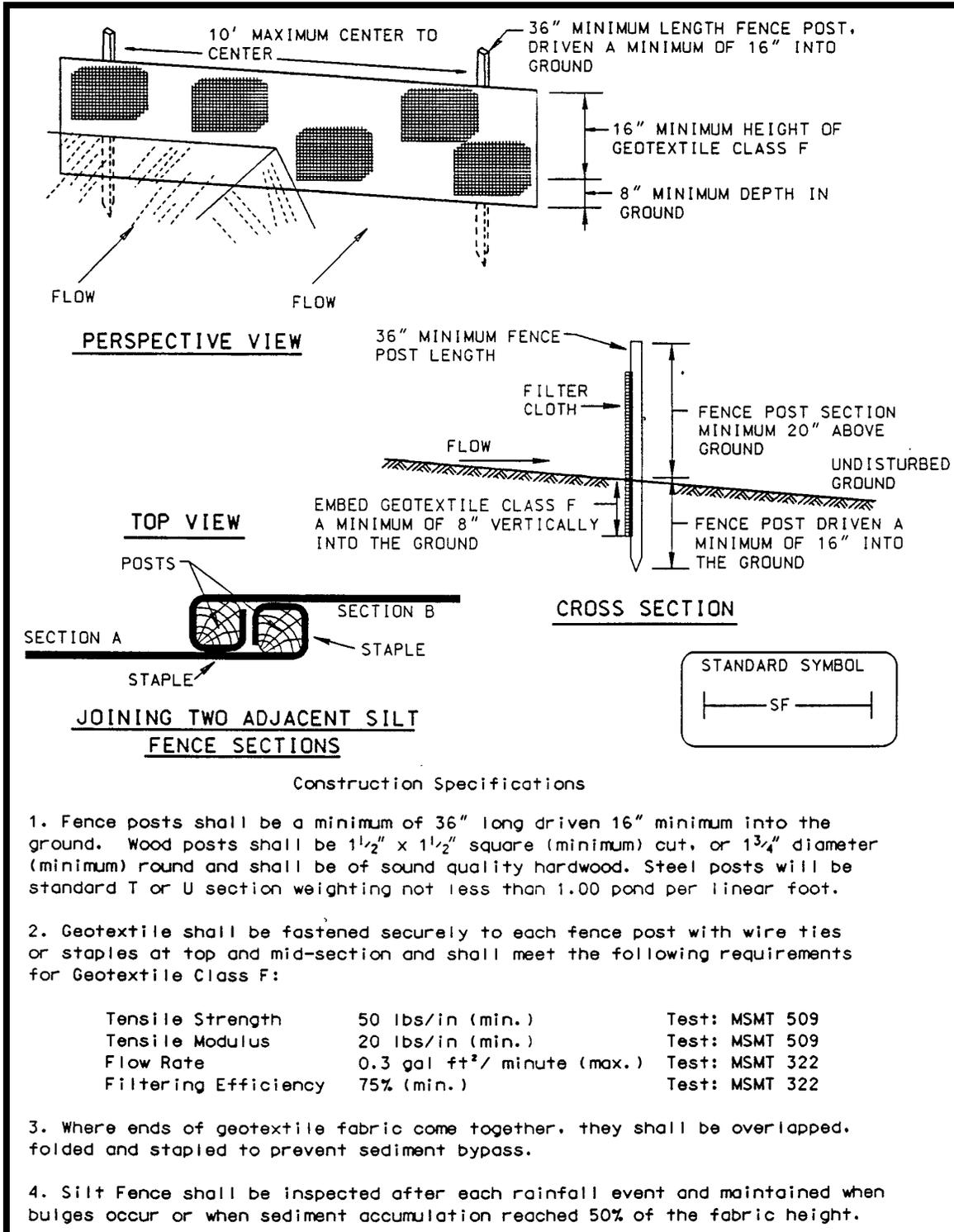
Table 7 – Silt Fence Slope Length & Fence Length Design Criteria

Slope Steepness (%)	Maximum Slope Length (ft)	Maximum Silt Fence Length (ft)
Less than 2	Unlimited	Unlimited
2 - 10	125	1,000
10 - 20	100	750
20 - 33	60	500
33 - 50	40	250
Greater than 50	20	125

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4. In areas of less than 2% slope and sandy soils, maximum slope length and silt fence length will be unlimited.
5. Downslope from the silt fence shall be undisturbed ground.
6. Fence posts shall be a minimum of 36 inches long driven 16" minimum into the ground. Wood posts shall be 1 ½ " x 1 ½ " (minimum) square cut, or 1 ¾" (minimum) diameter round and shall be of sound quality hardwood. Steel posts will be standard T or U section weighing not less than 1.00 pound per linear foot.
7. Geotextile shall be fastened securely to each fence post with wire ties or staples at top and mid-section and shall meet the requirements for Geotextile Class F [THIS SPEC HAS CHANGED WE SHOULD USE WHATEVER IS GOING TO GO INTO The 94 REVISIONS].
8. Where ends of geotextile fabric come together, they shall be overlapped, folded and fastened to prevent sediment bypass.
9. Silt fence shall be inspected after each rainfall event and maintained when bulges occur or when sediment accumulation reaches 50% of the fabric height.

**Diagram 15.0 – Silt Fence**



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Diagram 15.1 – Silt Fence Specifications

<u>Silt Fence Design Criteria</u>		
<u>Slope Steepness</u>	<u>(Maximum) Slope Length</u>	<u>(Maximum) Silt Fence Length</u>
Flatter than 50:1	unlimited	unlimited
50:1 to 10:1	125 feet	1,000 feet
10:1 to 5:1	100 feet	750 feet
5:1 to 3:1	60 feet	500 feet
3:1 to 2:1	40 feet	250 feet
2:1 and steeper	20 feet	125 feet

Note: In areas of less than 2% slope and sandy soils (USDA general classification system, soil Class A) maximum slope length and silt fence length will be unlimited. In these areas a silt fence may be the only perimeter control required.

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## SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOILS

### Definition

This practice provides for re-vegetation of disturbed areas by establishing grass and/or legume vegetation on bare soil areas.

### Purpose

This practice re-establishes vegetative cover on soil that was disturbed during the harvest process. Re-vegetation minimizes erosion and sediment export to watercourses. Consideration can be given to seeding mixtures beneficial to wildlife and shade tolerance.

### Conditions When Practice Applies

On disturbed forestland areas where normal harvesting activities have exposed the soil and where it is explicitly required to vegetatively stabilize the area to prevent or mitigate erosion and sedimentation. Areas of special consideration include areas with highly erodible soils, steep slopes and long slope lengths.

### Specifications

NOTE: These specifications are based upon NRCS code 342. The entire code is provided in the Appendix.

#### 1. Site and Seedbed Preparation:

Complete all grading and the loosening of compacted soil and install all water control measures prior to preparing a suitable seedbed.

Upon completion of the harvest or a portion of the harvest, all disturbed areas (particularly roads, trails, and landings) located on slopes 10% or greater shall be graded or backdragged, seeded and mulched according to specifications. Disturbed areas on slopes less than 10% shall be backdragged and left in a condition that permits successful natural regeneration of vegetation. Seeding and mulching will be required on other critical areas.

Soils with increased erosion potential that were exposed during harvest operations will be stabilized within 7 days of disturbance with seed and mulch. This includes areas:

- a. with slopes greater than 30%
- b. with slopes greater than 5% and within 50 feet of a water body.
- c. within 50 feet of other sensitive areas (i.e. property lines, protected habitat).

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## 2. Lime and Fertilizer:

Lime and fertilizer shall be applied at the completion of backdragging or final grading. Lime and fertilizer application rates are determined by soil type and soil acidity. (Application of fertilizer may be prohibited under certain circumstances and in certain locations. Observe all prohibitions stated elsewhere. See STANDARDS AND SPECIFICATIONS FOR STREAMSIDE MANAGEMENT ZONE.) The local County Extension Office will send soil samples for testing for a small charge. If soil tests are not used, apply one ton of lime per acre (45 lbs/1000 SF) and 500 lbs of 10-20-20 fertilizer per acre (10 lbs/1000 SF). The material shall be incorporated into the soil by surface roughening to prepare a seedbed. By using a soil test, appropriate, often lower, application rates are determined.

## 3. Seeding:

Selected seed mixtures may be broadcast, drilled, or hydroseeded. Successful seedings are usually in the spring and fall. If broadcasting seed, small or light seed can be mixed with a filler (e.g. sawdust) to provide adequate distribution. Incorporate seed  $\frac{1}{8}$  to  $\frac{1}{4}$  inch deep by raking, dragging, cultipacking or tracking with heavy machinery. Avoid windy conditions.

## 4. Mulching:

Mulch shall be applied to all seeded areas immediately after seeding.

If grading is completed outside of the seeding season, mulch alone shall be applied and maintained until the seeding season returns when seeding is completed.

When straw mulch is used, it shall be spread over all seeded areas at the rate of 2 tons per acre. Mulch shall be applied to a uniform loose depth of between one inch and two inches. Mulch applied shall achieve a uniform distribution and depth so that the soil surface is not exposed.

## 5. Maintenance:

Once the vegetation is established, the site shall have 95% groundcover to be considered adequately stabilized. If the vegetation provides less than 40% ground coverage, re-stabilize following the original lime, fertilizer (if not prohibited), seedbed preparation, and seeding recommendations. If the vegetation provides between 40% and 94% ground coverage, overseeding and fertilizing (if not prohibited) using half of the rates originally applied shall be necessary.

Mowing can be utilized to maintain roads which will be used in the future and/or maintain open areas for wildlife. When possible, delay mowing until late summer to allow wildlife nesting to be completed, then allow re-growth before winter. Prevent livestock grazing until plants are well established. Seeded areas must be protected from traffic, particularly during wet periods if rutting is to be prevented. Freshly seeded roads are particularly vulnerable to damage. Use gates, boulders, or logs to restrict vehicular access.

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Table 8: Nurse Crops (Temporary Seeding) To Be Added To Permanent Seeding Mixes					
Mix	Recommended Cultivar	Seeding Rate		Soil Moisture Conditions	Remarks
		lbs./ac.	lbs./1000 SF		
Annual Ryegrass <i>Lolium perenne</i> ssp. <i>Multiflorum</i>	Common	10	0.3	Dry to moist	Planting dates: Western Maryland - August 1 to May 31 Piedmont - August 1 to April 30 Coastal Plain - August 15 to April 30
Barley <i>Hordeum vulgare</i>	Common	40	1.0	Dry to moderately dry	
Oats <i>Avena sativa</i>	Common	40	1.0	Dry to moist	
Wheat <i>Triticum aestivum</i>	Common	40	1.0	Dry to moderately dry	
Foxtail Millet <i>Setaria italica</i>	Common	10	0.3	Dry to moist	Planting dates: Western Maryland - June 1 to July 31 Piedmont - May 1 to July 31 Coastal Plain - May 1 to August 14
Pearl Millet <i>Pennisetum glaucum</i>	Common	7	0.2	Dry to moist	

**TABLE 8 NOTE:**

1. Select a nurse crop to add to the permanent seeding mix, based on the time of year for planting. Use only one nurse crop for each permanent seeding mix. Do not use a mixture of nurse crops.

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Table 9: Permanent Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate		Soil Moisture Conditions	Sun/Shade Requirements	Wildlife Value	Remarks		
		Lbs per acre	Lbs per 1000 sq ft						
1. SELECT ONE SPECIES OF FESCUE:									
Tall Fescue <i>Lolium arundinaceum</i> (formerly <i>Festuca arundinacea</i> ) Or Hard Fescue <i>Festuca trachyphylla</i>	Recommended MD turf-types <sup>2/</sup>	60	1.38	Dry to moist	-	Low	Tall fescue is more suitable for highly compacted areas and moist sites.		
AND ADD: Kentucky Bluegrass <i>Poa pratensis</i>	Common or Bighorn	40	0.92				For best results, recommend using a blend of 3 cultivars each for tall fescue and Kentucky bluegrass.		
Perennial Ryegrass <i>Lolium perenne</i>	Recommended MD turf-types <sup>2/</sup> Blazer (II), Pennfine	40	0.92				20	0.46	
2. Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>									
Chewings Fescue <i>Festuca rubra</i> ssp. <i>commutata</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem Common	30	0.69	Very dry to moist	-	Low	Add rough bluegrass in moist, shady conditions.		
Kentucky Bluegrass <i>Poa pratensis</i>	Recommended MD turf-types <sup>2/</sup>	30	0.69					20	0.46
OPTIONAL ADDITION Rough Bluegrass <i>Poa trivialis</i>	Common	15	0.34					15	0.34
3. Deertongue <i>Dicanthelium clandestinum</i>									
	Tioga	15	0.34	Dry to wet	-	Moderate	All species are native to Maryland.		

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Table 9: Permanent Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate		Soil Moisture Conditions	Sun/Shade Requirements	Wildlife Value	Remarks
		Lbs per acre	Lbs per 1000 sq ft				
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	40	0.93				Use Virginia wild rye on moist, shady sites. Use Canada wild rye on droughty sites.
Virginia Wild Rye <i>Elymus virginicus</i> OR	Common	5	0.11				
Canada Wild Rye <i>Elymus canadensis</i>	Common	5	0.11				

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## TABLE 9 NOTES:

### 1. Sun - Shade Requirements:

Full Sun - needs 6 or more hours of sunlight per day or 4 hours of midday sun

Part Shade - needs 3 to 6 hours of sunlight per day

Shade - needs less than 3 hours of sunlight per day

### 2. Turf-type cultivars of Tall Fescue and Kentucky Bluegrass shall be selected based on recommendations of the University of Maryland Cooperative Extension Service, Agronomy Mimeo 77. Recommendations in the April, 2000 publication are as follows:

#### Kentucky Bluegrass -

A. The following Kentucky bluegrass cultivars are suitable for general use, and are also noted for shade tolerance:

America	Brilliant	Compact	Liberator	Nuglade	Quantum Leap	SR 2000
Ascot	Champagne	Coventry	Moonlight	Princeton 105	Showcase	Unique

B. The following Kentucky bluegrass cultivars are suitable for general use, and are also noted for tolerance of low maintenance conditions:

Barirus	Eagleton	Haga	Merit	Monopoly
Caliber	Freedom	Livingston	Midnight	Washington

Tall Fescue - The following turf-type cultivars are suitable for general use:

Alamo E	Bulldawg	Debutante	Good-En	Micro DD	Rebel 3D	Scorpio	Titan 2
Apache II	Chapel Hill	Dominion	Grande	Millennium	Rebel III	Shenandoah	Tomahawk
Avanti	Chieftain II	Duke	Guardian	Olympic Gold	Rebel Jr.	Shenandoah II	Trailblazer II
Axiom	Chinook	Duster	Heritage	Oncue	Rebel Sentry	Southern Choice	Twilight II
Bandana	Cochise II	Eldorado	Houndog 5	Pixie	Red Coat	SR 8200	Virtue
Barlexus	Comstock	Empress	Jaguar 3	Pixie E+	Regiment	SR 8300	Watchdog
Barrington	Coyote	Falcon II	Lancer	Plantation	Rembrandt	Stetson	Wolfpack
Bonanza	Crossfire	Finelawn Petite	Leprechaun	Pyramid	Renegade	Tarheel	WPEZE
Bonanza II	Crossfire II	Genesis	Masterpiece	Rebel 2000	Reserve	TF6	Wyatt

Table 10 - Area Determinations For Roads

Road Length (ft)	Road Width (ft)					
	8	10	12	14	18	20
150	.01	.01	.01	.02	.02	.02
200	.02	.02	.03	.03	.04	.05
250	.05	.06	.07	.08	.10	.11
500	.09	.12	.14	.16	.21	.23
1000	.18	.23	.28	.32	.41	.46
1500	.28	.34	.41	.48	.62	.69
2000	.36	.48	.56	.64	.83	.92
2500	.46	.57	.69	.80	1.03	1.15
5000	.92	1.15	1.38	1.61	2.07	2.30
5280	.97	1.21	1.45	1.70	2.18	2.42

To determine amount of seeding material needed for a project, multiply the value in the above table by the recommended per acre application rate.

Example: 12 foot road surface, 1500 feet in length has an area of .41 acres.

Seed Type	Lbs./ac.	Ac.	Total Lbs.
Tall Fescue	60*	.41	25
Kentucky Bluegrass	40*	.41	16
Total Seed Applied			41

\*For example only. For actual seeding rates consult charts in this specification or appendix

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## GLOSSARY

The list of terms that follows is a representative sample of those used by foresters, lumbermen, loggers, soil scientists, biologists, engineers, conservationist planners, etc. The terms may not be used in the text of this document but are commonly used in conservation matters. Words designated with (COMAR) provide in whole or in part, the exact definitions as found in the Code Of Maryland Regulations. As such, references contained in certain COMAR definitions relate to the regulations, not to this document.

**Access Road:** A temporary or permanent access route for vehicles into forestland.

**Agricultural Drainage Project (COMAR):**

“Agricultural Drainage Project” means the construction, reconstruction, or repair or the straightening, widening, or deepening of any ditch, drain, canal, or other watercourse natural or manmade financed or managed by a public drainage association for the purpose of lowering the water level in the soil of adjacent lands for agricultural purposes.

**Approval Authority:** Means any soil conservation district, the specified agency named in a municipality not within a soil conservation district, the Washington Suburban Sanitary Commission, or the Water Management Administration. (For the purposes of an approved plan for a forest harvest operation, the approval authority typically will be the local soil conservation district.)

**Barriers:** Obstructions to pedestrian, horse, and/or vehicular traffic. They are intended to restrict such traffic to a specific location.

**Bearing Capacity:** Maximum load that a material (soil) can support before failing.

**Bedding:** A site preparation method in which special equipment is used to concentrate surface soil and forest litter into a ridge 6 to 10 inches high on which forest seedlings are to be planted.

**Berm:** A temporary ridge of soil, compacted and located in such a manner as to direct water to a desired location.

**Blue Line Stream:** A feature on a United States Geological Survey 7.5 Minute Series (Topographic) map representing perennial and intermittent streams. These features are shown as a solid or dotted/dashed blue lines.

**Bottomlands:** A term often used to define lowlands adjacent to streams.

**Broad Based Dip:** A surface drainage structure specifically designed to drain water from an access road while vehicles maintain normal travel speeds.

**Buffer:** Historical term for the relatively undisturbed area maintained on either side of

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waters of the State during a forest harvest operation. The currently used term for this area is Streamside Management Zone (*q.v.*)

**Channel:** A natural stream that conveys water. A ditch or channel excavated to convey the flow of water.

**Check Dam:** A small dam constructed in a gully or other small watercourse to decrease the stream flow velocity, minimize channel scour, flatten channel slope, and promote deposition of sediment.

**Clear (COMAR):**

“Clear” means any activity that removes the vegetative ground cover.

**Clearcut:** A harvest method where essentially all trees have been removed in one operation. Depending on management objectives, a clearcut may or may not have reserve trees left to attain goals other than regeneration.

**Contamination:** A general term signifying the introduction into water of microorganisms, chemical, organic or inorganic wastes or sewage, or sediment which renders the water unfit for its intended use.

**Contour:** An imaginary line on the surface of the earth connecting points of the same elevation. A line drawn on a map connecting points of the same elevation.

**Culvert:** A conduit through which surface water can flow under roads.

**Custom Erosion And Sediment Control Plan:** An individual plan that includes site specific attachments developed by a Maryland Licensed Forester for a timber harvest operation. Usually a Custom Erosion And Sediment Control Plan is required when site conditions prevent the provisions of the Standard Plan from being met or to authorize work in a Streamside Management Zone.

**Cut:** Portion of land surface or area from which earth has been removed or will be removed by excavation; the depth below original ground surface to the excavated surface.

**Cut And Fill:** Process of earth moving by excavating part of an area and using the excavated material for adjacent embankments or fill areas.

**Discharge (COMAR):**

“Discharge” means:

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- a. the addition, introduction, leaking, spilling, or emitting of any pollutant to waters of this State; or
  - b. the placing of a pollutant in a location where the pollutant is likely to pollute.
- Sediment has been defined as a pollutant to waters of the State.

**Diversion:** A channel with a supporting ridge on the lower side constructed across or at the bottom of a slope for the purpose of intercepting surface runoff.

**Ephemeral Channel:** A ground surface configuration (such as a swale) that contains flowing water only during and shortly after a rainfall event. The duration of flow in this kind of system is too limited to establish an aquatic ecosystem.

**Erosion (COMAR):**

“Erosion” means the process by which the land surface is worn away by the action of wind, water, ice or gravity.

**Erosion And Sediment Control Plan (COMAR):**

“Erosion and Sediments Control Plan” means an erosion and sediment control strategy or plan to minimize erosion and prevent off-site sedimentation, by containing sediment on-site or passing sediment laden runoff through a sediment control measure prepared and approved in accordance with the specific requirements of an approval authority, and designed in accordance with the handbook, “1994 Maryland Standards And Specifications For Soil Erosion And Sediment Control”, which is incorporated by reference in regulation .11 of this chapter.

**Exemption:** Freedom from a duty. A circumstance where an activity is not subject to the provisions of a law or regulation. Typically, there is an explicit statement in a law or regulation that sets the specific conditions as to when an activity becomes subject to the provisions of the law or regulation.

**Fill:** The portion of land surface or area onto which excavated earth has been placed or will be placed; the height above original ground to the fill surface.

**Fill Slope:** The surface area formed where earth is deposited to build a road or trail.

**Ford:** Submerged stream crossing where tread is reinforced to bear intended traffic. A place where a perennial stream may be crossed by vehicle.

**Forest Land:** Land bearing forest growth or land from which the forest has been removed but which shows evidence of past forest occupancy and which is not now in other use.

**Forest Landowner:** An individual, combination of individuals, partnership, corporation, foundation, governmental agency, or association of whatever nature that holds an ownership interest in forestland.

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**Forest Practice:** An activity relating to the growing, protecting, harvesting, or processing of forest tree species on forest land and to other forest management aspects such as wildlife, recreation etc.

**Grade:** The slope of a road or trail expressed as a percent of change in elevation per unit of distance traveled.

**Grade (COMAR):**

“Grade” means to cause the disturbance of the earth. This shall include but not be limited to any excavating, filling, stockpiling of earth materials, grubbing, root mat or top soil disturbance, or any combination of them.

**Gully Erosion:** Erosion process whereby water accumulates in narrow channels and over short periods removes soil from this narrow area to considerable depths (one foot plus).

**Harvesting:** The felling, loading, and transportation of forest products, roundwood or logs.

**Intermittent Stream:** A stream or portion of stream whose flow includes a seasonal or temporary groundwater component (i.e. the base level of the stream is at or below the local water table). Such streams flow for days, weeks, or months following the most recent rainfall event. These streams may be shown as dotted/dashed lines on United States Geological Survey 7.5 Minute Series (Topographic) maps.

**Landing:** A place where logs are gathered in or near the forest for further transport, sometimes called a "deck".

**Logging Debris:** That unwanted, unutilized, and generally unmarketable accumulation of woody material in the forest such as large limbs, tops, cull logs, and stumps, that remain as forest residue after timber harvesting.

**Man-made Ditch:** a conveyance primarily constructed in order to and is serving to drain surface water, groundwater, or both. These typically occur as a network of interlaced shallow channels in agricultural fields. These structures are not a straitening, widening or deepening (hydrologic modification) of perennial streams. Typically, these ditches lack perennial flow (i.e. flow only in response to a rainfall event), do not show natural stream features, and lack an aquatic community. Man-made ditches may be referred to as ephemeral channels.

**Maryland Licensed Forester:**

1. A person who is licensed by the Board and who for compensation applies scientific techniques to the planting, conservation, protection, and management of trees and related

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resources for their continuing use whether found in large numbers and areas commonly known as forests, woodlands, and wood lots or in small groupings and individual trees in suburban and urban settings.

