

MISSISSIPPI FORESTRY COMMISSION



**FIREBREAK
HANDBOOK**

The *Firebreak Handbook* provides guidelines on how to plan, construct, and maintain firebreaks. MFC personnel should follow the guidelines of this handbook and consider them as **minimum** standards for constructing and maintaining firebreaks.

Best management practices taken from *Mississippi's Best Management Practices Handbook* (Third Edition, March 2000) have been incorporated into this handbook in order to promote improved water quality by preventing nonpoint source pollution.

March 2003

The Mississippi Forestry Commission provides equal employment opportunity and services to all individuals regardless of disability, race, age, religion, color, gender, creed, national origin, or political affiliation.

TABLE OF CONTENTS

INTRODUCTION	1
PLANNING	2
CONSTRUCTION	5
• WIDTH	5
• CLEARING	6
• GRADE	6
• DRAINAGE STRUCTURES	7
<input type="checkbox"/> Side Ditches	7
<input type="checkbox"/> Water Turnouts	8
<input type="checkbox"/> Water Bars	9
• TYING INTO/CROSSING LIVE STREAMS	11
• FIREBREAKS AS ROADS	12
VEGETATIVE COVER	13
• RECOMMENDED SPECIES FOR VEGETATIVE COVER	14
MAINTENANCE	15



INTRODUCTION

A **firebreak** is a permanent or semipermanent break in combustible fuels. Firebreak systems are primarily designed to help prevent the spread of wildfire. They improve protection of young pine timber, structures, hardwood stands, streamside management zones (SMZs), or other areas that may be subject to damage by fire. Firebreaks are also valuable for access to a property for fire suppression. Other benefits derived from firebreaks include increased diversity within a forest, corridors for wildlife movement, and improved access to the property for management, recreation, or other purposes.

PLANNING

Planning begins with the collection of information about the area where the firebreak system is to be developed. Consideration should be given to property boundaries, streams and streamside management zones, stream crossings, soil restrictions, slope, existing roads and rights-of-way, timber types, structures, and other site characteristics that should be protected or could be used to aid in the firebreak system. Aerial photographs, topographic maps, soil maps, and other property maps are helpful in designing a firebreak system.



Legend

	Pasture		Woods/field road
	Mature Pine		County road
	Young Pine		SMZ
	Transmission line		Firebreak

Limiting soil erosion and protecting water quality must be given high priority when selecting the location for firebreaks. When possible, avoid constructing firebreaks down steep slopes, in streamside management zones, across live streams, on wet soils, and in other sensitive areas. Firebreaks should be located on gentle slopes in such a way that side drainage can be achieved.



Erosion can be the result of too-steep firebreaks.



Avoid steep slopes; instead, construct firebreaks on gentle slopes.



Woods roads and utility rights-of-way should be considered not only as a part of the firebreak system, but also as a means of access to the system. If there is the potential for a wildfire to be started from a road, a firebreak should be constructed parallel to the road. Otherwise, the road may be used as a part of the firebreak system.

After the planning phase is complete, locate and mark the firebreak system on the ground using a compass, measuring tape and marking material such as survey flags, wooden stakes, colored tape or paint. Mark the centerline of the road, side ditches, water turnouts, and locations for waterbars. When marking the system, include pre-existing roads or woods trails to assure that these are checked for maintenance.



Mark for removal any potential hazards such as dead trees and snags along or near firebreaks.

CONSTRUCTION

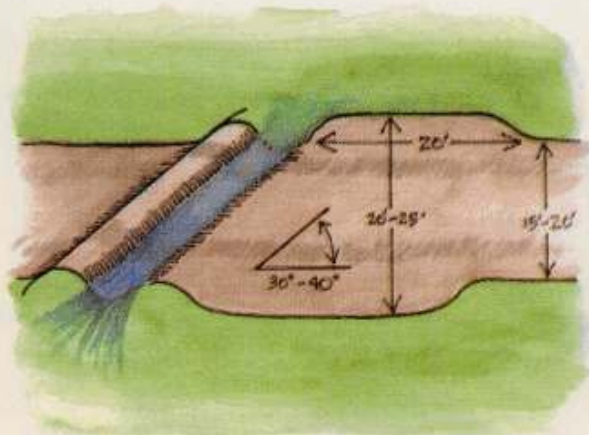
Proper construction is essential to the effectiveness of a firebreak and protection of water quality.