2. Under COMAR 26.17.01.07 B. (3) (i), one of five professionals authorized to certify that erosion and sediment control plans for forest harvest operations have been designed in accordance with approved erosion and sediment control ordinances, regulations, standards, and criteria.

**Mineral Soil:** Organic free soil that contains rock less than 2 inches in maximum dimension.

**Mulch:** A natural or artificial layer of plant residue or other materials covering the land surface which conserves moisture, holds soil in place, aids in establishing plant cover, and minimizes temperature fluctuations.

**Mulching:** Covering forest soil with any loose cover of organic residues, such as grass, straw, bark or wood fibers, to check erosion and stabilize exposed soil.

**Nonpoint Source Pollution:** Pollution that enters a water body from a diffuse origin on the watershed and does not result from discernable, confined, or discrete conveyances. Stormwater contaminated with sediment as a result of anthropogenic activities is an example of nonpoint source pollution.

**Nontidal Wetland (COMAR):**

“Nontidal wetland”:

- a. Means an area that is inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation...

**Nontidal Wetlands Of Special State Concern (COMAR):**

“Nontidal wetlands of special State concern” means the areas designated based on criteria in Regulation .04 of this chapter, and listed in COMAR 26.23.06.01 as having exceptional ecological or educational value of Statewide significance.

**Nutrients:** Mineral elements in the forest ecosystem such as nitrogen, phosphorus, or potassium, that are naturally present or may be added to the forest environment by forest practices such as fertilizer or fire retardant applications. Substances necessary for the growth and reproduction of organisms. In water, those substances that promote growth of algae and bacteria are chiefly nitrates and phosphates.

**Organics:** Particles of vegetation, other biologic material, or organic compounds that can degrade water quality by decreasing dissolved oxygen and by releasing organic solutes during leaching.

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**Perennial Stream:** A stream whose flow includes a permanent groundwater component (i.e. the base level of the stream is at or below the local water table). Such streams flow year round. These streams may be shown as solid blue lines on United States Geological Survey 7.5 Minute Series (Topographic) maps.

**Permeability Of Soil:** The capacity of a soil to move or transmit water or air through it. The permeability of a soil may be limited by the presence of one nearly impermeable soil horizon even though the others are permeable.

**Pollutant (COMAR):**

“Pollutant” means:

- (a) Any waste or wastewater that is discharged from:
  - (i) Any publicly owned treatment works, or
  - (ii) An industrial source; or
- (b) Any other liquid, gaseous, solid, or other substance that will pollute any waters of the State.

**Pollution (COMAR):**

“Pollution” means the contamination or other alteration of the physical, chemical, or biological properties of any waters of this State, including change in temperature, taste, color, turbidity, or odor of the waters, or the discharge or deposit of any organic matter, harmful organisms, or liquid, gaseous, solid, radioactive, or other substance into any waters of the State that will render the waters harmful, or detrimental, or injurious to:

- (a) Public health, safety or welfare;
- (b) Domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses; or
- (c) Livestock, wild animals, birds, fish or other aquatic life.

**Pollution Prevention For Forest Harvest Operations:** An auditing method applied to harvest operations that is intended to identify, isolate, reduce and eliminate or otherwise mediate sources of pollution found in that process. The implementation of these procedures within the harvesting process is intended to avoid or minimize the creation of undesirable by products, pollutants and waste.

This goal is accomplished by examining the waste stream(s) produced by the process. At each input to the waste stream the circumstances are analyzed to determine if the waste can be:

- reduced through:
  - o increasing efficiency,
  - o recycling in-process,
  - o altering the process, or
- eliminated through use of:
  - o an alternate, less hazardous product,
  - o improved technologies.

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This process has the potential to reduce the cost of environmental compliance by reducing or eliminating the costs associated with purchasing, managing, treating and disposing of waste materials. The overall reduction of the amount of pollution created within the process reduces the permitting requirements on the timber harvest industry.

**Public Drainage Association:** An independent political subdivision; an organization established to locate, construct, or reconstruct, operate and maintain ditches, drains, and channels to provide agricultural drainage under Article 25 §52 Annotated Code Of Maryland.

**Public Drainage Association Ditch:** any of the 800 miles of drainage ditches in the coastal zone mostly on the Eastern Shore that have operation and maintenance plans which address sediment control and water quality protection.

**Regeneration:** The young tree crop replacing older trees removed by harvest or disaster; the process of replacing old trees with young.

**Residual Trees:** Live trees left standing after the completion of harvesting.

**Rill Erosion:** An erosion process in which numerous small channels only several inches deep are formed. Occurs mainly on disturbed and exposed soils.

**Riprap:** Aggregate placed on erodible sites to reduce the impact of rain or surface runoff on these areas.

**Rolling Dip:** A shallow depression built diagonally across a light duty road or trail for the purpose of diverting surface water runoff from the road or trail.

**Runoff:** In forest areas, that portion of precipitation that flows from a drainage area on the land surface or in open channels.

**Ruts:** A depression in access roads made by continuous passage of logging vehicles.

**Sediment (COMAR):**

“Sediment” means soils or other surficial materials transported or deposited by the action of wind, water, ice, gravity, or by other artificial means.

**Seedbed:** The soil prepared by natural or artificial means to promote the germination of seed and the growth of seedlings.

**Sheet Erosion:** The removal of a fairly uniform layer of soil from the land surface by water runoff.

**Sheet Flow:** The passage of water over plane surfaces. Usually occurs in the headwaters of a stream’s drainage area. Flow has shallow depth and is broad. The velocity of rainfall runoff moving in sheet flow condition is very low. According to NRCS, sheet flow changes to shallow concentrated flow after 100 to 300 feet.

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**Silvicultural Activities:** All forest management activities, including logging, log transport, and forest roads (EPA interpretation).

**Site Preparation:** A forest activity to remove unwanted vegetation and other material, and to cultivate or prepare the soil for reforestation.

**Skid Trails:** A temporary pathway over forest soil to drag felled trees or logs to a landing.

**Slope:** Degree of deviation of a surface from the horizontal, measured as a numerical ratio, percent, or in degrees. Expressed as a ratio, the first number is the horizontal distance (run) and the second is the vertical distance (rise), as 2:1. A 2:1 slope is a 50 percent slope. Expressed in degrees, the slope is the angle from the horizontal plane, with a 90 degree slope being vertical (maximum) and 45 degree being a 1:1 slope.

**Soil:** The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.

**Soil Conservation:** Using the soil within the limits of its physical characteristics and protecting it from unalterable limitations of climate and topography.

**Soil Productivity:** The output or productive capability of a forest soil to grow timber crops.

**Stream:** A permanently or intermittently flowing body of water that follows a defined course.

**Stream Banks:** The usual boundaries, not the flood boundaries, of a stream channel. Right and left banks are named facing downstream.

**Streamside Management Zone (SMZ):** An area of 50 feet or more, based on steepness of adjacent slopes, on both banks of waters of the State. Provides extra precautions that are needed when carrying out forest harvests and protects stream banks and water quality. This designation was formerly known as buffer zone.

**Streamside Management Zone Plan:** An erosion and sediment control plan, prepared by a Maryland Licensed Forester, that upon approval by the appropriate plan approval authority (the SCD) allows harvesting within the Streamside Management Zone. The plan includes the harvest method, the square footage of basal area to be removed and retained, provisions for removing and restocking the cut trees, the erosion and sediment control measures to be implemented and maintained during the harvest, the location of skid trails and any other criteria required by the plan approval authority (the SCD). Used in conjunction with the Standard Erosion And Sediment Control Plan or incorporated into the Custom Erosion And Sediment Control Plan.

**Switchback:** A 180 degree direction change in a trail or road used to climb steep slopes.

# DRAFT

**Thermal Pollution:** A temperature rise in a body of water sufficient to be harmful to aquatic life.

**Tread:** Load bearing surface of a trail or road.

**Turnout:** 1. A drainage ditch which drains water away from roads. 2. A widened space in a road to allow vehicles to pass one another.

**Variance:** Official authorization to depart from a law. A stipulation in law, regulation, or agency policy that releases a person from the obligation to comply with the provisions of the law, regulation, or policy when it is determined that strict adherence to the requirements would result in undue hardship and not fulfill the intent of the law, regulation or policy. A hardship as a result of compliance is not by itself grounds for the issuance of a variance.

**Waste:** Materials and substances usually discarded as worthless to the user.

**Water Bar:** A diversion ditch and/or hump across a trail or road tied into the uphill side for the purpose of carrying water runoff into the vegetation, duff, ditch, or dispersion area so that it does not gain the volume and velocity which causes soil movement and erosion of the road or trail.

**Water Body:** An area where water stands with relatively little or slow movement (ponds, lakes, bays).

**Water Pollution:** Any introduction of foreign material into water or other impingement upon water which produces undesirable changes in the physical, biological, or chemical characteristics of that water.

**Water Quality:** A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

**Water Quality Standards:** Minimum requirements of purity of water for various uses; for example, water for agricultural use in irrigation systems should not exceed specific levels of sodium bicarbonate, pH, total dissolved salts, etc.

**Waters Of The State (COMAR):**

“Waters of the State” includes both surface and underground waters within the boundaries of the State subject to its jurisdiction, including that portion of the Atlantic Ocean within the boundaries of the State, the Chesapeake Bay and its tributaries, and all ponds, lakes, rivers, streams, public ditches, tax ditches, and public drainage systems within the State, other than those designated and used to collect, convey, or dispose of sanitary sewage. The floodplain of free-flowing waters determined by the Department on the basis of the 100-year flood frequency is included as waters of the State.

This is the definition of waters of the State used to identify locations on forest harvest operations that must have streamside management zones established or erosion and sediment

# DRAFT

control measures installed and maintained in order to protect water quality.

For the purposes of defining where on a forest harvest operation a streamside management zone must be established, waters of the State does not include the floodplain based on the 100 year flood frequency, man-made ditches created and managed under a public drainage association, natural and man-made systems that convey stormwater runoff only in direct response to precipitation events, and certain other man-made ditches specifically granted a variance and are located in Dorchester, Somerset, Wicomico, or Worcester counties, and approved by the appropriate plan approval authority (the SCD).

**Watercourse:** A definite channel with bed and banks within which concentrated water flows continuously or intermittently.

**Watershed Area:** All land and water within the confines of a drainage divide.

**Wetlands:** Geographic areas characteristically supporting hydrophytes, hydric soils and some saturation or flooding during the growing season.

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## APPENDIX A – EXAMPLES OF EROSION AND SEDIMENT CONTROL PLANS

The following pages contain:

- The Standard Erosion And Sediment Control Plan (Standard Plan),
- The Application for The Standard Erosion And Sediment Control Plan,
- Example of a completed standard plan showing the most basic plan; minimum width Streamside Management Zone and no cutting in the SMZ,
- Example of a completed standard plan showing wider SMZ, a waterway crossing and no cutting in the SMZ,
- Example of a completed standard plan showing harvesting adjacent to waters of the State in Dorchester, Somerset, Wicomico, or Worcester county,
- Example of a SMZ plan that can be used in association with a standard plan,
- Example of a Custom Erosion And Sediment Control Plan (Custom Plan) showing steep slope conditions and no cutting in the SMZ, and
- Example of a custom plan showing grading and Streamside Management Zone.

These examples may serve as guidance in preparing your plans. Other formats are possible. Specific requirements as to content, use of locally produced forms, and number of copies may vary from one approval authority to another. It is suggested that you check with your specific approval authority.

# STANDARD EROSION AND SEDIMENT CONTROL PLAN FOR FOREST HARVEST OPERATIONS IN MARYLAND (THE STANDARD PLAN)

## I. General Requirements

An erosion and sediment control plan is required for all harvests exceeding 5,000 sq. ft. of disturbed area, or which cross any perennial or intermittent watercourse.

This Standard Erosion and Sediment Control Plan may be used for forest harvest operations when all of the following conditions are met:

- Road cuts/fills are 3 feet or less (5 feet in Garrett, Allegany, Washington, & Frederick counties),
- Grades for haul roads do not exceed 15 percent,
- Landings are located on slopes 10 percent or less, and
- Grades for skid trails do not exceed 20 percent.

If the above conditions or any other criteria of this plan cannot be met, a Custom Erosion And Sediment Control Plan listing controls necessary to prevent erosion and ensure site stabilization will have to be submitted to the appropriate plan approval authority (the SCD) for approval.

**NOTE: Use of this Standard Plan by itself is intended only for sites having:**

- **No waters of the State, or**
- **An uncut Streamside Management Zone (SMZ) where roads, trails, and harvesting equipment are prohibited**

## II. Conditions

- A. Unless one operator assumes full responsibility for implementing this plan, all forest harvest operators working at a site must obtain an erosion and sediment control plan. An operator is defined as any individual or company that has contracted or subcontracted a portion of the harvest operation. This also applies to those operators conducting firewood cutting or separate forest harvest operations in conjunction with or subsequent to the initial harvest. Each operator must implement and maintain the required practices.
- B. The applicant shall notify the appropriate Inspection Agency at least seven days prior to commencing forest harvest operations. The inspection agency also must be notified at least five days prior to the completion of work.
- C. A copy of this plan and any applicable SMZ plan(s) shall be available on site during harvest operations.

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- D. Each site will be inspected periodically by local government and/or State inspectors for compliance with this Plan. State and local inspectors may require field modifications or a plan revision as conditions dictate, to prevent movement of sediment from the site. Plan revisions require approval by the appropriate plan approval authority (the SCD).
- E. Failure to properly implement or maintain the practices required by this plan, or to comply with written requirements for corrective action may result in the operation being stopped (issuance of a stop work order) until the deficiencies have been corrected. Failure to take required corrective action may also result in legal action.
- F. All erosion and sediment controls must be implemented in accordance with specifications contained in the document entitled the 2005 Maryland Erosion And Sediment Control Standards And Specifications For Forest Harvest Operations (the Standards And Specifications) available from the Maryland Department of Environment (MDE) or the Department of Natural Resources - Forest Service.
- G. The issuance of an approval by the MDE, a Soil Conservation District, a municipality not within a soil conservation district, or the Washington Suburban Sanitary Commission does not relieve the applicant of the continuing responsibility to effectively abate sediment pollution, and to comply with all other applicable local and State laws.

### III. Standard Plan Requirements

#### A. Site Maps:

- 1. Site maps or sketches shall be prepared for all harvests and submitted with the plan application to the appropriate plan approval authority (the SCD). The map shall identify the site location and provide directions and distances from the nearest major road intersection.
- 2. All access points, landings, haul roads, water bodies, uncut SMZ, and stream crossings must be identified on the map or sketch.
- 3. A more detailed map of SMZ areas is required when SMZ plans accompany the standard plan. The harvest area should also be delineated on a photocopy of the United States Geological Survey 7.5 Minute Series (Topographic) quadrangle maps (USGS maps.)

#### B. Site Access

- 1. Access points to the site shall be stabilized with wood chips, corduroy mats, a stone construction entrance or other methods approved in the Standards And Specifications. Any soil or debris that is tracked onto adjoining off-site roads shall be removed and deposited in a controlled area immediately.
- 2. A grading or entrance permit may be required for a new entrance onto a county or

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State road. Details may be obtained from the local permitting agency or the State Highway Administration.

- Existing public road drainage shall not be blocked or damaged by access construction. Pipe culverts or a bridge shall be installed if necessary to maintain existing drainage.

## C. Waterway Protection

- SMZ shall be marked and maintained on all sides of waters of the State. For the purpose of establishing the limits of the SMZ, waters of the State shall not include the 100 year floodplain, manmade ditches created and managed under a Public Drainage Association, or natural and man-made systems that convey stormwater runoff only in direct response to precipitation events (SEE THE TWO SPECIFICATIONS FOR STREAMSIDE MANAGEMENT ZONES in the Standards And Specifications and use the specification appropriate to the subject harvest.) These features are identified on USGS maps. The minimum SMZ width shall be 50 feet. This applies to land with no slope. Where sloping land is encountered, the following formula shall be adhered to:

$$50' \text{ feet} + (2 \text{ feet} \times \% \text{ slope}) = \text{SMZ width} \\ (\text{To A Maximum Of 150 Feet})$$

Example for 20% Slope:  $50' + (2' \times 20\%) = 50' + 40' = 90'$  SMZ

Average Percent Slope to Watercourse	Width of SMZ (ft) on Each Side of Watercourse
0	50
5	60
10	70
15	80
20	90

- New roads, trails and harvesting equipment shall not be allowed in any SMZ except to provide access to authorized stream crossings.
- Harvesting within the SMZ is not allowed unless a SMZ plan, along with the Standard Plan, is submitted to and approved by the appropriate plan approval authority (the SCD). This SMZ plan shall be prepared by a Maryland Licensed Forester and include the harvest method, the square footage of basal area to be removed and retained, provisions for removing and restocking the cut trees and other criteria established below and in the Standards And Specifications. All trees

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to be removed from the SMZ shall be marked at the base of the stump (so the mark remains after harvesting) by the Maryland Licensed Forester in advance of the harvest operation. Tree marking is not required if site is approved for clearcut.

In order for harvesting within the SMZ to be permitted, the approved SMZ plan must adhere to the following criteria. Basal area shall not be reduced below 60 square feet of evenly distributed trees which are 6 inches or greater in diameter, measured at 4.5 feet above the ground (diameter breast height, dbh). Where there is a sound silvicultural basis, the SMZ may be clearcut. The clearcut must be a part of the SMZ plan and approved by the appropriate plan approval authority (the SCD). Where clearcut is authorized, the SMZ plan shall specify that perimeter controls be implemented as close as practical to the body of water. Acceptable perimeter control includes silt fence, straw bale dike, approved vegetated buffer of specified width, and earth berm. Other practices may be approved by the appropriate plan approval authority. Any slash that inadvertently falls into adjacent water bodies must be pulled back to prevent waterway blockage. Except for stream crossings, no new roads shall be permitted within the SMZ. Timber cut within 50 feet of any waters of the State must be removed by cable, non-vehicular means, extended reach equipment, or by skidder using a limited number of passes. Limited number of passes is defined as ceasing use of the trail before the humus layer is compacted or otherwise disturbed. The use of low ground pressure equipment is strongly recommended. (See SPECIFICATIONS FOR STREAMSIDE MANAGEMENT ZONES in the Standards And Specifications.)

## D. Haul Roads and Skid Trails

1. Grading of existing roads and/or trails will be limited to that necessary to make them operable, provided that the requirements of Section D(2), (3), (4), (5), and (6) below are met. If any of the conditions cannot be met, an approved Custom Erosion And Sediment Control Plan will be required in order to utilize the existing roads and/or trails.
2. Haul roads and skid trails shall be laid out along natural land contours to avoid excessive cuts, fills, and grades. No road cut or fill shall exceed 3 feet (5 feet in Garrett, Allegany, Washington, and Frederick Counties). All roads requiring mapping must be flagged in advance of the harvest.
3. Crossing of perennial or intermittent streams should be avoided. Where it becomes necessary to cross either a perennial or an intermittent stream, a bridge, culvert, or ford crossing shall be temporarily installed. A MDE - Water Management Administration Waterway Construction Permit shall be obtained prior to crossing any stream. (SEE APPENDIX D AND G.1.)
4. Grades for haul roads shall not exceed 15 percent. Grades for skid trails shall not exceed 20 percent. If it is not feasible to maintain these grade limits, a custom erosion and sediment control plan that identifies the controls required to prevent

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erosion, must be approved by the appropriate plan approval authority (the SCD) prior to road or trail construction.

5. No haul roads or skid trails other than those providing access to waterway crossings shall be constructed within the SMZ. Drainage from approaches to waterway crossings shall be diverted to undisturbed areas.
6. Drainage structures shall be provided at the time of construction of haul roads and skid trails according to requirements contained in the Standards And Specifications.

## E. Landings

Landings shall be located outside of the SMZ. Landings shall be located on reasonably level (between 3 and 10 percent slope) well drained ground. If harvest sites do not have any area with a slope of at least 3 percent, landings shall be located on the maximum slope of the site. Landings located on slopes exceeding 10 percent shall require prior approval of a custom erosion and sediment control plan by the appropriate plan approval authority (the SCD).

## F. Stabilization

1. Following completion of installation of all perimeter erosion and sediment controls and all cut and fill slopes steeper than 3:1 (H:V) stabilization must be accomplished within seven calendar days.
2. For all other disturbance, stabilization must be accomplished within fourteen calendar days following completion of the activity.
3. Upon completion of the harvest, all roads, trails and landings located on slopes 10% or greater shall be graded or backdragged, and seeded and mulched according to specifications. The surface of roads and landings of trails less than 10 percent shall be backdragged and left in a condition that permits successful natural regeneration of trees, shrubs, or other annual and perennial plants. Under certain circumstances, stabilization of these roads and landings with seed and mulch shall be required.

## G. Maintenance

1. All practices installed shall be maintained at all times to function as intended.
2. Any practice that fails to function properly will be repaired or corrected immediately.



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**STANDARD PLAN – BASIC**

**Application**

**Site Plan**

**Location Map**

**Topo Map**

STANDARD EROSION AND SEDIMENT CONTROL PLAN  
FOR  
FOREST HARVEST OPERATIONS

I. Site Information

- A. Location ALPHA TRACT, BRUCEVILLE RD - 2.5 MILES FROM RT 408  
PART OF KENSYL PROPERTY  
(Include sketch map of property)
- B. Nature of Operation LOGGING Acres Harvested ±35AC  
(logging, woodchipping, firewood)

II. Landowner and Operator Information

- A. Landowner LEON KENSYL III Phone 555 555 1000  
Address PO BOX 7 DENTON MD 21629
- B. Operator IKOM - ISAW LOGGING COMPANY  
Address 5 PINE TREE WAY  
Phone 555 555 1200 Current F.P.O. Lic. # 7

1. List the names of other operators who will be involved in the harvest and the nature of their operations. NONE
2. If you are subcontracting to any of the operators listed above, do you assume responsibility for ensuring their compliance with this plan? YES. If you answered no, they must obtain a separate plan in advance of their operations.