General Tips

- Construct firebreaks during drier periods of weather when possible.
- Allow firebreak surface to settle before using.
- Firebreaks should be wide enough to enhance surface drying and minimize soil compaction during wet periods.

WIDTH

Firebreaks should be between 15 and 20 feet in width. Increase the width where water bars or other drainage structures are installed.



5

CLEARING

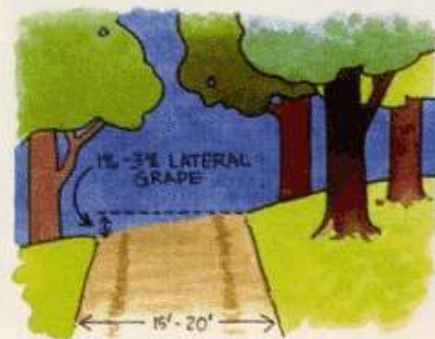
Clear all woody growth from the firebreak to achieve a total firebreak width of 25 feet. Be certain to remove all snags and other materials that may allow a fire to cross the firebreak.

GRADE

Grade is a term used to describe the slope of a road or firebreak. A grade of between 2 and 10 percent is desirable in order to allow surface water



to move over and off a firebreak. When possible, avoid flat, no-grade firebreaks or long, steep grades. When it is necessary to construct firebreaks with grades greater than 10 percent, close attention should be paid to the length of the firebreak and the need for special drainage structures. Firebreaks with grades up to 10 percent may be used, but should be no greater than 100 feet in length.



Lateral grade refers to the slope of the firebreak from side to side. Ideally, the lateral grade should be between 1 and 3 percent, but never more than 10 percent.

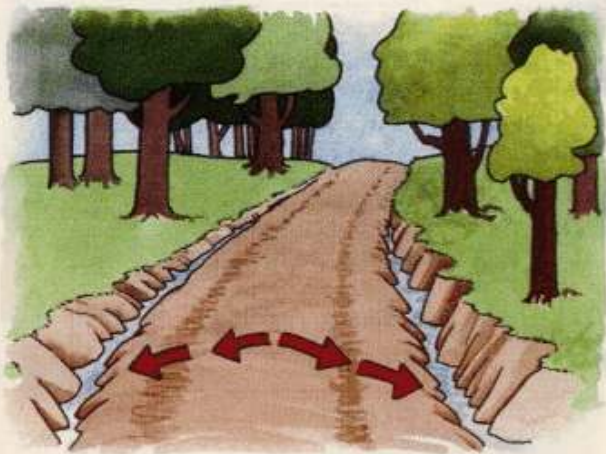
6

DRAINAGE STRUCTURES

Drainage is the most critical concern in construction of any road or firebreak. Drainage structures must be designed to divert surface water from rainfall, storm events, or springs in order to control soil erosion and maintain a stable firebreak surface. Three types of structures commonly used are side ditches, water turnouts, and water bars. Water bars are preferred and are usually less expensive to construct, and are less intrusive on the environment. However, side ditches and turnouts may be required to ensure proper drainage.

Side Ditches

Side ditches may be provided where needed along the firebreak. Side ditches should be constructed outside the width of the firebreak on the down grade side. Banks should be rounded and not sheer. Flat bottom ditches, with flat areas two or more feet wide, provide greater safety and less maintenance than deeper V-shaped ditches. Never allow a ditch to drain into a stream.



Water Turnouts

Water turnouts should be installed where needed to facilitate the movement of ditch water into an adjacent vegetated area. Always drain ditches into vegetated areas far enough from a stream that there is no chance of ditch sediment reaching the stream channel. The angle of the turn should smoothly redirect the water and prevent erosion. Turnouts should intersect the ditch line at an equal depth and be outsloped about 3 percent. Spacing of turnouts should not exceed those listed in Table 1 in order to allow the roadbed to dry and to reduce the volume and speed of side ditch waters.

Table 1: Spacing for Water Turnouts

- 200 feet apart on 2% to 5% grades
- 100 feet apart on 6% to 9% grades
- 75 feet apart on 10% grades

Water Bars

A water bar is a mound of soil designed to intercept water runoff and divert it away from the firebreak into an adjacent vegetated area. It should be installed at a 30 to 40 degree angle to the center of the firebreak. The width of the firebreak should be increased where water bars are installed. Widen the firebreak on the uphill slope for a distance of about 20 feet leading to the water bar.



Water bars should be spaced at a distance as shown in Table 2.