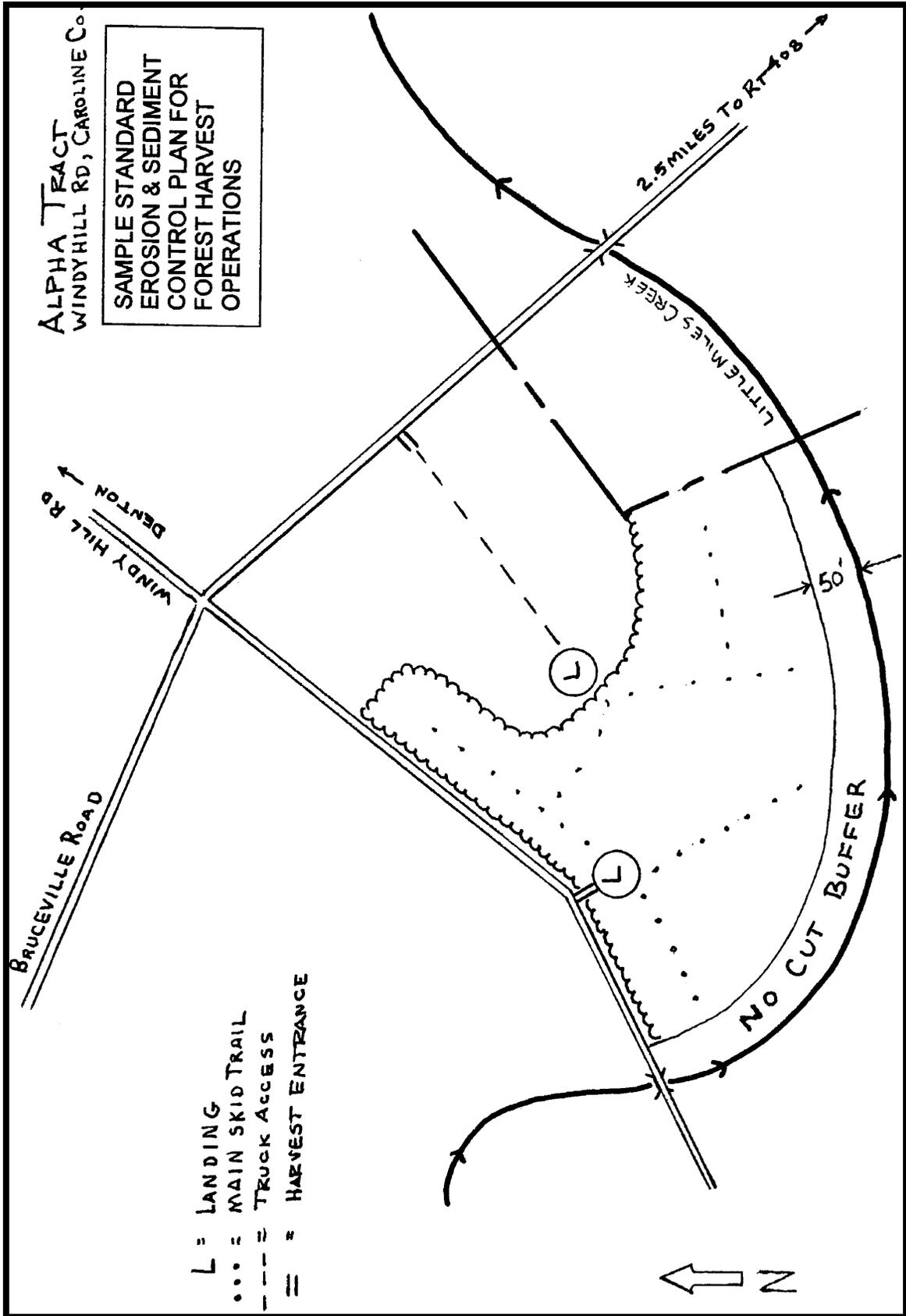
III. Agreement

- A. I/We agree to adhere to the terms of the attached Standard Plan for Forest harvest Operations and to grant inspectors the right of entry to the site to monitor compliance.
- B. I am aware of the landowner's responsibility in preventing accelerated erosion and sedimentation during and subsequent to forest harvest operations as mandated by the rules and regulations adopted by the State of Maryland and local jurisdictions.
- C. I agree to require that all operators conducting forest harvest operations on my property adhere to the requirements of the standard plan.

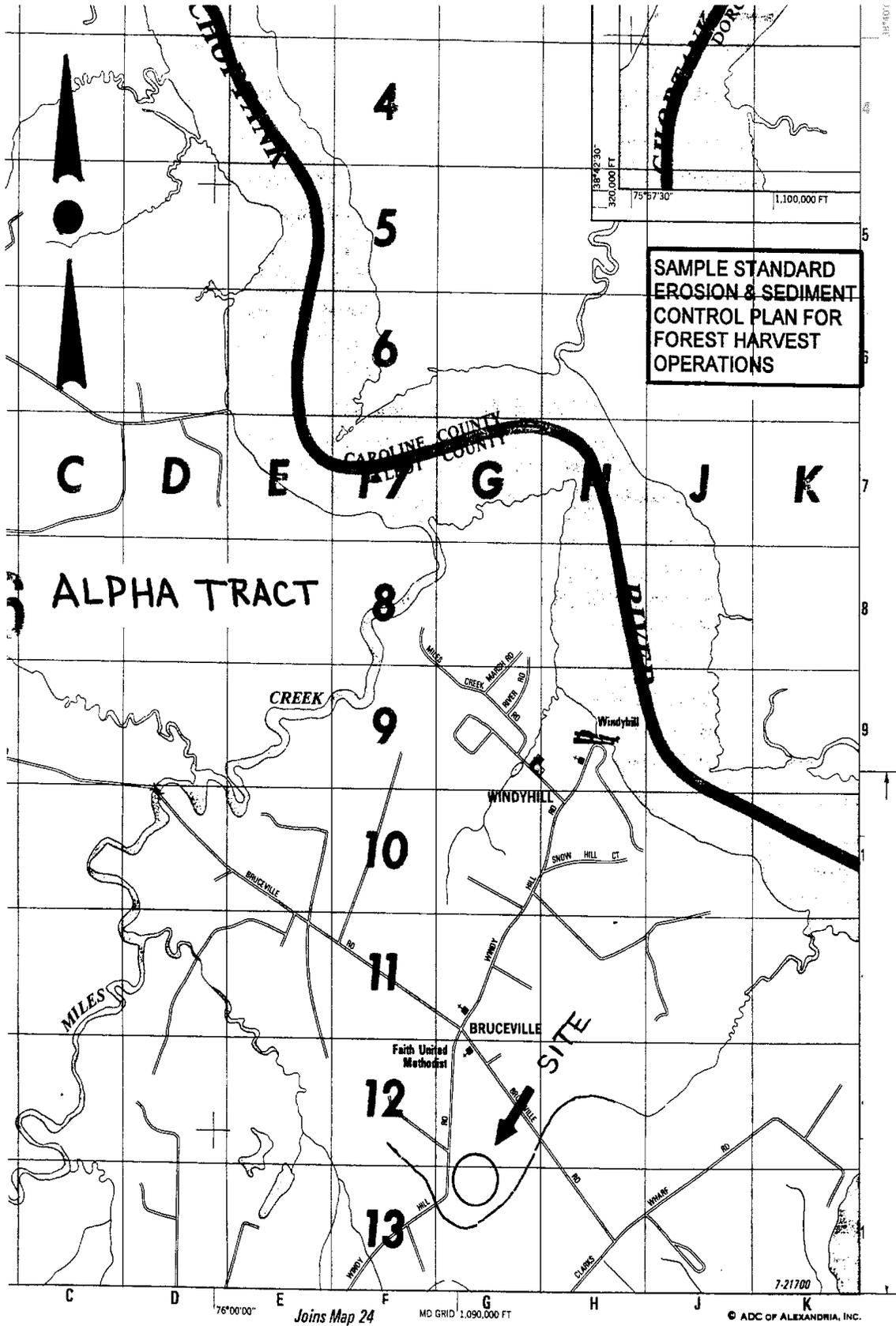
Leon Kensyl 1/20/05 Bunny Radcliffe 1/20/05  
Landowner Date Operator Date

D. Approved: Angel Worm 1/22/05  
Soil Conservation District Date

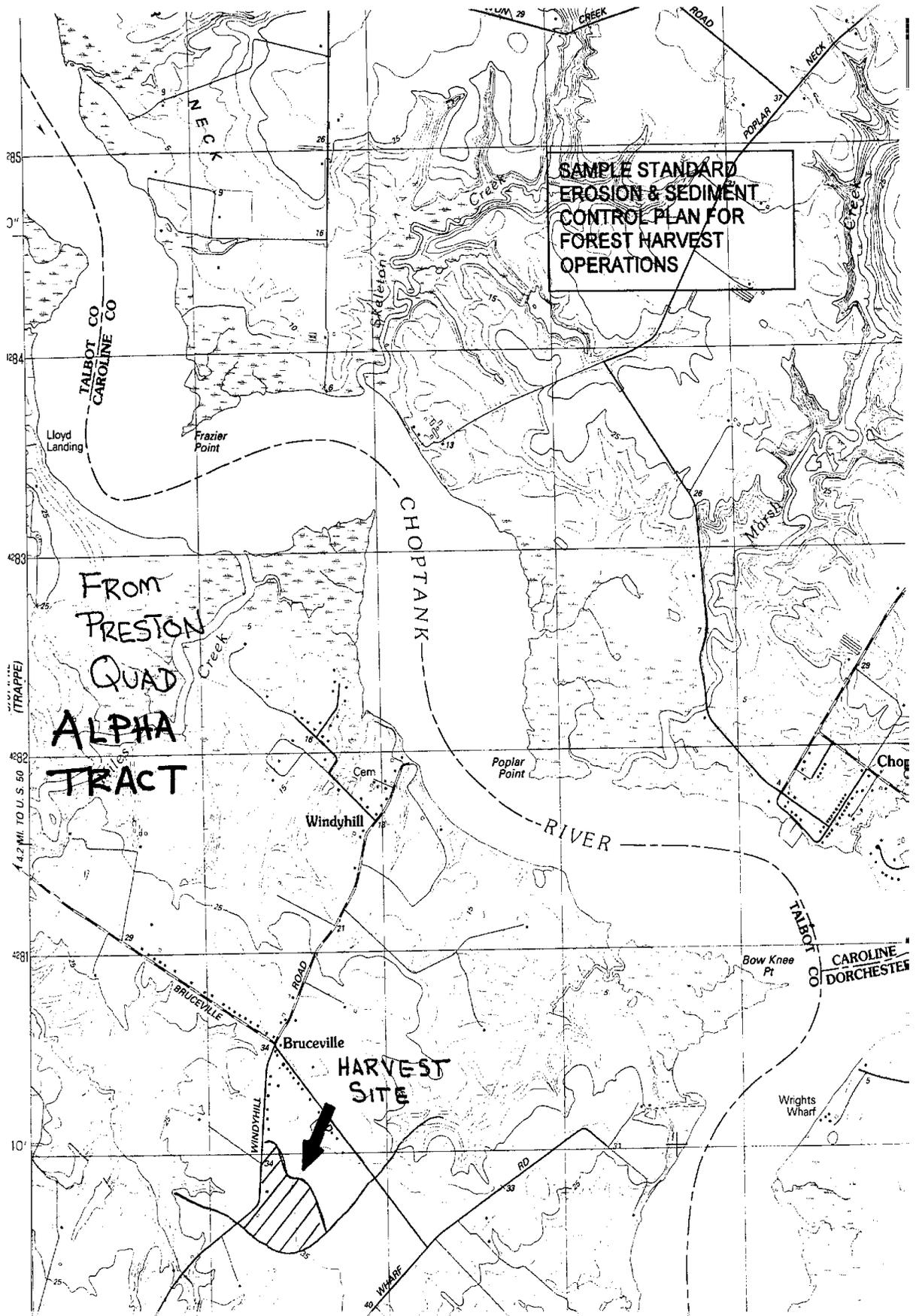
**SAMPLE STANDARD EROSION  
& SEDIMENT CONTROL PLAN  
FOR FOREST HARVEST OPERATIONS**



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**STANDARD PLAN – COMPLEX**

**Application**

**Site Plan**

**Location Map**

**Topo Map**

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## STANDARD EROSION AND SEDIMENT CONTROL PLAN FOR FOREST HARVEST OPERATIONS

### I. Site Information

- A. Location: BETA TRACT 3715 IRONSIDES RD  
4 MILES WEST OF RT. 6  
(Include Sketch Map Of Property)
- B. Nature of Operation: LOGGING/FIREWD Acres harvested: 113  
(Logging, Woodchipping, Firewood)

### II. Landowner and Operator Information

- A. Landowner: ED BOARDMAN Phone: 410 333 3333  
Address: 3715 IRONSIDES RD GRAYTON, MD 21703
- B. Operator: JAKE CHOPPER  
Address: 3 HIGHLANDS RD SIBLING W. VA 30015  
Phone: 722 222 222 Current F.P.O. Lic. #: 7

1. List the names of other operators who will be involved in the harvest and the nature of their operations: NONE
2. If you are subcontracting to any of the operators listed above, do you assume responsibility for ensuring their compliance with this plan? N/A  
If you answered no, they must obtain a separate plan in advance of their operations.

### III. Agreement

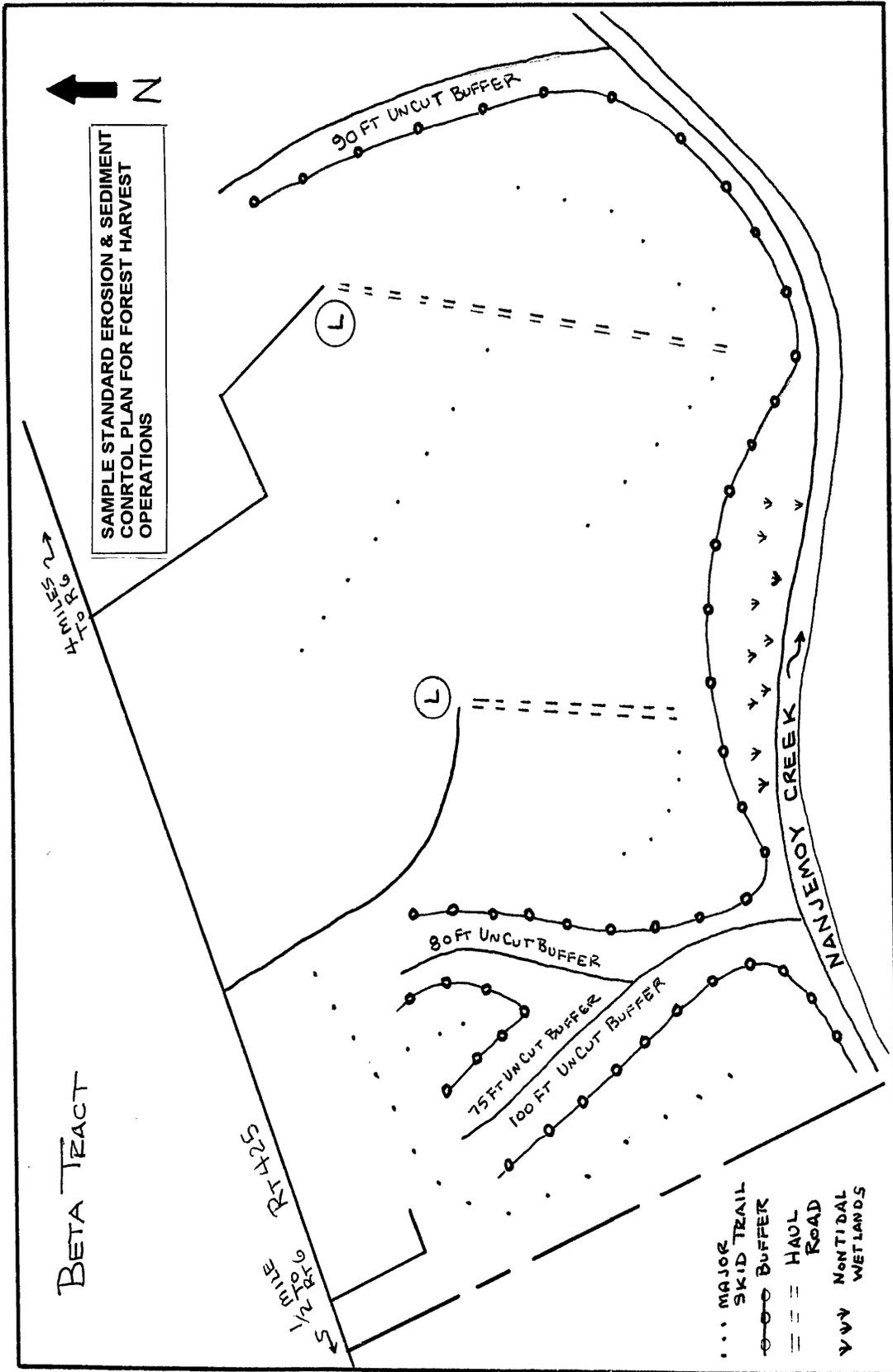
- A. I / We agree to adhere to the terms of the attached Standard Plan For Forest Harvest Operations and to grant inspectors the right of entry to the site to monitor compliance.
- B. I am aware of the landowner's responsibility in preventing accelerated erosion and sedimentation during and subsequent to forest harvest operations as mandated by the rules and regulations adopted by the State of Maryland and local jurisdictions.
- C. I agree to require that all operators conducting forest harvest operations on my property to adhere to the requirements of the Standard Plan.

Ed Boardman 3/30/05 Jake Chopper 3/30/05  
Landowner Date Operator Date

Approved: Augie Worn 3/31/05  
Soil Conservation District Date

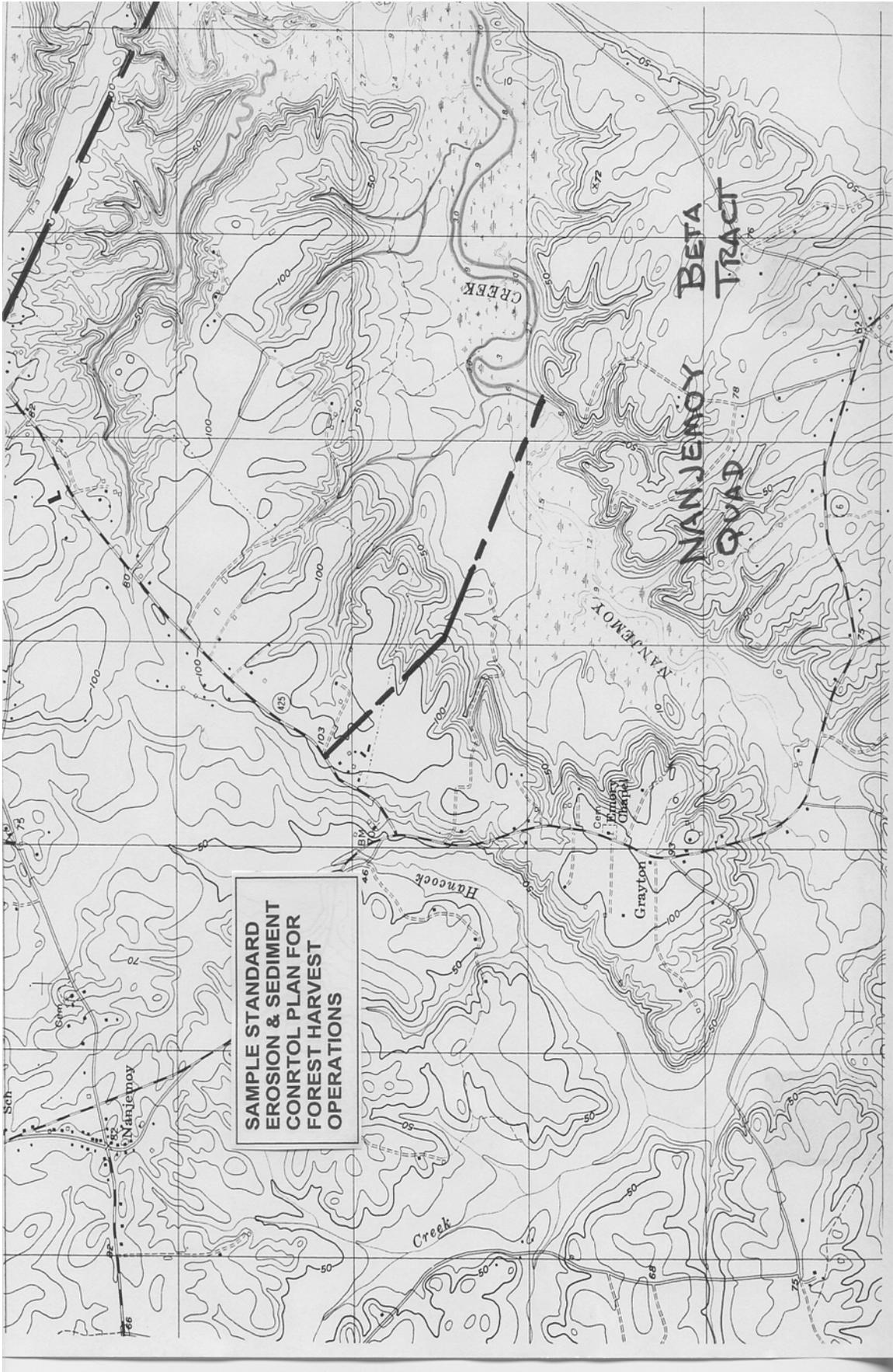
SAMPLE STANDARD EROSION &  
SEDIMENT CONRTOL PLAN FOR  
FOREST HARVEST OPERATIONS

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## **STANDARD PLAN – MANMADE DITCH ISSUES**

**Application**

**Site Plan**

**Channel Detail**

**Location Map**

**Topo Map**

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STANDARD EROSION AND SEDIMENT CONTROL PLAN  
FOR  
FOREST HARVEST OPERATIONS

I. Site Information

A. Location GAMMA TRACT - RICKRACK RD, 3.7 MILES NORTH OF RT. 413

(Include sketch map of property)

B. Nature of Operation LOGGING Acres Harvested 7.9  
(logging, woodchipping, firewood)

II. Landowner and Operator Information

A. Landowner STONE-OBX ENTERPRISES Phone 252 555 5555

Address PO BOX 8 WILSON NORTH CAROLINA 98765

B. Operator SAW AND AXE CLEARING COMPANY

Address 757 SAWMILL LANE

Phone 555 555 1111 Current F.P.O. Lic. # 3

1. List the names of other operators who will be involved in the harvest and the nature of their operations. NONE

2. If you are subcontracting to any of the operators listed above, do you assume responsibility for ensuring their compliance with this plan?  
YES. If you answered no, they must obtain a separate plan in advance of their operations.

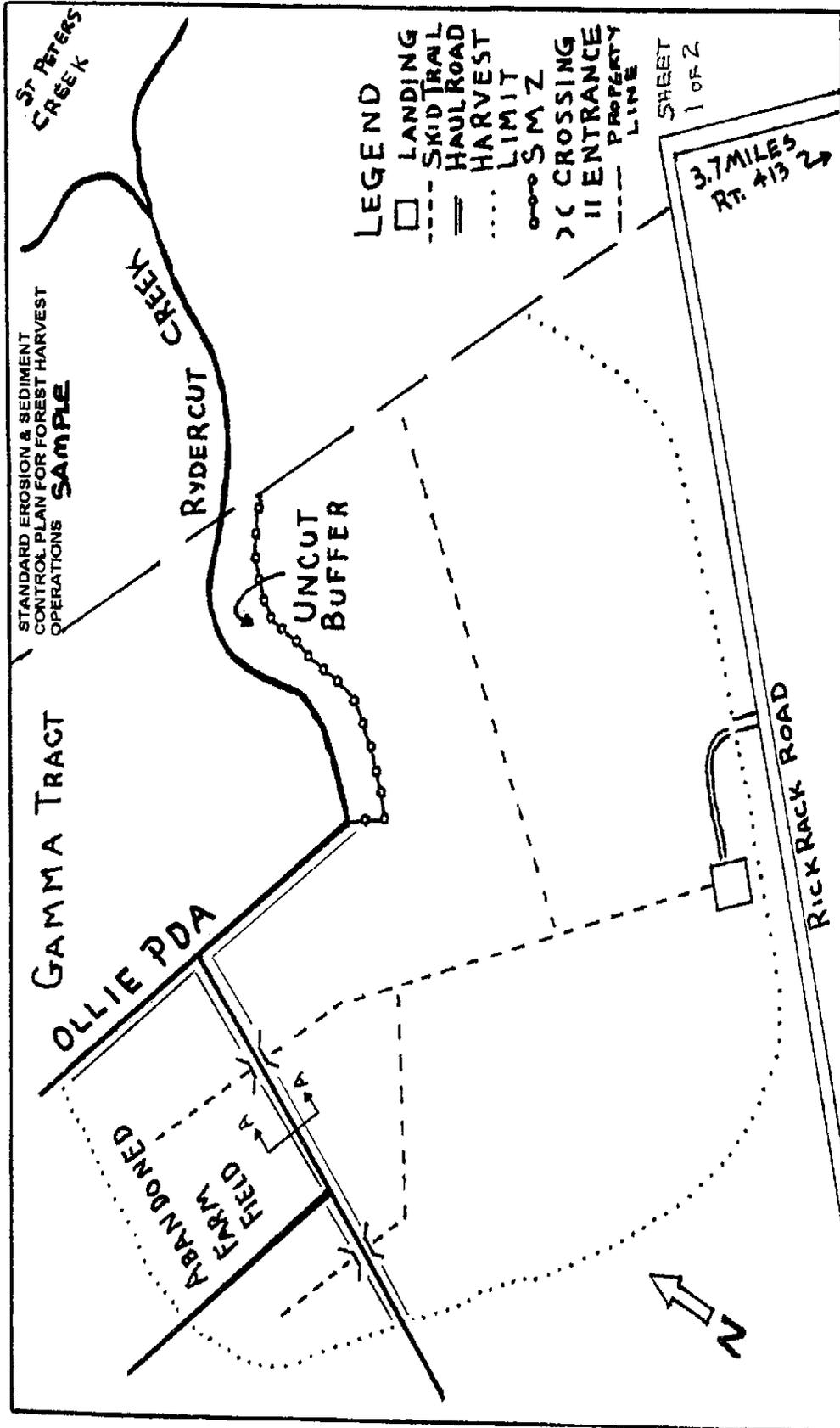
III. Agreement

- A. I/We agree to adhere to the terms of the attached Standard Plan for Forest harvest Operations and to grant inspectors the right of entry to the site to monitor compliance.
- B. I am aware of the landowner's responsibility in preventing accelerated erosion and sedimentation during and subsequent to forest harvest operations as mandated by the rules and regulations adopted by the State of Maryland and local jurisdictions.
- C. I agree to require that all operators conducting forest harvest operations on my property adhere to the requirements of the standard plan.

Robert Storrman 2/28/05 Frederick Sutter 2/28/05  
Landowner Date Operator Date

D. Approved: Angie Kozm 3/5/05  
Date

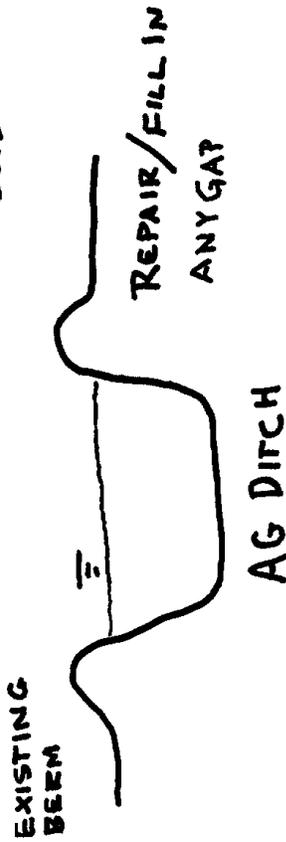
SAMPLE STANDARD EROSION  
& SEDIMENT CONTROL PLAN  
FOR FOREST HARVEST  
OPERATIONS



NOTE

IN LOCATIONS  
ADJACENT TO  
DITCHES WITHOUT  
ESTABLISHED SMZ  
THE EXISTING EARTH  
BERM WILL KEEP  
SEDIMENT LADEN  
STORMWATER RUN  
OFF OUT OF DITCHES

EXISTING BERM  
SIDE CAST MATERIAL  
FROM PREVIOUS DITCH  
CLEAN OUTS



PLAN SYMBOL

SECTION A-A  
TYPICAL  
NTS

GAMMA TRACT  
SITE PLAN  
SHEET 2 OF 2





# **DRAFT**

## **SMZ PLAN**

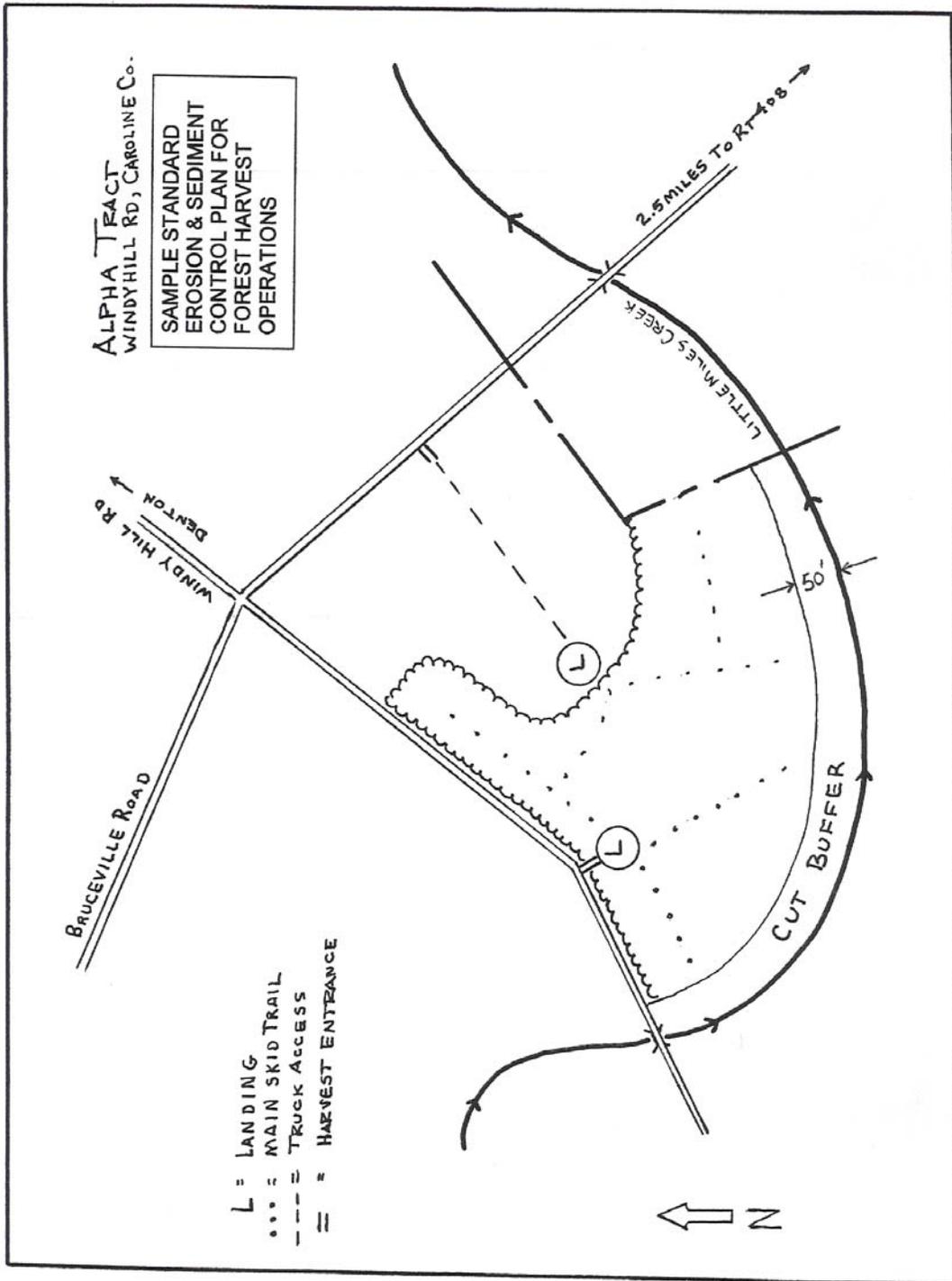
### **Caroline Forestry Associates**

#### **ALPHA TRACT BRUCEVILLE ROAD CAROLINE COUNTY**

The Streamside Management Zone will be field marked with blue flagging. There are no existing roads in the SMZ and no new ones will be constructed. No skid trails are shown in the SMZ; only a limited number of passes will be made through any one portion of the zone so as not to compact the humus layer. Any disturbance or compaction will be repaired prior to leaving that section of the tract. Any earth disturbance throughout the tract will be stabilized within seven days of the disturbance.

Timber to be cut in the SMZ will be marked at eye level and at the base of the stump. Timber felled within the last 50 feet of the zone will be skidded out using the least number of passes possible and skidding will cease before the humus layer is damaged.

Equipment will be serviced off site.



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## **CUSTOM PLAN – NO WORK IN THE SMZ**

**Plan Information**

**Site Plan**

**Location Map**

**Topo Map**

# DRAFT

## FREDERICK FORESTRY ASSOCIATES

Location: Delta Tract, 7500 Black Ankle Road; bounded by Talbot Branch to the north and Black Ankle and Buffalo Roads on the south.

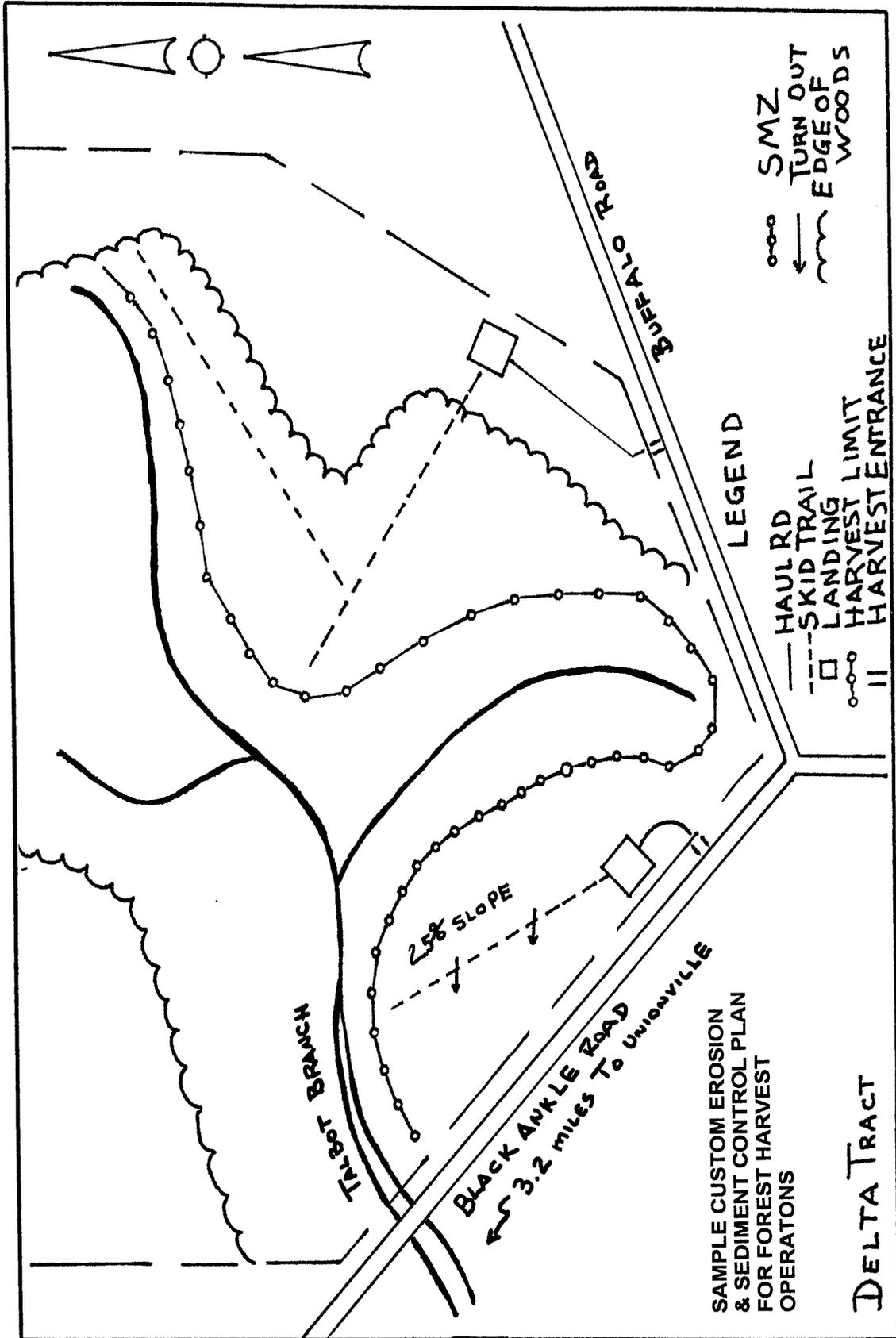
Owner: Nathan Broadbeam, P. O. Box 8, Uniontown Maryland 21212

Erosion And Sediment Control Plan: This harvest will follow the criteria as set down in the standard erosion and sediment control plan except for one section of skid trail that has a slope of approximately 25%. This trail is located on the western side of the tract, adjacent to Black Ankle Road. Turnouts will be installed along this trail every 50 feet. There will be no harvesting in the SMZ.

### SPECIFICATIONS FOR WATER TURNOUTS

1. The turnout shall intersect the ditch line at an equal depth and be outsloped 1 to 3 percent.
2. On sloping roads, the turnout shall be 30 degrees to 45 degrees downslope.
3. Turnouts shall be spaced to allow the roadbed to dry out and reduce the volume and velocity of side ditch waters.
4. Runoff water shall be spread at the outlet of the turnout.
5. Turnouts shall not feed directly into adjacent drainages or channels.

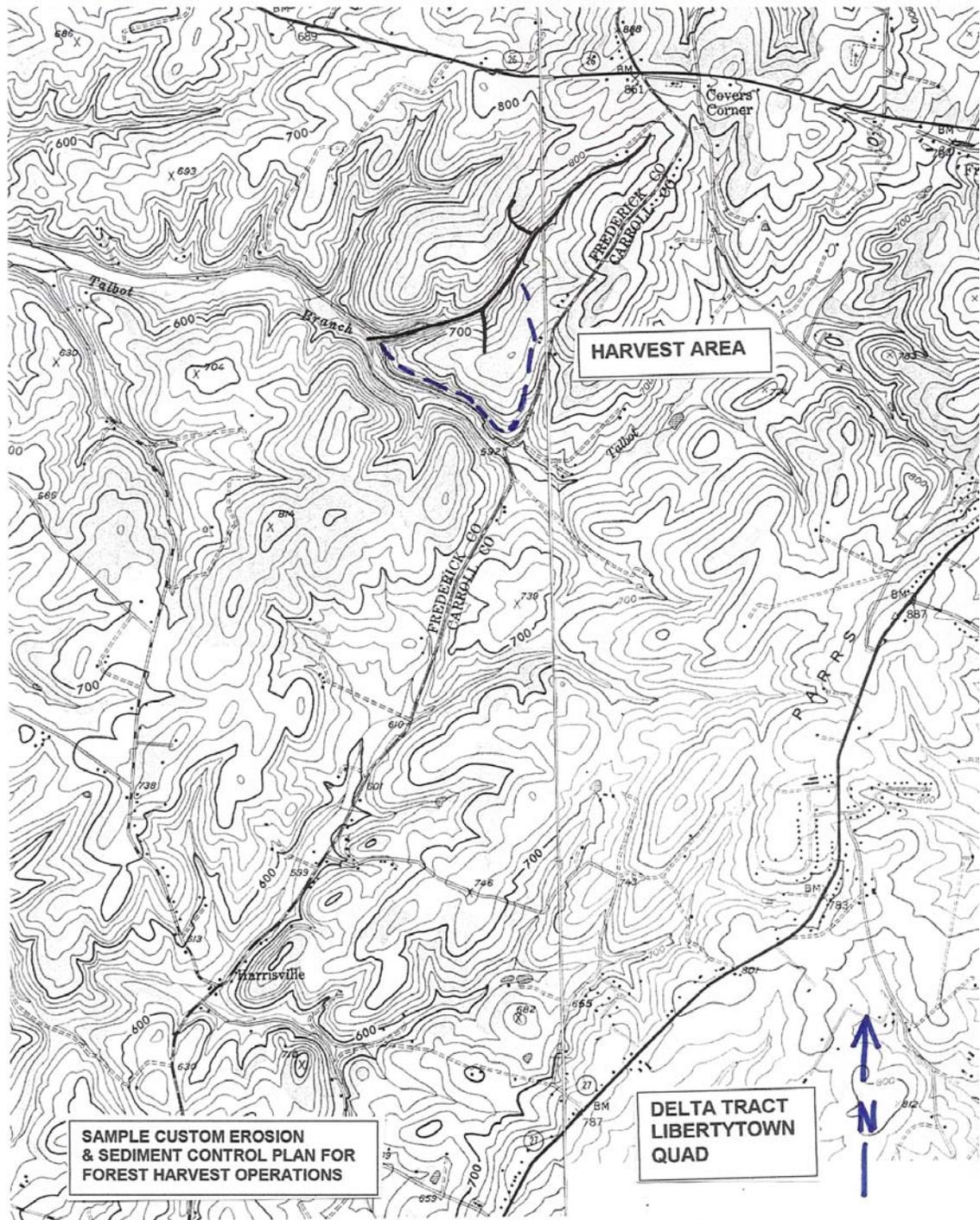
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## CUSTOM PLAN – INCLUDES SMZ ISSUES

**Plan Information**

**Site Plan**

**Location Map**

**Topo Map**

# DRAFT

## Allegheny Forestry Associates

### COLLIER TRACT WILLIAMS ROAD ALLEGANY COUNTY

The harvest of this site requires:

- over five feet of grading to install one skid trail,
- skid trails with approximately 25% slopes and
- cutting in the Streamside Management Zone.

Cut material will be graded out adjacent to the skid trail and stabilized in accordance with the standards and specifications. Turnouts will be installed every 50 feet along the skid trail where the slope exceeds 20%. In no case will the trail slope exceed 20% for more than 200 feet.

The Streamside Management Zone will be field marked with blue flagging. There are no existing roads in the SMZ and no new ones will be constructed except to access two waterway crossings. No skid trails are shown in the SMZ; only a limited number of passes will be made through any one portion of the zone so as not to compact the humus layer. Any disturbance or compaction will be repaired prior to leaving that section of the tract. Any earth disturbance throughout the tract will be stabilized within seven days of the disturbance.

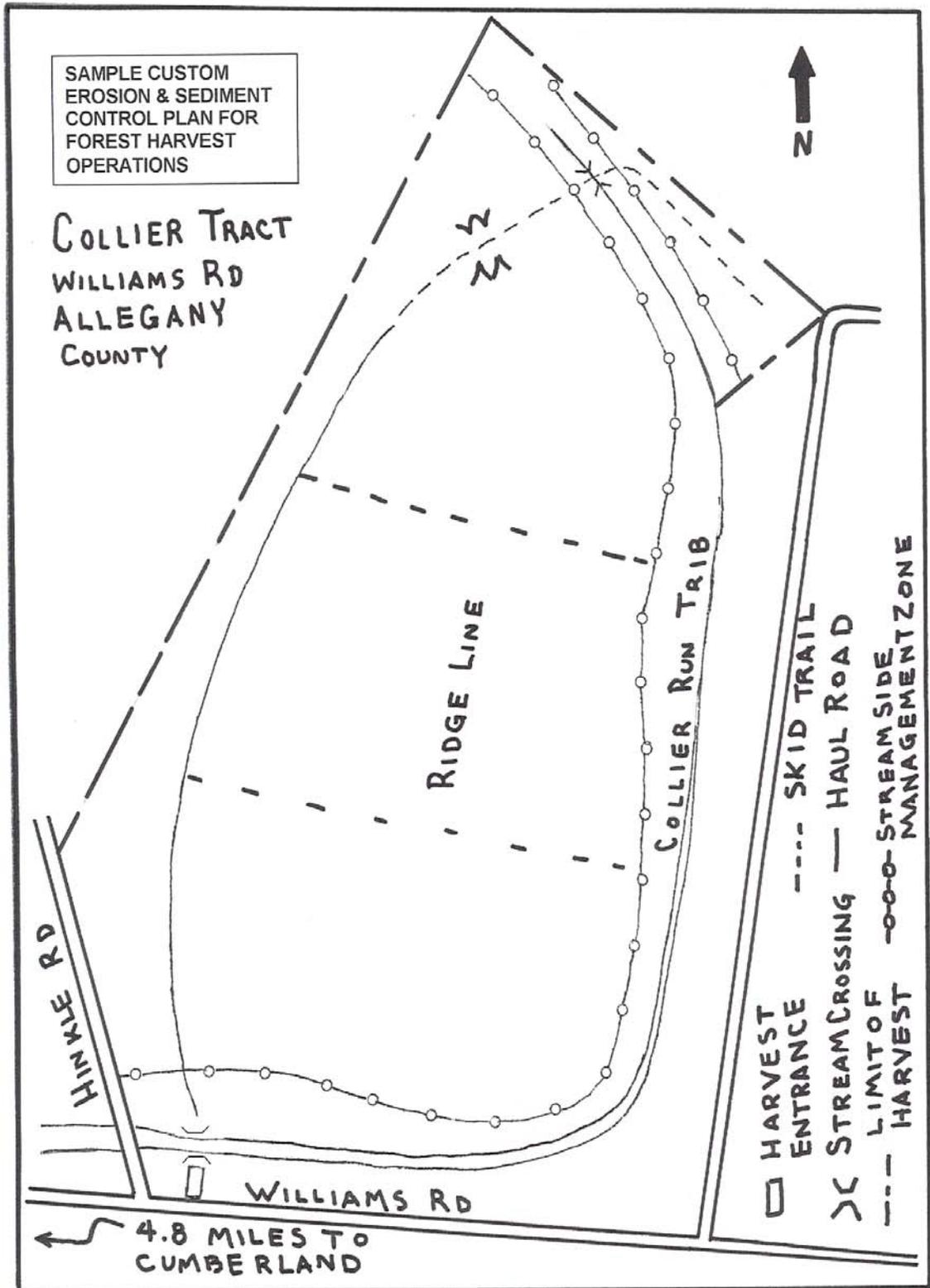
Timber to be cut in the SMZ will be marked at eye level and at the base of the stump. Timber felled within the last fifty feet adjacent to the stream will be skidded out using the least number of passes possible and skidding will cease before the humus layer is damaged.

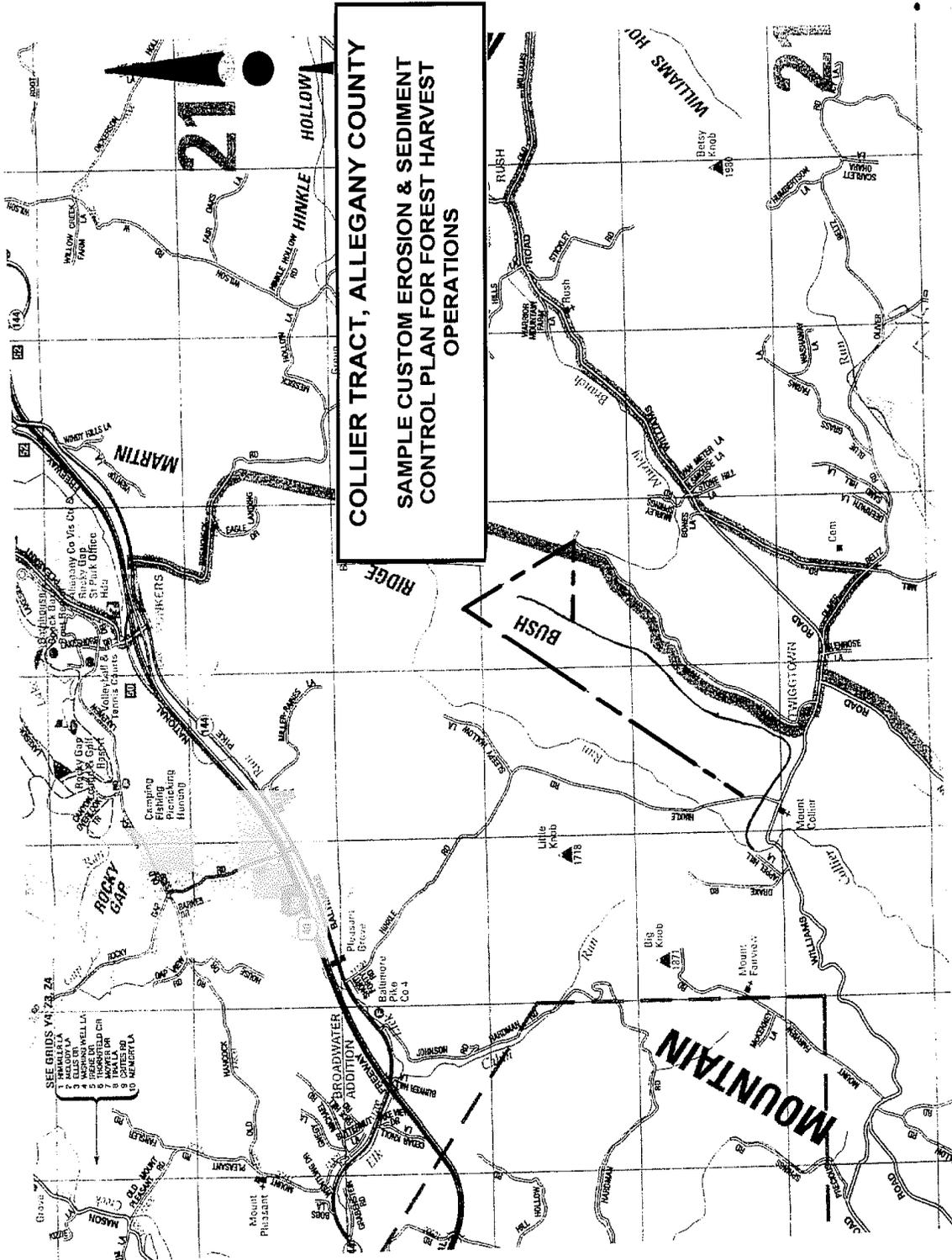
Equipment will be serviced off site.