Table 2: Spacing for Water Bars

Grade of Road (percent)	Approximate Distance (feet)
2	250
5	135
10	80
15	60

The following rule of thumb is often used on-site to estimate the distance between water bars: The line of sight of a six-foot-tall person, facing the uphill slope of a firebreak, will coincide with the approximate location for the next water bar.



Tying into or Crossing a Live Stream

Avoid tying into or crossing a live stream if at all possible. Instead, link the firebreak system to existing, properly constructed roads as a means of preventing the spread of wildfire. Priority must be given to preventing sediment runoff into streams. It may be necessary to use handtools or other special techniques to construct firebreaks within streamside management zones.



Use handtools when working in SMZs.

When it is necessary to cross a stream, make crossings at the narrowest practical portion of the stream and, if possible, cross at a right angle to the stream. If there is a gentle grade to the stream, the installation of water turnouts and water bars on each side of the crossing may suffice.

Fords may be used when crossing shallow streams if no practical alternative exists. A ford is a low-water crossing that uses existing or constructed stream bottoms to support vehicles. The stream bottom must be hard



Gravel is used to stabilize this stream crossing.

enough that no muddy water results when vehicles cross the ford. Approaches to a ford should be hard and stable. If necessary, stabilize the ford and both approaches to the ford with nonerodible material such as gravel. Extend the material to at least 50 feet from the ford on both sides.

Priority should be given to revegetating disturbed areas near streams or in SMZs in order to prevent erosion or sedimentation.

FIREBREAKS AS ROADS

The guidelines in this handbook have been designed to assist in the development of a permanent or semi-permanent firebreak system. If a firebreak is to be used as a permanent, all weather road, additional information beyond the scope of this handbook may be needed. A working knowledge of the various types of roads, the proper installation of culverts and bridges, stabilization materials, and environmental regulations will be required.



VEGETATIVE COVER

To be effective, a firebreak should provide either an exposed soil or vegetative cover which will be green and non-burning during the winter. When establishing a vegetative cover, be certain sufficient sunlight is available for adequate growth. To be successful, proper seed-bed preparation is necessary.

General Tips

- Loosen the top layer of soil if it has become hard or crusty.
- Incorporate lime and/or fertilizer according to soil test results.
- Only use smoothing equipment following fertilization.

Recommended Species for Vegetative Cover

Recommended Species for Temporary Cover

<i>Species</i>	<i>Preferred Planting Dates</i>	<i>Seeding Rate</i>
Browntop Millet	May - July 15	25 lb. seed/acre
Sorghum/Sudangrass	April - July	35 lb. seed/acre
Ryegrass (Gulf or Marshall)	Sept. - Oct.	30 lb. seed/acre
Oats (Florida 501 Bob)	Sept. - Oct.	4 bushels/acre
Wheat	Sept. - Oct.	2 bushels/acre
Rye (Vitagraze)	Sept. - Oct.	2 bushels/acre

Recommended Species for Permanent Cover

<i>Species</i>	<i>Preferred Planting Dates</i>	<i>Seeding Rate</i>
Lespedeza (Sericea)	March - April	30 lb. seed/acre
Bahiagrass	Feb.-June or Sept.-Nov.	30 lb. seed/acre
Bermudagrass (hulled)	March - June	8 lb. seed/acre

Wildlife Planting Recommendations

Some landowners may wish to establish vegetation which will provide both ground cover and benefit to wildlife species. The following table lists those plants which may serve both purposes.

<i>Species</i>	<i>Preferred Planting Dates</i>	<i>Seeding Rate</i>
Browntop Millet	May - July 15	20 lb. seed/acre
Oats	Sept. - Oct.	4 bushels/acre
Wheat	Sept. - Oct.	20 lb. seed/acre
Winter Peas	Sept. - Oct.	30 lb. seed/acre
Red Clover (Redland, Atlas)	Sept. - Oct. 15	8 lb. seed/acre
White Clover (Regal, Osceola)	Sept. - Oct.	3 lb. seed/acre

MAINTENANCE

Proper firebreak maintenance is essential to the effectiveness of the firebreak system. Firebreaks should be checked periodically, especially after storms, to assure that they are clear of materials that may allow a fire to cross and that soil stabilization efforts are effective.

General Tips

- Limit traffic during unfavorable weather.
- Clean all drainage structures and ditches as needed.
- Refertilize and/or revegetate as needed.
- Remove dead trees or snags that could fall across the firebreak.