#### **Specifications For Turnouts**

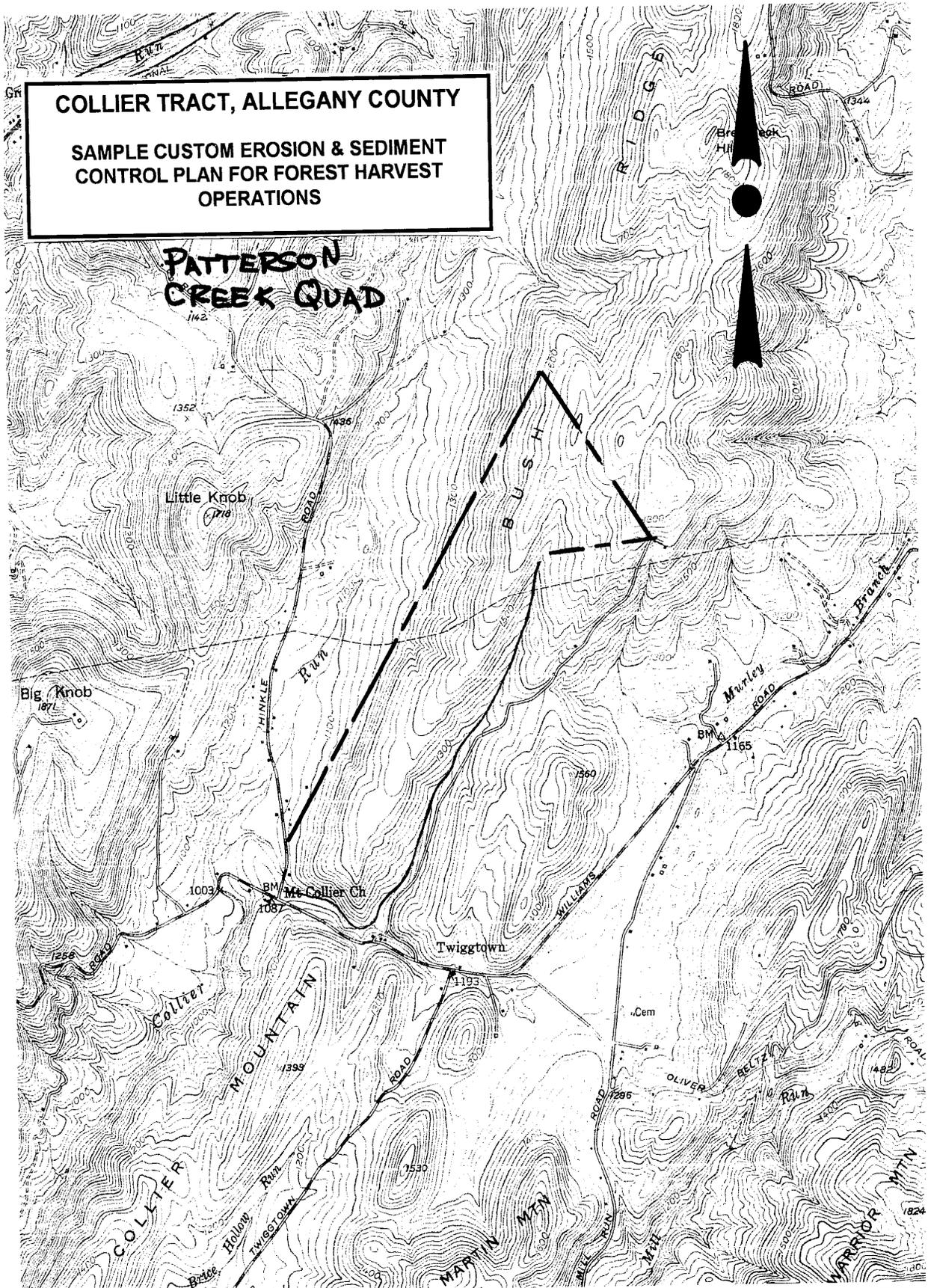
1. The turnout shall intersect the ditch line at an equal depth and be outsloped 1 to 3 percent.
2. On sloping roads, the turnout shall be 30 degrees to 45 degrees downslope.
3. Turnouts shall be spaced to allow the roadbed to dry out and reduce the volume and velocity of side ditch waters.
4. Runoff water shall be spread at the outlet of the turnout.
5. Turnouts shall not feed directly into adjacent drainages or channels.

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APPENDIX B – USDA CODE 342

Critical Area Planting 342-1

USDA  
 NATURAL RESOURCES  
 CONSERVATION SERVICE  
 MARYLAND CONSERVATION  
 PRACTICE STANDARD  
 CRITICAL AREA PLANTING  
 CODE 342  
 (Reported by Acre)

**DEFINITION**

Planting vegetation, such as trees, shrubs, vines, grasses, or legumes on highly erodible or critically eroding areas.

**PURPOSES**

This practice may be applied for one or more of the following purposes:

1. To reduce soil erosion by wind and water;
2. To improve water quality by reducing off-site sediment movement;
3. To improve wildlife habitat and visual resources.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to all land uses where soil stabilization requires using specialized plant species and establishment methods.

Examples of applicable areas include conservation structures, embankments, cuts, fills, mined areas, roadsides, landfills, spoilbanks, filter strips, and recreation areas.

This practice does not apply to tree planting that is primarily intended for production of timber and other forest products. (Refer to the conservation practice standard for Tree/Shrub Establishment, Code 612.)

**CONSIDERATIONS**

Assess site conditions including surrounding land uses, soils, available moisture during the growing season, and existing vegetation on the site and in adjacent areas, including any noxious weeds that may be present.

Take note of other constraints such as economic feasibility, access, regulatory or program requirements, social effects, and visual aspects.

Consider the need for structural practices, in addition to this vegetative practice, to stabilize a critically eroding site.

Consider the time of year for installation of this practice. Avoid periods of high runoff velocities, or temporarily divert runoff from the planted area. This will allow the vegetation to become well established before it is subjected to storm flows.

Consider long-term maintenance requirements of the established vegetation.

**CRITERIA**

**General Criteria**

**Grading Plan** - The grading plan and practice installation shall be based upon adequate topographic surveys and investigations. The plan shall show the location, slope, cut, fill, and finish elevation of the surfaces to be graded. The plan shall also include auxiliary practices for safe disposal of runoff water, slope stabilization, erosion control, and drainage. Practices such as waterways, ditches, diversions, grade stabilization structures, retaining walls and subsurface drains shall be included where necessary.

**Site Preparation** - Timber, logs, brush, rocks, stumps and vegetative matter that will interfere with the grading operation or affect the planned stability of fill areas shall be removed and disposed of according to the plan.

Strip and stockpile topsoil in amounts necessary to complete finish grading of all exposed areas requiring topsoil. A minimum 4-inch stripping

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

## Critical Area Planting 342-2

depth shall be used, depending on the particular soil.

Fill material shall be free of brush, rubbish, timber, logs, stumps, and other vegetative matter in amounts that is detrimental to constructing stable fills.

All disturbed areas shall be left with a generally smooth finish and shall be protected from erosion.

Include provisions to safely conduct surface water to storm drains or suitable watercourses and to prevent surface runoff from damaging cut faces and fill slopes. In areas having a high water table, provide subsurface drainage to intercept seepage that would adversely affect slope stability, building foundations, or create undesirable wetness.

Protect adjoining properties from sedimentation associated with excavation and filling operations.

Do not place fill material adjacent to the bank of a stream or channel, unless provisions are made to protect the hydraulic, biological, aesthetic and other environmental functions of the stream.

**Plant Materials** - Select plant species based on their adaptability to the environmental conditions present and to the planned land use. Herbaceous and/or woody plants may be appropriate. For best results, use species and varieties with proven conservation traits.

Species shall be selected based on:

1. Climatic conditions, such as annual and seasonal rainfall, growing season length, humidity, and USDA Plant Hardiness Zones (see Figure 1);
2. Soil and site conditions such as drainage class, pH, available water holding capacity, slope, aspect, shade, inherent fertility, salinity or alkalinity, flooding or ponding, and levels of toxic elements such as aluminum and heavy metals;
3. Plant characteristics, such as:
  - a. Ease of establishment, persistence, and time needed for full stand establishment;

b. Growth habit (e.g., sod or bunch) as it relates to surface cover;

c. Rooting depth and spread as it relates to slope stability;

d. Resistance to dislodgment by flowing water or wave action at various velocities and depths;

e. Season of growth (warm or cool) and life cycle (annual, perennial, or biennial);

f. Fertility and management requirements;

g. Visual appeal;

h. Suitability as wildlife food and/or cover.

Plant materials shall either be native to Maryland, or introduced and non-invasive (i.e., not likely to spread beyond the planted area and displace native species). When feasible, select locally native plant species and/or species that are beneficial to wildlife.

Site preparation and planting to establish vegetative cover shall be done at a time and manner to insure survival and growth of selected species. Provide supplemental moisture if and when necessary to assure early survival and establishment of selected species.

Only viable, high quality seed and planting stock shall be used. The method of planting shall include hand or machine planting techniques, suited to achieving proper depths and placement for the selected plant species.

Vegetation may be established by using seed, bare-root seedlings, containerized stock, or balled-and-burlapped stock. Younger planting stock is generally preferred to older stock because younger plants adapt more readily to new conditions.

Protect the planting from unacceptable impacts due to pests, wildlife, livestock, or fire. Exclude livestock as needed to establish the planting.

Control noxious weeds as required by state law.

**Additional Criteria for Soil Amendments**

Use soil tests to determine the optimum recommendations for both lime and fertilizer. Soil analysis shall be performed by a soil testing laboratory that has been accredited by the North American Proficiency Testing Program, preferably the University of Maryland Soil Testing Laboratory. At a minimum, soil samples taken for nutrient and pH analysis shall be from the soil layer that will be used as the surface layer (top 4 to 6 inches) for seeding. Follow sampling procedures recommended by the laboratory.

**Lime** - Apply lime to achieve a soil pH of 6.0 if legumes are included in a planting, and 5.5 if only grasses or woody plants are used. Lime materials shall be ground agricultural limestone that contains at least 50% total oxides (calcium plus magnesium oxide). Hydrated lime may be substituted for agricultural lime, except in hydroseeding applications. Do not use burnt lime as a soil amendment.

Pulverized limestone shall be ground to such fineness that at least 50% will pass through a 100-mesh sieve and at least 98% will pass through a 20-mesh sieve. Apply pulverized limestone with a drop spreader when high winds will not interfere with uniform distribution of the material or cause nuisance dust. Pulverized limestone may also be used in a hydroseeding slurry.

Granular limestone shall be of such fineness that at least 30% will pass through a 100-mesh sieve, at least 50% through a 60-mesh sieve, and at least 98% through a 20-mesh sieve. Apply granular limestone with a drop or rotary spreader, but do not use it in a hydroseeding slurry.

Pelletized limestone, a product composed of pellets of pulverized limestone, shall be of a pellet type and size that is recommended by the manufacturer for use with turfgrass. The limestone used in the manufacture of the pelletized limestone product shall meet the minimum fineness requirements for pulverized limestone. Apply pelletized limestone with a drop or rotary spreader, or include it in a hydroseeding slurry.

When a soil test is not feasible, apply lime according to the rates specified as follows:

Soil Texture	Limestone Application Rate	
	Tons/Acre	Lbs./1,000 SF
Clay, clay loam, and highly organic soil	3	135
Sandy loam, loam, silt loam	2	90
Loamy sand, sand	1	45

Limestone applied at rates greater than 50 pounds per 1,000 square feet (or greater than 1 ton per acre) shall be incorporated into the upper 4 to 6 inches of the soil. Limestone applied at lower rates may be incorporated or left on the soil surface.

**Fertilizer** - The use of commercial fertilizer and other forms of plant nutrients must be in compliance with Maryland nutrient management regulations, as applicable. Apply fertilizer to prepared seedbeds, as needed based on soil test results. Fertilizer applied without a soil test may result in an inefficient quantity of nutrients for plant establishment, or could result in overapplication of nutrients leading to potential water quality problems and excessive weed growth. However, in circumstances when obtaining a soil test is not feasible, and a site is likely to have low nutrient levels, use the following rates for fertilizer applications:

1. Cool-season grass: 500 pounds per acre (or 10 pounds per 1,000 square feet) of 10-20-20 or equivalent;
2. Cool-season grass + legume: 500 pounds per acre (or 10 pounds per 1,000 square feet) of 5-20-20 or equivalent;
3. Warm-season grass or warm-season/cool-season grass mixes: 500 pounds per acre (or 10 pounds per 1,000 square feet) of 0-10-10 or equivalent. Nitrogen is generally not recommended for use during the establishment of warm-season grass because it encourages increased weed competition. However, on sites with very low fertility and

## Critical Area Planting 342-4

minimal likelihood of weed competition, 30 pounds per acre (0.7 pound per 1,000 square feet) of slow-release N may be applied at the time of planting, or 40 pounds per acre (1 pound per 1,000 square feet) of soluble N after grass emergence.

4. Warm-season grass + legume, or warm-season/cool-season grass mixes + legumes: 500 pounds per acre (or 10 pounds per 1,000 square feet) of 0-10-10 or equivalent. On very low fertility sites where there is minimal weed competition, apply 20 pounds per acre (0.5 pound per 1,000 square feet) of N after emergence.

All fertilizer shall be uniform in composition, free-flowing, and suitable for application by approved equipment. Fertilizers shall be delivered to the site fully labelled according to applicable state fertilizer laws, and shall bear the name, trade name, or trademark and warranty of the producer. When feasible, use slow-release forms of nitrogen to provide nitrogen over a longer period of time, and to reduce nitrogen leaching and runoff.

**Organic Amendments** - Apply manure and compost at a rate based on a nutrient analysis of that material. Organic amendments to sites shall be recommended only after an evaluation of any potential water quality hazards. To the extent practical, incorporate organic amendments into the upper 4 to 6 inches of the soil with a disk, springtooth harrow, or other suitable equipment.

### **Additional Criteria for Topsoil**

Topsoil shall be added to a site when needed to improve the soil medium for plant establishment and growth. The use of topsoil shall be limited to slopes that are 2:1 or flatter.

Exposed soils shall be topsoiled if they have one or more of the following limiting factors:

1. Very shallow to bedrock or other restrictive layer (e.g., the subsoil is less than 6 inches deep);
2. Extremely acidic (pH less than 5.0); or,
3. Extremely salty (conductivity greater than 500 parts per million, or 4.0 millisiemens per centimeter).

Topsoil may also be used when assurance of improved vegetative growth is desired.

**Topsoil Quality** - Topsoil shall be friable and loamy, free of debris, stones, or other materials larger than 1.5 inches in diameter. It shall be free of any known viable seeds or plant parts of objectionable weeds such as Johnsongrass, shattercane, thistle, multiflora rose, or others as specified.

Topsoil shall contain no toxic substance that may be harmful to plant growth. Soluble salts shall not be excessive (concentration greater than 500 parts per million). A pH range of 5.5 to 7.5 is required. If pH is less than 5.5, lime shall be applied and incorporated with the topsoil to adjust the pH to between 5.5 and 7.5. A pH of 6.5 is ideal. Topsoil hauled in from off-site shall have a minimum organic matter content of 1% by weight, based on soil test results.

**Topsoil Application** - Before topsoiling, test the pH of the exposed subsoil. If the subsoil is highly acidic, add ground agricultural limestone at the rate of 4 to 8 tons per acre (200 to 400 pounds per 1,000 square feet). Distribute the lime uniformly, and work it into the subsoil as previously described in the section concerning Soil Amendments.

Immediately before spreading topsoil, the subsoil shall be loosened by disking or scarifying to provide a good bond for the topsoil. Where the slope of the site is flatter than 3:1, loosen the subsoil to a minimum average depth of 2 inches. On steeper slopes (up to 2:1), loosen the subsoil to a depth of 0.5 to 1 inch, or use a bulldozer to track up and down slope to create horizontal check slots that will prevent topsoil from sliding down the slope.

Topsoil shall only be handled when it is dry enough to work (less than field capacity) without damaging soil structure. Do not spread topsoil when it is partly frozen or muddy, or on frozen slopes covered with ice or snow.

Topsoil shall be uniformly applied in a 5 to 8 inch layer, and lightly compacted to a minimum thickness of 4 inches. Subsoil with a pH of 4.0 or less, or containing iron sulfide, shall be covered with a minimum depth of 12 inches of topsoil.

Topsoil placed on slopes greater than 5% shall be promptly limed and fertilized (if needed), seeded, mulched, and tracked with suitable equipment.

#### Additional Criteria for Seedbed Preparation

Seedbed preparation shall be done when the soil is moist, but not wet. Lime, fertilizer, and other soil amendments shall be evenly applied where needed on the site, as described in previous sections of this standard. Either dry or wet application methods may be suitable.

**Slopes flatter than 3:1** - Seedbed preparation shall consist of working the soil to a depth of 3 to 5 inches with a disk or similar equipment. Continue tillage until a reasonably uniform seedbed is prepared.

**Slopes 3:1 or steeper** - Scarify the soil surface with a bulldozer, heavy chain, hand tools or other equipment that will loosen the soil 0.5 to 1 inch deep. After the soil is loosened, do not work it completely smooth, but leave it in a somewhat roughened condition. Follow the general contour when making the final surface preparation.

#### Additional Criteria for Seed Quality and Treatment

All seed shall be labeled and meet the requirements of the Maryland State Seed Law. Refer to Table 5 for minimum germination and purity requirements. Seed shall have had a germination test within 12 months prior to the date of sowing. Use of certified seed is preferred. Keep seed cool and dry until planting.

Species with seed lots greater than 50% hard seed shall be dehulled and/or scarified and planted no later than 60 days after scarification.

Grasses that have fluffy seeds shall be planted using specially designed native seed drills. Alternatively, mechanically remove beards or awns from such seeds to facilitate movement through conventional seeding equipment.

Legume seeds shall be inoculated with the proper, viable *Rhizobium* bacteria before planting. Keep inoculant as cool as possible until use, and do not use it later than the date indicated on the package. When hydroseeding, use four times the recommended inoculant rate.

#### Additional Criteria for Seeding Operations

Seed shall be applied uniformly by hand, cyclone seeder, drill, cultipacker-seeder, or hydroseeder. The preferred method of seeding is by drilling or cultipacker-seeder method because these methods optimize seed to soil contact.

Seeding operations shall be done on the contour to the extent feasible. When a uniform distribution of seed is especially important (e.g., on lawns and athletic fields) and slopes are not extremely steep, apply seed in two directions, each perpendicular to one another. Apply one-half the seeding rate in each direction.

**Drill** - Seed shall be planted by using a grass drill or cultipacker-type seeder. A grain drill may also be used if it can be calibrated to plant small seeds at the recommended planting rates. As noted above, plant grasses with fluffy seeds by using a specially designed native seed drill. All drills shall have packer wheels, chains, or similar devices to close the seed slot and provide good seed to soil contact. Do not plant small-seeded grasses more than 1/4 to 1/2-inch deep.

**Broadcast** - Seed may be broadcast by using a cyclone or whirlwind seeder, or by hand. If spread by hand, small or light-seeded species such as redbud or bluestem may be mixed with filler (e.g., sawdust, finely ground corn, or slightly moistened peat moss) to achieve an even distribution. Incorporate seed into the soil 1/8 to 1/4-inch deep by raking or dragging, cultipacking, or tracking with heavy machinery. Raked areas shall be rolled with a weighted roller to provide good seed to soil contact. Do not use broadcast seeding methods during windy conditions.

**Hydroseeding** - This method is best suited for steep, inaccessible areas where use of a drill or other mechanized equipment is not feasible. Hydroseeding shall be done in two separate operations with seed and fertilizer applied in the first pass, and mulch applied in the second pass. Do not use burnt or hydrated lime when hydroseeding. If legume inoculant is used, complete the seeding within 3 to 4 hours after slurry is mixed, or add a fresh supply of inoculant to the mix. If possible after seeding, track the area up and down slope with heavy machinery such as a bulldozer to improve seed to soil contact.

### Additional Criteria for Temporary Seeding and Nurse Crops

When the period of soil exposure is more than two months but less than twelve months, a temporary seeding (usually an annual grass) shall be used to provide short-term cover on disturbed areas. See Table 1 for recommended plant species and planting rates.

Temporary seedings shall be planted as a nurse crop with a permanent seeding mixture when rapidly growing cover is needed. When seeding toward the end of the listed planting dates for permanent seedings, or when conditions are expected to be less than optimal, select an appropriate nurse crop from Table 1 and plant with the permanent seeding mix. Companion seedings of small-seeded grasses shall not exceed 5% (by weight) of the overall permanent seeding mixture. Companion seedings of small grains such as barley, wheat, or oats shall be sown at one-third the rates listed in Table 1. Cereal rye generally should not be used as a nurse crop, unless planting will occur in very late fall beyond the seeding dates for other temporary seedings. Cereal rye has allelopathic properties that inhibit the germination and growth of other plants.

Oats are the recommended nurse crop for warm-season grasses.

When a temporary or permanent seeding cannot be completed because of weather conditions or time of year, apply mulch only (no seeding) as a temporary cover when soil stabilization is needed. Refer to the Mulching section of this standard for application rates and methods.

### Additional Criteria for Permanent Seeding

Permanent herbaceous vegetation shall be designed to achieve a minimum stand density of 85 percent ground cover within one year.

Seed Mixes - To establish permanent cover, select grass and legume mixes according to the guidelines listed in Tables 3 and 4.

Planting Dates - Use Figure 1 and Table 2 to determine the recommended planting dates for selected mixes.

Supplemental Watering - If soil moisture is deficient, supply new seedings with adequate

water (a minimum of 1/4-inch twice a day) until vegetation is well established. This is especially necessary when seedings are made in abnormally dry or hot weather or on droughty soils.

### Additional Criteria for Mulching

Mulch shall consist of natural and/or artificial non-toxic materials, such as coconut fibers, wood shavings, straw, hay, bark chips, plastic, or fabric of sufficient thickness and durability to achieve the intended effect for the required time period. Tackifiers, emulsions, netting, pinning, or other methods of anchoring mulch shall be sufficiently durable to maintain mulch in place until it is no longer needed.

Mulching is required for critical area plantings on structural measures (e.g., grassed waterways, diversions, embankments, etc.), and shall be applied elsewhere as needed to accomplish one or more of the following purposes:

1. To provide temporary erosion control when planting must be delayed until the proper planting dates, or until plantings become well established;
2. To conserve soil moisture and to aid seed germination and plant survival;
3. To reduce soil temperature fluctuations and frost heaving;
4. To reduce weed growth in planted areas;
5. To reduce surface compaction or crusting, and improve water infiltration.

Mulching may not be needed when critical area plantings are used on field borders, filter strips, highly erodible cropland, and similar areas where crop residue and/or nurse crops will provide sufficient cover after planting.

Soil Stabilization Matting - Biodegradable matting shall be used as needed to provide temporary erosion control until seedlings or other plantings become well established. These materials are especially applicable where high water velocities are expected.

Matting shall have a uniform thickness and distribution of natural or other biodegradable synthetic fibers or cords that freely allow

penetration by water and plant seedlings. The materials shall resist decay for a minimum of 6 months, and shall not contain any harmful chemicals or other materials that may leach into the soil, or reduce the germination and establishment of seedlings.

Biodegradable matting shall be applied on seeded areas and shall be secured to the soil surface according to the manufacturer's instructions.

Permanent geotextiles (non-biodegradable) may also be used where long-term erosion control is needed. These materials shall also be installed according to the manufacturer's instructions.

**Straw or Hay Mulch** - Straw or hay shall be applied at the rate of 2 tons per acre (90 pounds per 1,000 square feet) immediately following seeding. Straw and hay shall be unweathered and free of any known viable seeds of objectionable weeds such as Johnsongrass, shattercane, thistle, or others as specified.

Spread mulch uniformly by hand or by mechanical methods so that approximately 85% of the soil surface is covered. This will provide erosion protection and allow adequate light penetration for seedling germination. Straw or hay shall not be chopped or finely broken during application.

On sites where mulch is exposed to displacement by wind and water, it shall be anchored immediately after placement. Use one of the following methods, depending on the size of the area, steepness of slope, and costs:

1. **Mulch Netting**. Cover mulch with degradable plastic, jute, or cotton netting. Staple the netting in place using wire staples;
2. **Crimper**. Use a tractor-drawn mulch anchoring coultter (crimper) to cut mulch into the soil surface, so as to anchor part of the mulch and leave part standing upright. Follow the general contours of the site when crimping mulch. Crimping operations are limited to areas accessible by tractor;
3. **Liquid Mulch-Binders**. Use one of the following:
  - a. **Organic and Vegetable-Based Binders**. Mix with water and apply to mulch to form

an insoluble polymer gel binder. Use at rates and under weather conditions as recommended by the manufacturer. These mulch binders shall be physiologically harmless and not impede the germination and growth of desired vegetation;

- b. **Synthetic Binders**. Mix with water and apply to mulch to form an insoluble high polymer synthetic binder. Use at rates and under weather conditions as recommended by the manufacturer.

**Wood Fiber or Paper Fiber Mulch** - Mulch made from wood, paper, or plant fibers shall be applied at the rate of 2,000 pounds per acre, or as recommended by the product manufacturer. Mulch shall not contain any germination or growth inhibiting materials. It may be applied by hydroseeder, but shall not be mixed in the tank with seed. Use shall be limited to flatter slopes and during optimum seeding periods in the spring and fall. Do not use on steep slopes or in concentrated flow areas.

**Pelletized Mulch** - Dry pellets of compressed and extruded paper and/or wood fiber products shall be applied by hand or mechanical spreader at the rate of 60 to 75 pounds per 1,000 square feet, in accordance with the manufacturer's recommendations. Pelletized mulch may contain co-polymers, tackifiers, fertilizers, and coloring agents. Apply 1/4 to 1/2-inch of water after spreading pelletized mulch to activate and expand the mulch and to provide sufficient soil coverage. This mulch material is especially applicable for small lawns or renovation areas where weed-free mulch is desirable, or straw mulch and tackifiers are not practical.

**Bark Mulch** - Shredded or chipped hardwood bark or pine bark mulch shall be applied to a depth of 2 to 3 inches around plantings of trees, shrubs, groundcovers, and vines. Pine bark mulch generally decomposes more slowly and is less toxic to plants than hardwood bark mulch.

Shredded bark and bark chips ("nuggets") shall be well-aged, and applied to provide at least 85% ground cover. A minimum 3-foot diameter circle of mulch is recommended around each tree or shrub. Do not mulch within 3 inches of the trunk. On steep slopes, use shredded bark mulch, rather than chips, because it is less subject to movement by water.

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### Additional Criteria for Sod

**Sod Quality and Treatment** - Sod used shall be state certified sod which is at least one year old but not older than 3 years. Commonly available sod types include Kentucky Bluegrass blends, and Tall Fescue/Kentucky Bluegrass mixes.

Sod shall be machine cut to uniform thickness of 3/4-inch, plus or minus 1/4-inch, at the time of cutting. Measurement of thickness shall exclude top growth or thatch.

Standard size sections of sod shall be strong enough to support their own weight and retain their shape when suspended vertically with a firm grasp of the upper 10% of the section.

Individual pieces of sod shall be cut to the supplier's width and length. Maximum allowable deviation from standard widths and lengths shall be no more than 5%.

Sod shall be harvested, delivered, and installed within a period of 36 hours. Sod not transplanted within this period shall be inspected and approved prior to its installation.

Do not harvest or transplant sod when the moisture content (excessively wet or dry) may adversely affect its survival.

**Planting Dates** - Use Figure 1 and Table 2 to determine the appropriate planting dates for sod.

The optimum planting period is in early fall, followed by the spring planting period. Sod may be planted during the summer if supplemental watering will be provided until the sod is well established. The fall planting season is limited by the amount of time the sod has to develop roots before the ground freezes. Newly sodded areas usually need 4 to 6 weeks before the sod is sufficiently rooted. Similarly, the spring planting season is limited by the high temperatures and drought of summer, unless supplemental water will be provided.

**Installation** - Prior to sodding, the soil surface shall be cleared of roots, brush, trash, debris, and other objects that would interfere with planting. Based on a soil test, apply lime and fertilizer as needed, and mix into the top 3 inches of soil. Then rake the site smooth in preparation for laying the sod.

During periods of high temperature, lightly water the soil surface immediately before laying the sod. Lay sod strips lengthwise on the contour, never up and down the slope, starting at the bottom of the slope and working up. On steep slopes, use ladders to facilitate the work and prevent damage to the sod.

Lay sod strips in staggered rows, with joints butted tightly together to prevent voids. Roll or tamp the sod immediately following placement to insure solid contact of root mat and soil surface. Do not overlap the sod strips.

On slopes greater than 3:1, secure sod to the soil surface with wooden pegs or wire staples.

Where surface water cannot be diverted from flowing over the face of a sodded slope, install a capping strip of heavy jute or plastic netting, properly secured, along the crown of the slope and edges to provide extra protection against lifting and undercutting of sod. Use the same technique to anchor sod in water-carrying channels and other critical areas. Use wire staples to anchor netting in channel work.

**Supplemental Watering** - Immediately following installation, sod shall be watered until moisture penetrates the soil layer beneath the sod to a depth of 4 inches. Maintain optimum moisture for at least 2 weeks by lightly watering the sod on a regular (usually daily) basis, unless sufficient rainfall has occurred. Do not allow the sod to dry out completely. After the sod begins to take root, reduce the frequency of watering and increase the amount of water applied per watering. This encourages the development of a deep root system and ultimately reduces the amount of water needed.

### Additional Criteria for Groundcovers

On sites where grass is difficult to grow or maintain, other perennial groundcovers may be used to control erosion. Groundcovers are low-growing herbaceous plants, vines, and creeping shrubs that spread quickly to form a dense cover. These plants should not be expected to provide erosion control or prevent soil slippage on sites that are inherently unstable due to soil texture, structure, water movement, or excessive slope.

**Selection of Plant Species** - Low-maintenance groundcovers are available to suit a variety of

conditions, especially for small areas around homes and commercial buildings. These plants generally require more care than turf during the initial establishment period, but may require less care after establishment.

Species recommendations may be found by consulting publications in the "References" section of this standard. Be cautious of using species that have aggressive growth habits and may spread beyond the planted area, especially if the planting is near a neighboring property or a natural area such as a shoreline or woodland. Species such as English Ivy (*Hedera helix*) and Periwinkle (*Vinca minor*) tend to grow rapidly once established, and should not be used except under well-contained conditions.

**Planting Dates** - Use Figure 1 and Table 2 to determine the appropriate planting dates for the different types of plant materials.

**Installation** - Soil shall be prepared by incorporating 2 inches of compost into the upper 8 inches of soil. If needed based on a soil test, incorporate lime and fertilizer into the soil. In the absence of a soil test for very small sites (e.g., in home landscaping areas), fertilizer may be added at the rate of 2 pounds of 5-10-10 grade fertilizer (or equivalent) per 100 square feet.

Install the plants at a spacing that is based on their present size, expected rate of growth and size at maturity, and how quickly a complete cover is desired. In general, use a spacing of one plant for every 1 to 4 square feet, and stagger the spacing of plants between rows.

Cover the entire planted slope with a mulch that will provide sufficient erosion control during the establishment period. Refer to the Mulching section of this standard for application rates and methods.

#### **Additional Criteria for Trees and Shrubs**

If trees and shrubs will be used on a critical area, the soil surface shall be stabilized with mulch or with a low-growing herbaceous planting (e.g., creeping red fescue) to control erosion until the woody plants are large enough to serve that purpose.

Refer to the Conservation Practice Standard for Conservation Cover (Code 327) for a selected list

of native tree and shrub species that may be used. Other trees and shrubs that are native to Maryland, or are introduced and are non-invasive (i.e., not likely to spread beyond the planted area and displace native species), may also be suitable. Follow the establishment recommendations in the Maryland Job Sheet for Trees and Shrubs.

For selection and use of trees and shrubs as part of a soil bioengineering system for upland slopes, refer to Chapter 18 of the Engineering Field Handbook.

#### **SPECIFICATIONS**

Plans and specifications for establishment and maintenance of a critical area planting shall be prepared for each site or management unit according to the Considerations, Criteria, and Operation and Maintenance described in this standard. They shall be recorded on specification sheets, job sheets, narrative statements in conservation plans, or other acceptable documentation.

When this practice is used to specify the vegetative component of another practice (e.g., grassed waterway, filter strip, pond, etc.), plans and specifications shall meet the requirements of this standard and the other applicable standard to achieve the intended purpose of the practice. The completed work shall be checked and documented to verify that the practice was completed according to the drawings and specifications of both standards. Documentation shall be in accordance with the section "Supporting Data and Documentation" in both standards.

## **OPERATION AND MAINTENANCE**

### **General Requirements for All Plantings**

Take corrective actions as needed to replace destroyed plant material or dislodged mulching material. Reshape the soil surface and replant areas where prolonged slope instability is present. Where vegetative efforts have failed, reassess the suitability of the chosen species for the site, and the need for structural measures to complement vegetative measures.

Control invasions by undesirable plants by pulling, mowing, or spraying with a selective herbicide. Where wildlife habitat is a concern, do not mow during the primary nesting season (April 15 to August 15). Control noxious weeds as required by state law.

Inspect for insects and diseases, and if an incidence threatens stand survival, take corrective action to bring the pest under control.

If fertilizer is used, it must be applied in compliance with Maryland nutrient management regulations, as applicable.

### **Grasses and Legumes**

During the establishment period, monitor plantings for germination success, water stress, pest problems, and damage by erosion. After one full year from planting, replant all areas with less than 85% plant cover according to the following recommendations:

1. If the stand provides less than 40% ground cover, reestablish following the original seedbed preparation, lime, fertilizer, and seeding recommendations;
2. If the stand provides 40 to 84% ground cover, overseed and fertilize using one-half the original rate. On small areas, reseeding may be accomplished by broadcasting and lightly raking the seed. For larger areas, use of a grass drill or cultipacker-seeder is preferable.

Spring seedings may require an application of fertilizer between September 1 and October 15, at least every two years, according to soil test recommendations. In lieu of a soil test, apply 30 pounds per acre (0.7 pounds per 1,000 square feet) of N, P205 and K20.

Fall seedings may require the above fertilization between March 15 and May 1 the following spring.

Mixtures dominated by legumes may only need topdressing once every three years according to soil test recommendations.

If a slow release form of nitrogen (such as Ureaform or Osmocote ) was used, a follow-up topdressing of nitrogen may not be necessary for several years.

Lime according to soil test recommendations at least once every five years. In lieu of a soil test, apply lime at the rate of 1 ton per acre (45 pounds per 1,000 square feet).

### **Groundcovers**

Use a soil test analysis to determine the need for lime and fertilizer. In lieu of a soil test, a general recommendation is to apply 2 to 3 pounds per 100 square feet of 5-10-10 fertilizer in the fall or early spring. Spread 2 to 3 inches of organic mulch such as shredded hardwood or pine bark mulch (or chips) to reduce evaporation of moisture from the soil and help reduce invasion by weeds.

Use hand tools to remove weeds from between plants. Some perennial weeds, such as thistle and dandelion, are difficult to remove by hand weeding, and may require spot treatment with a nonselective broadleaf herbicide. Care must be taken to avoid herbicide contact with the desired groundcovers or vines, because they are susceptible to being killed or severely damaged by nonselective herbicides. Follow all label directions when using herbicides.

### **Trees and Shrubs**

Follow the maintenance recommendations in the Maryland Job Sheet for Trees and Shrubs

## **SUPPORTING DATA AND DOCUMENTATION**

### **General Requirements for All Plantings**

The following is a list of the minimum data and documentation to be recorded in the case file:

1. Field location and extent of planting in acres, and assistance notes. Also note the location of the planting on the conservation plan map. Assistance notes shall include dates of site visits, name or initials of the person who made the visit, specifics as to alternatives discussed, decisions made, and by whom;
2. Completed copy of the appropriate Job Sheet(s) or other specifications, and management plans. The following items shall be addressed, as appropriate:
  - a. Method of site preparation and type of seedbed preparation;
  - b. Type of problem site, or Conservation Practice Code to be seeded (if used as the planting component of another conservation practice);
  - c. Species and rates to be seeded/planted;
  - d. Seeding/planting dates;
  - e. Rate and type of soil amendments to be applied;
  - f. Rate and type of mulch and anchoring methods.

## **Additional Documentation for Construction Check Data/As-Built**

In addition to the general requirements listed above, the following is a list of minimum documentation to be included in the case file when Critical Area Planting, Code 342, is used to specify the planting component of structural practices:

1. Assistance notes shall include inspection date(s), name of the person who performed the inspection(s), specifics as to what was inspected, alternatives and adjustments discussed, decisions made and by whom;
2. Dimensions of the stabilized area;
3. Certification statement on seeding/planting;
4. Final quantities, and documentation for any quantity changes. Include materials certification when requested;
5. Sign and date check notes and plans to include the statement that the practice meets or exceeds the requirements of the NRCS conservation practice standard.

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TABLE 1: Temporary Seeding for Site Stabilization

Plant Species	Seeding Rate <sup>1/</sup>		Seeding Depth (inches) <sup>2/</sup>	Recommended Seeding Dates by Plant Hardiness Zone <sup>3/</sup>		
	lbs./ac.	lbs./1,000 sq. ft.		5b and 6a	6b	7a and 7b
<b>Cool Season Grasses</b>						
Annual Ryegrass <i>Lolium perenne</i> ssp. <i>multiflorum</i>	40	1.0	0.5	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Nov 30
Barley <i>Hordeum vulgare</i>	96	2.2	1.0	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Nov 30
Oats <i>Avena sativa</i>	72	1.7	1.0	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Nov 30
Wheat <i>Triticum aestivum</i>	120	2.8	1.0	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Nov 30
Cereal Rye <i>Secale cereale</i>	112	2.8	1.0	Mar 15 to May 31 Aug 1 to Oct 31	Mar 1 to May 15 Aug 1 to Nov 15	Feb 15 to Apr 30 Aug 15 to Dec 15
<b>Warm Season Grasses</b>						
Foxtail Millet <i>Setaria italica</i>	30	0.7	0.5	Jun 1 to Jul 31	May 16 to Jul 31	May 1 to Aug 14
Pearl Millet <i>Pennisetum glaucum</i>	20	0.5	0.5	Jun 1 to Jul 31	May 16 to Jul 31	May 1 to Aug 14

TABLE 1 NOTES:

- Seeding rates for the warm-season grasses are in pounds of Pure Live Seed (PLS). Actual planting rates shall be adjusted to reflect percent seed germination and purity, as tested. Adjustments are usually not needed for the cool-season grasses.  
Seeding rates listed above are for temporary seedings, when planted alone. When planted as a nurse crop with permanent seed mixes, use 1/3 of the seeding rate listed above for barley, oats, and wheat. For smaller-seeded grasses (annual ryegrass, pearl millet, foxtail millet), do not exceed more than 5% (by weight) of the overall permanent seeding mix. Cereal rye generally should not be used as a nurse crop, unless planting will occur in very late fall beyond the seeding dates for other temporary seedings. Cereal rye has allelopathic properties that inhibit the germination and growth of other plants. If it must be used as a nurse crop, seed at 1/3 of the rate listed above.
- Oats are the recommended nurse crop for warm-season grasses.
- For sandy soils, plant seeds at twice the depth listed above.
- The planting dates listed are averages for each Zone, and may require adjustment to reflect local conditions, especially near the boundaries of the zone.

**TABLE 2: Recommended Planting Dates for Permanent Cover in Maryland <sup>1</sup>**

Type of Plant Material	Plant Hardiness Zones		
	5b and 6a	6b	7a and 7b
Seeds - Cool-Season Grasses (includes mixes with forbs and/or legumes)	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Oct 31 Nov 1 to Nov 30♦
Seeds - Warm-Season/Cool-Season Grass Mixes (includes mixes with forbs and/or legumes)	Mar 15 to May 31 ♦ Jun 1 to Jun 15*	Mar 1 to May 15 ♦♦ May 16 to Jun 15*	Feb 15 to Apr 30 ♦♦ May 1 to May 31*
Sod - Cool-Season	Mar 15 to May 31 Jun 1 to Aug 31* Sep 1 to Nov 1**	Mar 1 to May 15 May 16 to Sep 14* Sep 15 to Nov 15**	Feb 15 to Apr 30 May 1 to Sep 30* Oct 1 to Dec 1**
Unrooted Woody Materials; Bare-Root Plants; Bulbs, Rhizomes, Corms, and Tubers <sup>2</sup>	Mar 15 to May 31 Jun 1 to Jun 30*	Mar 1 to May 15 May 16 to Jun 30*	Feb 15 to Apr 30 May 1 to Jun 30*
Containerized Stock; Balled-and-Burlapped Stock	Mar 15 to May 31 Jun 1 to Jun 30* Sep 1 to Nov 15**	Mar 1 to May 15 May 16 to Jun 30* Sep 15 to Nov 30**	Feb 15 to Apr 30 May 1 to Jun 30* Oct 1 to Dec 15**

**TABLE 2 NOTES:**

- The planting dates listed are averages for each zone. These dates may require adjustment to reflect local conditions, especially near the boundaries of the zones. When seeding toward the end of the listed planting dates, or when conditions are expected to be less than optimal, select an appropriate nurse crop from Table 1 and plant with the permanent seeding mix. (See Table 1, Note 1, for more information.)
- When planted during the growing season, most of these materials must be purchased and kept in a dormant condition until planting. Bare-root grasses are the exception—they may be supplied as growing (non-dormant) plants.
  - ♦ Additional planting dates for the lower Coastal Plain, dependent on annual rainfall and temperature trends. Recommend adding a nurse crop, as noted above, if planting during this period.
  - ♦♦ Warm-season grasses need a soil temperature of at least 50 degrees F in order to germinate. If soil temperatures are colder than 50 degrees, or moisture is not adequate, the seeds will remain dormant until conditions are favorable. In general, planting during the latter portion of this period allows more time for weed emergence and weed control prior to planting. When selecting a planting date, consider the need for weed control vs. the likelihood of having sufficient moisture for later plantings, especially on droughty sites.
  - \* Additional planting dates during which supplemental watering may be needed to ensure plant establishment.
  - \*\* Frequent freezing and thawing of wet soils may result in frost-heaving of materials planted in late fall, if plants have not sufficiently rooted in place. Sod usually needs 4 to 6 weeks to become sufficiently rooted. Large containerized and balled-and-burlapped stock may be planted into the winter months as long as the ground is not frozen and soil moisture is adequate.

**TABLE 3: Recommended Permanent Seeding Mixtures by Site Condition or Purpose**

Site Condition or Purpose of the Planting	Recommended Mix (see Table 4)												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Steep Slopes, Roadsides	✓	✓	✓	◆	✓	◆				◆	◆	✓	✓
Sand and Gravel Pits, Sanitary Landfills	✓	✓	✓	◆	✓					◆	◆	✓	
Salt-Damaged Areas	◆												✓
Mine Spoil, Dredged Material, and Spoil Banks	◆		✓	◆									
Utility Rights-of-Way	✓	✓	✓	✓	✓	✓	◆			✓	✓	✓	
Dikes and Dams	◆		✓	◆		✓	✓	◆		✓	✓	✓	
Berms, Low Embankments (not on Ponds)	✓	✓	✓	✓	✓	✓	◆	◆		✓	✓	✓	◆
Pond and Channel Banks, Streambanks	✓	✓	✓	✓	◆	◆	◆			◆			
Grassed Waterways, Diversions, Terraces, Spillways	◆				◆	✓	✓	◆	✓		✓		◆
Bottom of Drainage Ditches, Swales, Detention Basins				◆		✓	◆			◆	✓		✓
Field Borders, Filter Strips, Contour Buffer Strips	✓	✓	✓	◆	◆	✓	◆	✓	✓	✓	✓	✓	◆
Wastewater Treatment Strips and Areas								✓	◆	◆			
Heavy Use Areas (Grass Loading Paddocks for Livestock)								✓					
Athletic Fields, Residential and Commercial Lawns							◆	✓	✓			✓	
Recreation Areas							✓	✓	✓			✓	

**TABLE 3 NOTES:**

- ✓ Recommended mix for this site condition or purpose.
- ◆ Alternative mix, depending on site conditions.

TABLE 4: Selected List of Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate <sup>1/</sup>		Soil Drainage Class <sup>2/</sup>	Max. Height (feet)	Maint. Level <sup>3/</sup>	Remarks
		Ibs./ac.	Ibs./1000 sq. ft.				
<b>WARM-SEASON/COOL-SEASON GRASS MIXES</b>							
<b>1. SELECT ONE WARM-SEASON GRASS:</b>							
Switchgrass <i>Panicum virgatum</i> <b>OR</b>	Blackwell, Carthage, Cave-in-Rock, or Shelter	10	0.23				All species are native to Maryland. Plant this mix with a regular grass drill. Coastal panicgrass is best adapted to Zones 7a and 7b.
Coastal Panicgrass <i>Panicum amarum</i> var. <i>amarulum</i>	Atlantic	10	0.23				
<b>AND ADD:</b>							
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortress, Ruby, or Salem	15	0.34	E - P	4 - 7	C - D	Creeping red fescue is a cool-season grass that will provide erosion protection while the warm-season grass (switchgrass or coastal panicgrass) is becoming established.
<b>PLUS ONE OF THE FOLLOWING LEGUMES:</b>							
Partridge Pea <i>Chamaecrista fasciculata</i>	Common	4	0.09				Switchgrass, coastal panicgrass, the 'Dawson' variety of creeping red fescue, and partridge pea are moderately salt-tolerant. Do not use bush clover or wild indigo on wet sites.
Bush Clover <i>Lespedeza capitata</i>	Common	2	0.05				
Wild Indigo <i>Baptisia tinctoria</i>	Common	2	0.05				
<b>2. Big Bluestem <i>Andropogon gerardii</i></b>	Niagara or Rountree	6	0.14				All species are native to Maryland.
Indiangrass <i>Sorghastrum nutans</i>	Runsey	6	0.14				The indiagrass and bluestems have fluffy seeds. Plant with a specialized native seed drill.
Little Bluestem <i>Schizachyrium scoparium</i>	Aldous or Blaze	4	0.09				
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortress, Ruby, or Salem	15	0.34	E - MW	6 - 8	C - D	Creeping red fescue is a cool-season grass that will provide erosion protection while the warm-season grasses are becoming established.
<b>PLUS ONE OF THE FOLLOWING LEGUMES:</b>							
Partridge Pea <i>Chamaecrista fasciculata</i>	Common	4	0.09				The indiagrass and bluestems have fluffy seeds. Plant with a specialized native seed drill.
Bush Clover <i>Lespedeza capitata</i>	Common	2	0.05				
Wild Indigo <i>Baptisia tinctoria</i>	Common	2	0.05				
Showy Tick-Trefoil <i>Desmodium canadense</i>	Common	1	0.02				

TABLE 4: Selected List of Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate <sup>J</sup>		Soil Drainage Class <sup>K</sup>	Max. Height (feet)	Maint. Level <sup>L</sup>	Remarks
		lbs./ac.	lbs./1000 sq. ft.				
<b>WARM-SEASON/COOL-SEASON GRASS MIXES</b>							
<b>3. SELECT THREE GRASSES:</b>							
Deertongue <i>Dichanthelium clandestinum</i>	Tioga	20	0.46				Excellent for excessively droughty, low pH (acidic) soils.
Sheep Fescue <i>Festuca ovina</i> <b>OR</b>	Common or Bighorn	20	0.46				
Canada Wild Rye <i>Elymus canadensis</i>	Common	3	0.07				
Redtop <i>Agrostis gigantea</i>	Streaker	1	0.02		4 - 6	C - D	
<b>PLUS ONE OF THE FOLLOWING LEGUMES:</b>							
Common Lespedeza <i>Lespedeza striata</i>	Kobe	10	0.23				Common lespedeza ('Kobe' variety) is more tolerant of low acidity and high manganese concentrations than Korcan lespedeza. These lespedezas are reseeding annuals.
Korcan Lespedeza <i>Lespedeza stipulacea</i>	Climax or Rowan	10	0.23	F - MW			
<b>4. Deertongue <i>Dichanthelium clandestinum</i></b>							
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Tioga	15	0.34				Use Virginia wild rye on moist, shady sites. Use Canada wild rye on droughty sites.
Virginia Wild Rye <i>Elymus virginicus</i> <b>OR</b>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	20	0.46				
Canada Wild Rye <i>Elymus canadensis</i>	Common	5	0.11	W - P	2 - 3	C - D	
	Common	5	0.11				

TABLE 4: Selected List of Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate <sup>L</sup>		Soil Drainage Class <sup>M</sup>	Max. Height (feet)	Maint. Level <sup>N</sup>	Remarks
		lbs./ac.	lbs./1000 sq. ft.				
<b>COOL-SEASON GRASS MIXES</b>							
<b>5. SELECT WND GRASSES:</b>							
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Penmlawn, Flyer, Fortess, Ruby, or Salem	20	0.46				Use creeping red fescue in heavy shade and on moist sites.
Hard Fescue <i>Festuca trachyphylla</i>	Attila or Aurora	20	0.46				Perennial ryegrass and redtop will establish more rapidly than either fescue. Redtop tolerates wet sites better than ryegrass.
Perennial Ryegrass <i>Lolium perenne</i>	Blazer (II), Pennfine	10	0.23				
Redtop <i>Agrostis gigantea</i>	Streaker	1	0.02	E - SP	2 - 3	B - D	Flatpea will suppress woody vegetation. It should be planted in the spring, or as a dormant seeding in late fall or winter. It must be incorporated into the soil or covered with mulch. It may not be winter-hardy if planted late summer - fall. Caution: Flatpea can spread aggressively, and can be toxic to livestock.
<b>AND ADD THE FOLLOWING LEGUME:</b>							
Flatpea <i>Lathyrus sylvesteris</i>	Lathco	15	0.34				
<b>6. Tall Fescue <i>Lolium arundinaceum</i> (formerly <i>Festuca arundinacea</i>)</b>							
Perennial Ryegrass <i>Lolium perenne</i>	Recommended MD turf-types <sup>P</sup> Blazer (II), Pennfine	40	0.93				
PLUS ONE OF THE FOLLOWING LEGUMES: Birdsfoot Trefoil <i>Lotus corniculatus</i>	Empire, Viking, Norsean, Lco Common	8	0.18		W - SP	C - D	Birdsfoot trefoil is suitable for use only in Zones 5b and 6a.
White Clover <i>Trifolium repens</i>	Common	5	0.11				
<b>7. Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i></b>							
Kentucky Bluegrass <i>Poa pratensis</i>	Recommended MD turf-types <sup>P</sup> Dawson, Penmlawn, Flyer, Fortess, Ruby, or Salem	60	1.38				This mix has good shade tolerance.
	Recommended MD turf-types <sup>P</sup>	15	0.34	W - MW	1 - 2	C - D	

TABLE 4: Selected List of Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate <sup>1/</sup>		Soil Drainage Class #	Max. Height (feet)	Maint. Level <sup>2/</sup>	Remarks
		lbs./ac.	lbs./1000 sq. ft.				
<b>Cool-Season Grass Mixes</b>							
8. Tall Fescue <i>Lolium arundinaceum</i> (formerly <i>Festuca arundinacea</i> )	Recommended MD turf-types <sup>3/</sup>	100	2.3	E - SP	2 - 3	A - D	Tall fescue produces a dense turf if frequently mowed, but tends to be clumpy if mowed only occasionally. For best results, recommend using a blend of 3 cultivars. Use low-endophyte cultivars in areas where livestock may graze.
9. SELECT ONE SPECIES OF FESCUE: Tall Fescue <i>Lolium arundinaceum</i> (formerly <i>Festuca arundinacea</i> ) Hard Fescue <i>Festuca trachyphylla</i> AND ADD: Kentucky Bluegrass <i>Poa pratensis</i> Perennial Ryegrass <i>Lolium perenne</i>	Recommended MD turf-types <sup>3/</sup> Atrila or Aurora Recommended MD turf-types <sup>3/</sup> Blazer (II), Pennfine	60 40 40 20	1.38 0.92 0.92 0.46				Good for highly managed athletic fields. Tall fescue is more suitable for compacted, high use areas and on moist sites. Hard fescue produces finer-textured turf with more shade tolerance. Use tall fescue instead of hard fescue for wastewater treatment strips and areas. For best results, recommend using a blend of 3 cultivars each for tall fescue and Kentucky bluegrass.
10. Orchardgrass <i>Dactylis glomerata</i> Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i> Redtop <i>Agrostis gigantea</i> Alsike Clover <i>Trifolium hybridum</i> White Clover <i>Trifolium repens</i>	Any Dawson, Pennlawn, Flyer, Fortress, Ruby, or Salem Streaker Common Common	25 10 1 3 3	0.57 0.23 0.02 0.07 0.07				Low maintenance mix that is easy to establish. Alsike clover can be toxic to horses. Omit the clovers if using this mix for wastewater treatment strips and areas.

TABLE 4: Selected List of Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate <sup>1/</sup>		Soil Drainage Class <sup>2/</sup>	Max. Height (feet)	Maint. Level <sup>3/</sup>	Remarks
		lbs./ac.	lbs./1000 sq. ft.				
<b>COOL-SEASON GRASS MIXES</b>							
11. Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	30	0.69				
Chewings Fescue <i>Festuca rubra</i> ssp. <i>commutata</i>	Common	30	0.69				
Kentucky Bluegrass <i>Poa pratensis</i>	Recommended MD turf-types <sup>4/</sup>	20	0.46	E - MW	2 - 3	B - D	Add rough bluegrass in moist, shady conditions.
<b>OPTIONAL ADDITION</b>							
Rough Bluegrass <i>Poa trivialis</i>	Common	15	0.34				
<b>12. Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i></b>							
Hard Fescue <i>Festuca trachyphylla</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	25	0.57				Attractive mix of fine fescues and wildflowers for low maintenance conditions. Once well-established, the grasses may tend to outcompete the wildflowers.
Sheep Fescue <i>Festuca ovina</i>	Atilla or Aurora	25	0.57				Wildflowers are best established by broadcasting and cultipacking on a prepared seedbed. Drilling can be also used, but care must be taken so that seeds are not drilled too deep.
<b>PLUS WILDFLOWER MIX:</b>							
Black-eyed Susan <i>Rudbeckia hirta</i>	Common	2	0.05				Hydroseeding is not recommended for this mix if wildflowers are used. (They have very small seeds.)
Lance-leaved Coreopsis <i>Coreopsis lanceolata</i>	Common	2	0.05	E - MW	2 - 3	C - D	
Purple Coneflower <i>Echinacea purpurea</i>	Common	2	0.05				
Partridge Pea <i>Chamaecrista fasciculata</i>	Common	5	0.11				
<b>OR ADD CLOVER MIX:</b>							
White Clover <i>Trifolium repens</i>	Common	3	0.07				
Red Clover <i>Trifolium pratense</i>	Any	3	0.07				

**TABLE 4: Selected List of Permanent Herbaceous Seeding Mixtures**

Mix	Recommended Cultivar	Seeding Rate <sup>V</sup>		Soil Drainage Class <sup>2</sup>	Max. Height (feet)	Maint. Level <sup>3</sup>	Remarks
		lbs./ac.	lbs./1000 sq. ft.				
<b>Cool Season Grass Mixes</b>							
13. Alkali Saltgrass	<i>Puccinellia distans</i>	20	0.46				This is the recommended mix for saline sites. Saltgrass will persist only under saline conditions.
Creeping Red Fescue	<i>Festuca rubra</i> var. <i>rubra</i>	15	0.34				For best results, use only the 'Dawson' variety of creeping red fescue. It is a salt-tolerant variety.
Fowl Meadowgrass	<i>Poa palustris</i>	2	0.05	W - P	2 - 3	B - D	
<b>OPTIONAL ADDITION</b>							
Creeping Bentgrass	<i>Agrostis stolonifera</i>	2	0.05				Add bentgrass for wetter conditions.

**TABLE 4 NOTES:**

- Seeding Rates:** Seeding rates for the warm-season grasses are in pounds of Pure Live Seed (PLS). Actual planting rates shall be adjusted to reflect percent seed germination and purity, as tested. Adjustments are usually not needed for the cool-season grasses, legumes, or wildflowers. All legume seeds shall be inoculated before planting with the appropriate *Rhizobium* bacteria. When feasible, hard-seeded legumes should be scarified to improve germination.
- Soil Drainage Class** (refer to the county soil survey for further information):  
 E - Excessively Drained; W - Well Drained; MW - Moderately Well Drained; SP - Somewhat Poorly Drained; P - Poorly Drained.
- Maintenance Level:**  
 A - Intensive mowing (every 2 - 4 days), fertilization, lime, insect and weed control, and watering (examples: high maintenance lawns and athletic fields).  
 B - Frequent mowing (every 4 - 7 days), occasional fertilization, lime, pest control, and watering (examples: residential, school, and commercial lawns).  
 C - Periodic mowing (every 7 - 14 days), occasional fertilization and lime (examples: residential lawns, parks).  
 D - Infrequent or no mowing, fertilization, or lime after the first year of establishment (examples: wildlife areas, roadsides, steep banks)

TABLE 4 NOTES (Continued):

4. Turf-type cultivars of Tall Fescue and Kentucky Bluegrass shall be selected based on recommendations of the University of Maryland Cooperative Extension Service, Agronomy Mimeo 77. (See the "References" section of this standard.) Recommendations in the April, 2000 publication are as follows:

A. Kentucky Bluegrass -

1. The following Kentucky bluegrass cultivars are suitable for general use, and are also noted for shade tolerance:

America	Coventry	Quantum Leap
Ascol	Liberator	Showcase
Brilliant	Moonlight	SR 2000
Champagne	Nuglade	Unique
Compact	Princeton 105	

2. The following Kentucky bluegrass cultivars are suitable for general use, and are also noted for tolerance of low maintenance conditions:

Barrus	Haga	Monopoly
Caliber	Livingston	Washington
Eagleton	Merit	
Freedom	Midnight	

B. Tall Fescue - The following turf-type cultivars are suitable for general use:

Alamo E	Buildawg	Debutante	Good-En	Micro DD	Rebel 3D*	Scorpio	Titan 2
Apache II	Chapel Hill	Dominion	Grande	Millennium	Rebel III*	Shenandoah	Tomahawk*
Avanti*	Chieftain II*	Duke	Guardian	Olympic Gold	Rebel Jr.	Shenandoah II	Trailblazer II*
Axiom	Chinook	Duster*	Heritage	Oncue	Rebel Sentry	Southern Choice*	Twilight II
Bandana	Cochise II	Eldorado*	Houndog 5	Pixie	Red Coat	SR 8200	Virtue*
Barlexus	Comstock	Empress	Jaguar III	Pixie E+	Regiment*	SR 8300	Watchdog
Barrington	Coyote	Falcon II*	Lancer	Plantation	Rembrandt	Steison	Wolfpack
Bonanza*	Crossfire*	Finelawn Petite*	Leprechaun	Pyramid	Renegade	Tarheel	WPEZE
Bonanza II	Crossfire II	Genesis	Masterpiece	Rebel 2000	Reserve	TF6	Wyatt

Tall fescue cultivar names that are followed by an asterisk (\*) have low endophyte levels (20% or lower, based on seed analysis). To avoid livestock health problems due to endophyte toxicity, use low-endophyte cultivars for critical area plantings where livestock may be allowed to graze (e.g., heavy use grass loading paddocks). Please note that endophyte levels in plantings can vary between varieties; between fields of the same variety, and with the time of year. For areas where livestock will not have access, cultivars with higher endophyte levels are desirable because they tend to be more drought tolerant and more resistant to disease and insect damage.

**TABLE 5: Quality of Seed**

Species	Minimum Seed Purity (%)	Minimum Seed Germination (%)	Species	Minimum Seed Purity (%)	Minimum Seed Germination (%)
<i>COOL-SEASON GRASSES</i>					
Barley	98	85	Bluestem, Big	60	60
Benigrass, Creeping	95	85	Bluestem, Little	55	60
Bluegrass, Canada	90	80	Deertongue	95	75
Bluegrass, Kentucky	97	80	Indiangrass	60	60
Bluegrass, Rough	96	80	Millet, Foxtail or Pearl	98	80
Fescue, Chewings	97	85	Panicgrass, Coastal	95	70
Fescue, Creeping Red	97	85	Switchgrass	95	75
Fescue, Hard	97	85	<i>LEGUMES/FORBS</i>		
Fescue, Sheep	97	85	Clover, Alsike	99	85
Fescue, Tall	97	85	Clover, Bush	--	--
Meadowgrass, Fowl	--	--	Clover, Red	99	85
Oats	98	85	Clover, White	98	90
Orchardgrass	90	80	Flatpea	98	75
Redtop	92	80	Indigo, Wild	--	--
Rye, Cereal	98	85	Lespedeza, Common	98	80
Ryegrass, Annual or Perennial	97	85	Lespedeza, Korean	98	80
Saltgrass, Alkali	85	80	Pea, Partridge	98	70
Wheat	98	85	Tick-Trefoil, Showy	--	--
Wild Rye, Canada	85	70	Trefoil, Birdsfoot	98	85
Wild Rye, Virginia	--	--	Wildflowers	--	--

**TABLE 5 NOTE:**

1. All seed shall comply with the Maryland State Seed Law. Seed shall be free of prohibited or restricted noxious weeds, as currently listed by the Maryland Department of Agriculture, Turf and Seed Section.

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## APPENDIX C – SOIL CONSERVATION DISTRICT OFFICES

For The Most Up-To-Date Information About Local Soil conservation Districts View The Natural Resource Conservation Service Web Site At [NRCS.USDA.GOV](http://NRCS.USDA.GOV) And Follow The State & Region Link

Allegany  
11602 Bedford Road, NE  
Cumberland, MD 21502  
(301) 777-1747

Cecil  
105 Chesapeake Blvd, Suite B-3  
Elkton, MD 21921  
(410) 398-4411

Anne Arundel  
2662 Riva Road, Suite 150, MS7001  
Annapolis, MD 21401  
(410) 222-7822

Charles  
101 Catalpa Drive  
La Plata, MD 20646  
(301) 934-9590

Baltimore County  
9831 Van Buren Lane  
Cockeysville, MD 21030  
(410) 666-1188

Dorchester  
501 Court Lane, Rm 213  
Cambridge, MD 21613  
(410) 228-1323

Calvert  
65 Duke St., PO Box 657  
Prince Frederick, MD 20678  
(410) 535-1521

Frederick  
92 Thomas Johnson Drive, Suite 230  
Frederick, MD 21702  
(301) 695-2803

Caroline  
640 Legion Road, Suite 3  
Denton, MD 21629  
(410) 479-2182

Garrett  
1916 Maryland Hwy, Suite C  
Oakland, MD 21550  
(301) 334-6950

Carroll  
1004 Littlestown Pike, Suite B-2  
Westminster, MD 21157  
(410) 848-8200

Harford  
1208 Churchville Road, Suite 201  
Forest Hill, MD 21014  
(410) 838-6181

Catoctin  
92 Thomas Johnson Drive, Suite 230  
Frederick, MD 21702  
(301) 695-2803

Howard  
708-E Lisbon Center Drive  
Woodbine, MD 21797-8600  
(410) 489-7987

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## Kent

122 Speer Rd, Suite 4  
Chestertown, MD 21620  
(410) 778-5150

## Montgomery

18410 Muncaster Road  
Derwood, MD 20855  
(301) 590-2855  
(Additional erosion and sediment control  
information can be obtained from the  
Montgomery County Department of  
Permitting Services 240 777 6343)

## Prince George's

14741 Gov. Oden Bowie Drive, Rm 1101  
Upper Marlboro, MD 20772  
(301) 574-5162 ext 3

## Queen Anne's

505 Railroad Ave., Suite 3  
Centreville, MD 21617  
(410) 758-3136

## St. Mary's

Court Square Building, PO Box 810  
Leonardtown, MD 20650  
(301) 475-8402

## Somerset

30730 Park Drive, Anderson Bldg.  
Princess Anne, MD 21853  
(401) 651-0390

## Talbot

215 Bay Street  
Easton, MD 21601  
(410) 822-1577

## Washington

1260 Maryland Ave., Suite 101  
Hagerstown, MD 21740  
(301) 797-6820

## Wicomico

2322 B Goddard Pkwy.  
Salisbury, MD 21801  
(410) 546-4731

## Worcester

304 Commerce St.  
Snow Hill, MD 21863  
(410) 632-5439

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## APPENDIX D – MDE CONTACTS

MARYLAND DEPARTMENT OF THE ENVIRONMENT  
Water Management Administration  
1800 Washington Blvd.  
Baltimore, Maryland 21230

### LIST OF MDE CONTACTS FOR FOREST HARVEST OPERATIONS

Compliance Program (410) 537-3510  
This program can answer questions relating to approved erosion and sediment control plans, tidal and nontidal wetlands, and waterway authorizations. There are three divisions, each covering a specific region of the state. Contact the division covering the county where the activity is occurring.

#### Inspection Divisions

WESTERN DIVISION (301) 689-8494 Frostburg  
(301) 665 2850 Hagerstown  
Allegany, Carroll, Frederick, Garrett, Howard, Montgomery, and Washington Counties

CENTRAL DIVISION (410) 537-3510  
Baltimore City, Anne Arundel, Baltimore, Calvert, Charles, Prince Georges, Saint Mary's Counties

EASTERN DIVISION (410) 901-4020  
Caroline, Cecil, Dorchester, Harford, Kent, Queen Anne's, Somerset, Talbot Wicomico, and Worcester Counties

Sediment, Stormwater And Dam Safety Program (410) 537-3543  
Normally this program deals with erosion and sediment control and stormwater management on state or federal construction projects. It can however supply such information to the private sector.

Wetlands And Waterways Program (410) 537-3837  
(301) 689-8150 (Frostburg)  
(410) 543-6703 (Salisbury)  
This program issues the tidal and nontidal wetland authorizations and waterway permits commonly needed for forest harvest projects.

**APPENDIX E – DNR MFS CONTACTS**

**MARYLAND DEPARTMENT OF NATURAL RESOURCES**

Forest Service

Tawes State Office E-1, 580 Taylor Avenue

Annapolis, Maryland 21401

410 260 8531 Fax 410 260 8595

**CENTRAL REGIONAL OFFICE**

2 S Bond Street

Bel Air, MD 21014

(410) 836-4571

(410) 836-4552 Fax

**Baltimore County**

Cub Hill Ranger Station

9405 Old Harford Road

Baltimore MD 21234

(410) 665-5820

(410) 882-9961 Fax

**Cecil County**

Black Hill Ranger Station

130 McKinneytown Road

North East MD 21901

(410) 287-5777

(410) 287-0010 Fax

**Carroll County**

328A E Nicodemus Road

Westminster MD 21157

(410) 848-9290 or

(410) 840-9450

(410) 848-3291 Fax

**Harford County**

2 S Bond Street

Bel Air MD 21014

(410) 836-4579

(410) 836-4552 Fax

**Howard\Montgomery Counties**

17400 Annapolis Rock Rd

Woodbine MD 21797

(301) 854-6060

(410) 442-2080

(410) 442-2126 Fax

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EASTERN REGIONAL OFFICE  
201 Baptist Street Suite 22  
Salisbury, MD 21801  
(410) 543-6745  
(410) 543-6768 Fax

Caroline/Talbot Counties  
Martinak State Park  
105 Deep Shore Road  
Denton MD 21629  
(410) 479-1623  
(410) 479-1814 Fax

Dorchester County  
4329 Golden Hill Road  
Church Creek MD 21622  
(410) 228-1861  
(410) 228-6071 Fax

Kent/Queen Anne's Counties  
120 Broadway Avenue  
Centreville MD 21617  
(410) 758-5258  
(410) 758-5018 Fax

Wicomico County  
Powellville Work Center  
6095 Sixty Foot Road  
Parsonsburg MD 21849  
(410) 543-1950  
(410) 543-2888 Fax

Somerset County  
10990 Market Lane  
Princess Anne MD 21853  
(410) 651-2004  
(410) 651-0397 Fax

Worcester County  
Nassawango Work Center  
6572 Snow Hill Road  
Snow Hill MD 21863  
(410) 749-2206  
(410) 749-0628 Fax

SOUTHERN REGIONAL OFFICE  
Carter Building, Box 653  
Leonardtown, MD 20650  
(301) 475-4755  
(301) 475-8527 Fax

Anne Arundel County  
Forestry Education Center  
8023 Long Hill Road  
Pasadena MD 21122  
(410) 768-0830  
(410) 768-7134 Fax

Charles County  
PO Box 2746  
La Plata MD 20646  
(301) 934-2543  
(301) 934-8685 Fax

Anne Arundel County  
Forestry Education Center  
8023 Long Hill Road  
Pasadena MD 21122  
(410) 768-0830  
(410) 768-7134 Fax

Prince George's County  
11716 Fenno Road  
Upper Marlboro, MD 20772  
(301) 888-9214  
(301) 579-6805 Fax

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St. Mary's County  
Carter Building  
Leonardtown MD 20650  
(301) 475-8551  
(301) 475-8527 Fax

WESTERN REGIONAL OFFICE  
3 Pershing Street, Room 101  
Cumberland, MD 21502  
(301) 777-2137  
(301) 777-2197 Fax

Allegany County  
3 Pershing Street  
Room # 101  
Cumberland MD 21502  
(301) 777-2027  
(301) 777-2197 Fax

Frederick County  
8602 Gambrill Road  
Frederick MD 21701  
(301) 473-8417  
(301) 473-4570  
(301) 473-8577 Fax

Garret County  
1728 Kings Run Road  
Oakland MD 21550  
(301) 334-3296  
(301) 334-6541 Fax

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## **APPENDIX F CRITICAL AREA**

**APPENDIX F.1 – CRITICAL AREA LOCAL OFFICES**

**APPENDIX F.2 - CHESAPEAKE BAY CRITICAL AREAS INFORMATION**

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## APPENDIX F.1 – CRITICAL AREA LOCAL OFFICES

### CHESAPEAKE BAY CRITICAL AREA COMMISSION AND LOCAL AREA OFFICES

State Office: The Chesapeake Bay Critical Area Commission has established criteria for the protection of the area within 1000 feet of the mean high waterline. Seventeen counties and over 35 towns have used these criteria to develop and implement their own Critical Area programs. The Commission headquarters is located in Annapolis; general questions about the state program can be directed to them at 1804 West Street, Suite 100, Annapolis, Maryland 21401, 410-260-3460. Specific project questions may be directed to your local program at the following numbers. Since your forest harvest project may impact critical areas, it is advisable that you contact your local program office.

#### CRITICAL AREA LOCAL OFFICE CONTACT

Anne Arundel County	410-222-7780	Kent County	410-778-7473
Annapolis	410-263-7961	Berterton	410-348-5522
Baltimore City	410-396-8485	Chestertown	410-778-0500
Baltimore County	410-887-3980	Millington	410-928-3880
Calvert County	410-535-2348	Rock Hall	410-639-7611
Chesapeake Beach	301-855-8398	Prince George's County	301-731-8790
North Beach	301-855-6681	Queen Anne's County	410-758-4088
Caroline County	410-479-2230	Centreville	410-758-1180
Denton	410-479-2050	Church Hill	410-758-3740
Federalsburg	410-754-8173	Queen Anne	410-364-5667
Greensboro	410-482-6222	Queenstown	410-827-7646
Hillsboro	410-364-5760	St. Mary's County	301-475-4670
Cecil County	410-996-5225	Leonardtwn	301-475-9791
Charlestown	410-287-6173	Somerset County	410-651-1424
Chesapeake City	410-885-5298	Crisfield	410-968-1333
Elkton	410-398-4999	Princess Anne	410-651-1818
North East	410-287-5801	Talbot County	410-822-2030
Perryville	410-642-6066	Easton	410-822-2525
Port Deposit	410-378-2122	Oxford	410-226-5122
Charles County	301-645-0540	St. Michael's	410-745-9535
Indian Head	301-743-5511	Wicomico County-Salisbury	410-548-4860
Dorchester County	410-228-3234	Fruitland	410-548-2800
Cambridge	410-228-1955	Mardela Springs	410-742-7988
Secretary	410-943-3113	Sharptown	410-883-3747
Vienna	410-376-3442	Worcester County	410-632-1200
Harford County	410-838-6000	Snow Hill	410-632-2080
	X226	Pocomoke City	410-957-1333
Havre de Grace	410-939-0150		

## **APPENDIX F.2 – CHESAPEAKE BAY CRITICAL AREAS INFORMATION**

The Chesapeake Bay Critical Area is the land within 1,000 feet of the Chesapeake Bay and its tidal waters or tidal wetlands. Timber harvests in the Chesapeake Bay Critical Area which are regulated by the Critical Area Criteria are one acre or more in size and occur within a one-year interval.

### **Critical Area Requirements**

For one acre or more of forest in the Critical Area to be cut within any one-year interval, a "Timber Harvest Plan" must be prepared and approved before any timber can be harvested. The approval process is a partnership between a District Forestry Board and the Department of Natural Resources (DNR). An Erosion And Sediment Control Plan for Forest Harvest Operations is required for harvests that disturb 5,000 square feet or more in the Critical Area.

The Critical Area Criteria include regulations affecting timber harvests in two categories: Forest and Woodland Protection and Habitat Protection Areas.

### **Forest and Woodland Protection**

The following information must be included in a Timber Harvest Plan to meet the forest and woodland protection criteria:

1. Description of measures to maintain surface water and groundwater quality;
2. A determination of whether the harvest will disturb or affect "Habitat Protection Areas", and description of measures incorporated to protect any "Habitat Protection Area";
3. A description of the timing, intensity, and size of the harvest which assures continuity of wildlife habitat;
4. Confirmation of an Erosion And Sediment Control Plan for Forest Harvest Operations; and
5. Confirmation that cutting in the buffer will be in accordance with the buffer regulations.

### **Habitat Protection Areas**

"Habitat Protection Areas" fall into five categories:

- 1) buffers;
- 2) nontidal wetlands (NTW);
- 3) habitat for threatened or endangered species;
- 4) other plant and wildlife habitat; and
- 5) anadromous fish spawning areas.

Unless no feasible alternative exists, roads, bridges, or utilities may not be located in any portion of a "Habitat Protection Area." Where any road, bridge or utility must cross a buffer coincident with another type of "Habitat Protection Area," a variance must be obtained through the process described under the heading "Variances".

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## Buffer

Within the Critical Area, a minimum 100-foot buffer must be maintained around all waterways or tidal wetlands. Cutting is allowed in the landward (outermost) 50 feet of the buffer under two circumstances:

- 1) The area can be selectively cut, or
- 2) The area can be clear-cut if the stand is predominantly (50% or more) loblolly pine or yellow poplar.

The buffer is to be maintained in natural vegetation, but may include planted vegetation where necessary to protect, stabilize, or enhance the shoreline. Roads and skid trails may not be constructed in the buffer, even if the outer, landward 50 feet is being cut.

Under certain circumstances, buffers can also be expanded and tree cutting prohibited. The buffer is expanded where sensitive areas such as steep slopes (over 15%), undrained hydric soils, or highly erodible soils are adjacent to the 100-foot buffer. For slopes over 15%, the buffer is expanded four feet for each one percent of slope, or to the top of the slope, whichever is greater in extent. For highly erodible soils, the buffer is expanded to the edge of the erodible soil map unit or to where the slope is less than 5%. The buffer can be expanded to include nontidal wetlands.

## Nontidal Wetlands

Cutting timber is allowed in NTW and hydric soils, although care must be taken in harvesting wet areas to avoid irreparable damage.

The following criteria must be met in Timber Harvest Plans:

1. At least a 25-foot buffer is to be maintained around NTW.
2. Minimize disturbances to the surface and subsurface flow of water of NTW.
3. A wetlands mitigation plan must be prepared and carried out. The harvest or associated activity such as road building must be of substantial economic benefit and the impacts to the wetlands must be unavoidable and necessary. The mitigation plan must outline measures to provide water quality benefits and plant and wildlife habitat equivalent to the wetlands destroyed or altered. Replacement should be accomplished on-site or near the affected wetland where possible and in the same watershed.

The wetlands mitigation plan must be part of the Timber Harvest Plan submittal to the District Forestry Board. The Best Management Practices will be implemented through the Erosion And Sediment Control Plan for Forest Harvest Operations and the plan or a draft plan must be presented to the District Forestry Board before a Timber Harvest Plan for NTW may be approved.

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## **Habitat for Threatened and Endangered Species in Need of Conservation**

Timber Harvest Plans must identify habitats of any species designated by the Secretary of the DNR or by the federal Endangered Species Act as species in need of conservation, threatened, or endangered. The following criteria are to be used to judge the adequacy of protection measures included in the Timber Harvest Plan:

1. A protection area is designated around each of the habitats within which disturbance is prohibited unless it is shown in the Timber Harvest Plan that the harvest activities will not have or cause adverse impacts to the species or its habitat. The recommendation from the DNR - Wildlife and Heritage Program should be included;
2. Special provisions for protection are included in the forest management recommendations for the harvest; and
3. The landowner(s) enter(s) conservation easements or other cooperative agreements that provide protection (optional).

## **Other Plant and Wildlife Habitat**

Other plant and wildlife habitats include forest interior dwelling bird habitat, riparian forests, forests of 100 acres or more, colonial nesting waterbird areas, plant and wildlife habitat of local significance, and Natural Heritage Areas.

All Timber Harvest Plans must identify the types of plant and wildlife habitat listed below:

1. Colonial waterbird nesting sites;
2. Historic waterfowl staging and concentration areas in tidal waters, tributary streams, or tidal and NTW;
3. Existing riparian forests;
4. Forest areas utilized for breeding by forest interior dwelling birds and other wildlife;
5. Other plant and wildlife habitats determined by the local Critical Area Program to be of local significance; and
6. Natural Heritage Areas designated by the DNR.

## **Anadromous Fish Spawning Habitat**

Timber Harvest Plans must identify streams on or adjacent to the property that support spawning of anadromous fish such as rockfish, yellow perch, white perch, shad, and river herring. The following criteria are to be used to protect anadromous fish spawning waters:

1. Artificial materials may not be introduced onto the bottom of natural streams unless it is shown that water quality and fisheries habitat will be improved.
2. Channelization, such as culverts or road crossings, which may change the course or circulation of a stream and interfere with the movement of the fish, is prohibited.
3. Sediment-laden runoff is minimized to the extent possible.
4. The natural vegetation of the watershed is maintained.
5. No structures that would interfere with the movement of spawning fish or larval forms are

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placed in streams.

6. Bridge activities or other stream crossings within the buffer or that occur instream are prohibited between March 1 and June 15.

## **Procedural Requirements**

### **Preparation of Timber Harvest Plans**

Timber Harvest Plans shall be prepared by a Maryland Licensed Forester. These would include private consultants, company foresters, and DNR service foresters. A completed plan shall include the stamp and number of the Maryland Licensed Forester. No format for a timber harvest plan is mandated, although the plan must contain information that addresses the Critical Area Criteria.

The basic information includes landowner name and address, timber harvest location, and a map showing the location, size, and layout of the harvest. The critical area boundary, slopes over 15%, and "Habitat Protection Areas" must be identified. The Timber Harvest Plan must describe the harvest method, regeneration method, confirmation of an erosion and sediment control plan, wildlife corridor layout, and allowances made for habitat continuity.

### **Buffer Management Plans**

If harvesting is to occur within the 100-foot streamside buffer in the Critical Area, a buffer management plan must be prepared in addition to the Timber Harvest Plan. This plan is needed to address particular protection requirements for the buffer.

All Timber Harvest Plans must delineate a minimum 100 foot buffer adjacent to tidal waters, tidal wetlands, and perennial tributary streams. A tributary stream may be tidal or nontidal. Commercial harvesting of trees by selection or by clear cutting of loblolly pine and tulip poplar may be permitted to within 50 feet of the mean high water line of tidal water, the edge of tidal wetlands, or the edge of perennial tributary streams. There are no specific buffer requirements under the Critical Area Law for intermittent streams; however, erosion and sediment control best management practices do not allow cutting adjacent to intermittent streams to avoid sedimentation during fish spawning season.

### **Submission and Review Process**

Plans should be submitted to the DNR - Forest Service Project Manager for the county in which the property is located. The Project Manager will submit complete Timber Harvest Plans to the District Forestry Board within five (5) weeks of submission. The District Forestry Board will review the plan, checklist, and comments and determine if the provisions of the local Critical Area Program are met.

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## **Approval and Appeal**

The approval process is a partnership between the District Forestry Board and the DNR. The Timber Harvest Plan may be modified before approval by the District Forestry Board and the DNR - Forest Service. Some counties require approval of plans by a county department in addition to DNR/District Forestry Board approval.

## **Variances**

If the literal enforcement of the General Approval requirements would result in unwarranted hardship to a landowner, they may request a variance from these requirements. The landowner should request the variance through the District Forestry Board.

## **Length Of Approval:**

Plan approvals are valid for three years from the date of the District Forestry Board approval, or whatever approval length (if any) is indicated in the local Critical Area Program.

## **Appeal:**

Occasionally, conflicts arise where management recommendations are unacceptable to the landowner, or interpretations of the Critical Area criteria are disputed. There is a multi-level conflict resolution procedure to resolve these disputes. If this process does not result in a satisfactory solution, landowners or applicants may appeal to the Secretary of DNR. Further appeal may be conducted through the court system.

Copies of the complete Chesapeake Bay Critical Area Law and Criteria and the guidance papers can be obtained from the Chesapeake Bay Critical Area Commission, 1804 West Street, Suite 100, Annapolis, MD 21401. Local Critical Area Programs can usually be obtained from the local Planning and Zoning Office. Other documents may be obtained from the Maryland Department of Natural Resources - Forest Service, E-1, Tawes State Office Building, Annapolis, MD 21401.

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## APPENDIX G – WATERWAY AND WETLAND REGULATIONS

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## APPENDIX G.1 – GENERAL WATERWAY CONSTRUCTION PERMIT

### CODE OF MARYLAND REGULATIONS 26.17.04.10 General Waterway Constructions Permit

A. A person shall be permitted by this regulation to make changes in the course, current or cross section of the 100-year frequency floodplain if the conditions specified in this regulation for these activities are met and the project is not located in the stream channel or floodplain of a wild and scenic river as defined in Natural Resources Article §8-402, Annotated Code of Maryland. The changes include the following:

- (1) Clearing and grading activities in the 100-year floodplain when:
  - (a) Less than 5,000 feet of land area and less than 100 cubic yards of earth are disturbed,
  - (b) Habitable structures are not constructed, and
  - (c) Permanent obstructions are not created that would affect the hydraulic characteristics of the floodplain;
- (2) Temporary construction on the waters of the State which meet the special requirements of Regulation .08B, C, D, and E of this chapter; or
- (3) Minor maintenance and repair of existing structures that are located in the waters of the State.

B. In addition to the conditions imposed on the categories of construction activities set forth in §A of this regulation, an owner of a project site subject to general waterway construction permit shall do all of the following:

- (1) Provide the Administration with 30 days advance written notice of the planned construction activity including any required plans, specifications, and the construction schedule, and provide anticipated dates of the beginning of construction activity;
- (2) Allow reasonable inspection of the site by representatives of the Administration;
- (3) Maintain construction plans and specifications at the construction site for reasonable inspection by the Administration during construction;
- (4) When applicable, obtain an approved sediment and erosion control plan from the local soil conservation district before construction;
- (5) Provide for specifically designed measures, which shall be included in the construction plans, to minimize sediment pollutants from entering the waters of the State for those construction activities within a stream channel that are not subject to the requirements of COMAR 26.17.01.05, which requires an approved erosion and sediment control plan for certain activities; and
- (6) Provide the Administration with written notice within 30 days after completion of the project.

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## APPENDIX G.2 – NONTIDAL WETLANDS FORESTRY ACTIVITIES

### CODE OF MARYLAND REGULATIONS 26.23.05.02

#### Forestry Activities

A. A person conducting a forestry activity is exempt from the requirements under this subtitle to obtain a nontidal wetland permit and to provide mitigation. Unless exempted in Section B of this regulation, a person conducting a forestry activity shall implement best management practices to protect nontidal wetlands through a sediment and erosion control plan submitted to and approved by a soil conservation district after December 31, 1990.

B. Exemptions. The following forestry activities shall be exempt from the plan approval requirements of this regulation and Regulation .03 of this chapter:

(1) Repair and maintenance of existing structures associated with forestry activities in nontidal wetlands, including drainage ditches, roads, skid trails, causeways, bridges, culverts, and firebreaks, provided the repair and maintenance activities do not drain, dredge, fill, or convert nontidal wetlands.

(2) Forestry activities on areas that have lain fallow due to disease eradication or before site preparation. A person conducting forestry activities shall implement best management practices when the land is no longer fallow and the area is replanted or allowed to regenerate.

(3) Forestry activities on areas that have lain fallow after harvesting before replanting or regeneration due to a civil action involving ownership of the property. A person conducting forestry activities shall implement best management practices to protect nontidal wetlands upon resolution of the civil action.

(4) Forestry activities on nontidal wetlands that have been set aside or taken out of production under a formal State or federal program for forest land for the time period of the set aside if change does not occur in land use. A person conducting forestry activities shall implement best management practices upon expiration of the time period of the set aside and when a new sediment and erosion control plan is required.

(5) Forestry activities that do not require a sediment and erosion control plan.

(6) Forestry activities that are begun before January 1, 1991, in accordance with a sediment and erosion control plan approved before January 1, 1991.

C. Intent of Best Management Practices. Best management practices for forestry activities in nontidal wetlands shall be designed to achieve the following goals:

(1) Control soil loss and sediment deposition in nontidal wetlands;

(2) Minimize water quality degradation caused by sediment;

(3) Minimize adverse impacts to circulation patterns or flow of surface water or ground water;

(4) Prevent a nontidal wetland from being changed to upland or any other area that no longer meets the nontidal wetland definition; and

(5) Minimize adverse impacts to the chemical, physical, or biological characteristics of nontidal wetlands.

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D. A soil conservation district shall consider the following factors in approving the use of best management practices for forestry activities in nontidal wetlands:

- (1) Properties of specific soils to resist compaction or ruts and support equipment;
- (2) Ability to maintain surface and ground water levels in the nontidal wetland after the harvest; and
- (3) Maintenance of the ecological value of nontidal wetlands of special State concern.

E. Best Management Practices.

(1) A person conducting forestry activities in nontidal wetlands shall implement best management practices that meet the intent of §§ C and D of this regulation as set forth in a sediment and erosion control plan prepared by a registered professional forester, and approved by a soil conservation district that is consistent with this regulation and Regulation .03 of this chapter.

(2) For skid trails, log decks, and roads, a person conducting a forestry activity shall use site specific best management practices approved by a soil conservation district. These best management practices may include:

- (a) Locating major skid trails to the maximum extent feasible on soils that resist compaction, ruts, or other disturbances that adversely impact nontidal wetland hydrology.
- (b) Selecting appropriate equipment to skid logs shall be based upon:
  - (i) Slope; and
  - (ii) Ability of the soil to resist erosion or other disturbance.
- (c) Constructing forest roads:
  - (i) On uplands where feasible, or on the highest available ground if uplands are unavailable, so as to minimize encroachment into nontidal wetlands.
  - (ii) Using stabilization techniques to minimize erosion.
  - (iii) Following natural contours of the land, wherever feasible.
  - (iv) Maintaining the hydrology of the nontidal wetland by constructing diversion ditches at the minimum depth to maintain flow of water and using mats or similar temporary structures to reduce compaction or creation of ruts.
  - (v) By not using fill materials for forest roads or using the minimum amount of fill material necessary to maintain a road. Fill shall be excavated from uplands when feasible, and shall be free from State or federally designated toxic pollutants.
- (d) Constructing stream crossings as to:
  - (i) Cross in the shortest distance feasible.
  - (ii) Be of appropriate design, considering the size of the stream and whether the crossing is temporary or permanent. Examples of these structures are mats, bridges, or culverts.
  - (iii) Allow unrestricted movement of aquatic life in the stream.
- (e) Locating and maintaining log decks:
  - (i) On uplands when they are on-site or available;
  - (ii) As far from streams or nontidal wetlands as practicable or on the highest available ground if uplands are unavailable;
  - (iii) At a minimum size and number necessary for the operation;
  - (iv) With diversion ditches to direct water away from the deck during use;
  - (v) By collecting and disposing of trash, debris, and chemicals outside the nontidal wetland.

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(f) Regrading and revegetating as necessary areas affected by skid trails, log decks, and temporary roads after harvesting is completed.

(3) For harvest and regeneration practices, a person conducting a forestry activity shall use site-specific best management practices approved by a soil conservation district. These best management practices may include one or more of the following:

(a) Using high flotation equipment when nontidal wetland soils are unable to support conventional equipment or harvesting on frozen or dry nontidal wetland soils when these soils are capable of supporting equipment to prevent compaction, ruts, or other significant disturbances to nontidal wetland soils or hydrology.

(b) Conducting forestry activities so as to prevent impoundment of water or increased runoff in the nontidal wetland, unless the change is recommended in a sediment and erosion control plan.

(c) Employing site preparation methods that do not result in the conversion of nontidal wetland to upland by grading, bedding, or other disturbances to the soil.

(d) Complying with the seed tree law.

(e) Employing natural regeneration as the preferred method of regeneration in nontidal wetlands, excluding nontidal wetlands with loblolly pine that are regulated under the seed tree law and nontidal wetlands described in § E(3)(f) of this regulation, if surface water is present for at least 1 month of the growing season and high ground water is present for most of the growing season.

Presence of surface or high ground water can be determined by:

(i) Visual observation;

(ii) Soil samples; or

(iii) Other hydrological indicators that are described in the Federal Manual.

(f) Managing nontidal wetlands with at least 20 percent of the live trees being Atlantic white cedar (*Chamaecyparis thyoides*), red spruce (*Picea rubens*), balsam fir (*Abies balsamea*), American larch (*Larix laricina*), or bald cypress (*Taxodium distichum*) to maintain at least the same distribution after harvest.

(4) For nontidal wetlands of special State concern, a person conducting a forestry activity shall use site-specific best management practices approved by a soil conservation district under all of the following criteria:

(a) These best management practices shall maintain the ecological value of nontidal wetlands of special State concern by establishing:

(i) A primary protection area for the crucial portions of nontidal wetlands of special State concern within which a disturbance may not occur, and

(ii) A secondary protection area, when appropriate, within the nontidal wetland of special State concern where group selection, single tree selection, natural regeneration, limited skidder access, disturbance restrictions during the breeding and nesting season, and other low-impact techniques shall be used; and

(b) Practices to maintain the ecological value of nontidal wetlands of special State concern may not be such that harvesting is prohibited within the secondary protection area provided that best management practices are consistent with § E (4)(a)(ii) of this regulation and this section.

F. Best management practices for loblolly pine nontidal wetlands that are regulated by the seed tree law shall be simplified and limited to practices listed under § E(1), (2), and (3)(a)-(d) of this regulation, as appropriate to a specific site.

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## **APPENDIX G.3 – NONTIDAL WETLANDS PLAN REVIEW AND APPROVAL FOR FORESTRY ACTIVITIES**

### **CODE OF MARYLAND REGULATIONS 26.23.05.03 Plan Review and Approval for Forestry Activities**

A. A soil conservation district shall obtain and consider all of the following information to determine which best management practices are necessary and appropriate:

(1) A delineation according to the Federal Manual of the extent of nontidal wetlands affected by forestry activities including acreage of nontidal wetland to be harvested.

(2) The method and schedule for harvesting as prepared by a registered professional forester.

(3) A description of equipment to be used to conduct forestry activities in nontidal wetlands.

(4) The estimated location of:

(a) Major skid trails;

(b) Log decks; and

(c) Roads.

(5) The proposed location of diversion ditches.

(6) A description of anticipated site preparation methods. Methods may include one or more of the following, as appropriate:

(a) Bedding;

(b) Stabilization;

(c) Additional clearing or stump removal;

(d) Chemical treatment.

(7) Description of measures to rectify disturbances from temporary forest roads, log decks, skid trails, and other temporary structures as necessary.

(8) The proposed planting or regeneration method.

(9) Forestry activities and protection areas in nontidal wetlands of special State concern described in Regulation .02E(4) of this chapter.

B. A person conducting forestry activities in loblolly pine nontidal wetlands regulated under the seed tree law may submit a reforestation plan, instead of the information requirements of §A of this regulation, to a soil conservation district to expedite a review of a sediment and erosion control plan if the reforestation plan:

(1) Contains information required under §A of this regulation to approve best management practices appropriate to the site; and

(2) Has been approved by the Department.

C. Plan Processing and Approval.

(1) A soil conservation district shall:

(a) Delineate or review and approve the delineation of nontidal wetlands according to the Federal Manual; and

(b) Review and approve the sediment and erosion control plan if it complies with this regulation and Regulation .02 of this chapter.

(2) A soil conservation district may use guidance maps prepared by the Department to assist in the identification of nontidal wetlands of special State concern.

(3) The Department shall delineate the primary and secondary protection areas for nontidal

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wetlands of special State concern in consultation with a soil conservation district. Comments from the landowner and the registered professional forester prescribing the harvest method and schedule shall be considered.

(4) A person conducting forestry activities shall:

(a) Submit copies of an approved sediment and erosion control plan to the Department;  
and

(b) Notify the soil conservation district when site conditions require a change in best management practices.

(5) A person conducting forestry activities in nontidal wetlands on State lands shall submit sediment and erosion control plans to the Department for approval.

(6) The Department shall recommend additional voluntary protection standards for forestry activities in nontidal wetlands upon request from a person conducting forestry activities.

(7) Forestry activities in nontidal wetlands shall be subject to the enforcement provisions of COMAR 26.23.01.05.

(8) A soil conservation district shall cooperate with the Department to resolve a violation of these regulations caused by a forestry activity.

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