

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

FIREBREAK

(Ft.)

CODE 394

DEFINITION

A permanent or temporary strip of bare or vegetated land planned to retard fire.

PURPOSE

- Reduce the spread of wildfire.
- Contain prescribed burns.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on all land uses where protection from wildfire is needed or prescribed burning is applied.

CRITERIA

General Criteria Applicable to All Purposes

Firebreaks may be temporary or permanent and shall consist of fire-resistant vegetation, non-flammable materials, bare ground, or a combination of these.

Firebreaks as Part of a System

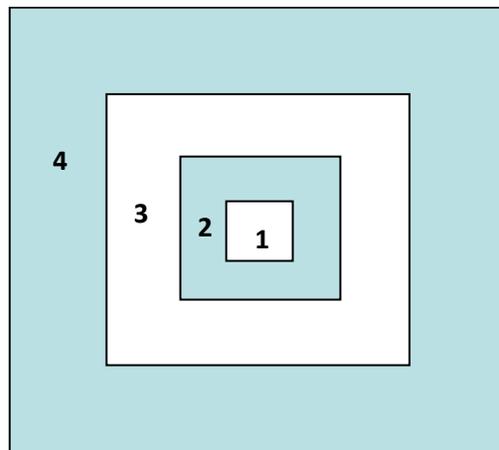
Firebreaks are an integral part of a complete system to minimize the potential impact of catastrophic wild fires.

Wildfire prevention is no better than the weakest link in the fire control system employed. Following are a few of the critical points of a fire control system.

Targeted Fire Control Efforts

Most benefits accrue from efforts at the center:

Figure 1.



1. Buildings are covered with noncombustible or fire resistant materials (house, barn, etc.).
2. Defensible space exists around and within areas to be protected. Minimum of 30 feet around high value property (non-combustible ground cover such as soil, gravel, irrigated lawn, etc.).
2. Combustible materials (LP tanks, firewood, etc.) are located away and downwind from structures.
3. Combustible debris (leaves, papers, limbs, etc.) is not allowed to accumulate.
4. Firebreaks are properly sited, contiguous, and well maintained.
4. Easy access for firefighters.
4. Management plans exist to address extreme fire conditions.

Firebreak Types

There are three main types of firebreaks – vegetative, nonvegetative, and burned. For permanent or long-term protection and when high-value property is being protected, a combination of vegetative and non-vegetative firebreaks shall be installed.

Vegetative firebreaks

Vegetated firebreaks require a higher degree of expertise and resources when conducting the prescribed burn. Please refer to Conservation Practice Standard (CPS) Prescribed Burning (338) for minimum requirements related to equipment and resources.

Vegetated firebreaks shall consist of short vegetation or vegetation that can be kept short with frequent mowing or grazing. They are prepared in the following ways:

- Shallow cultivation or mowing, shredding or clipping of vegetation (vegetation left on surface shall be removed).
- Application of a herbicide treatment designed to limit growth but not necessarily kill existing vegetation.
- Intensively grazing strips of vegetation (stubble height should be two to three inches following grazing).
- Establishment of low-growing and/or greener, more succulent vegetation adjacent to the area to be protected.

Species recommended for establishing permanent or long-term vegetative firebreaks are native or introduced legumes and/or forbs. Introduced legumes should not make up more than 30 percent of the mix if dense nesting cover is a concern. Please refer to Tables 4, 5, 6A, and/or 6B in Range Technical Note No. 4 for a list of species and their adaptations.

Vegetative firebreaks are most effective when green and relatively succulent. Even when dry, well managed vegetative firebreaks are effective in reducing flame length and fire intensity.

Please refer to Table 2 to determine minimum widths for vegetative firebreaks based on

slope, surrounding area and the upwind hazardous fuel type.

In some locations, yards and other areas adjacent to structures are irrigated and kept green during the entire growing season. If wide enough, these may fulfill the purpose of a firebreak without the nonvegetative component. Irrigated vegetative firebreaks may be used alone for high value property protection; however, the vegetation must be kept green through the entire fire season, and the width must be equal to the combined width of the vegetative and nonvegetative firebreak as found in Table 2.

Nonvegetative firebreaks

Nonvegetative firebreaks consist of a strip of land with no vegetation or other combustible material for their entire width. The surface material of nonvegetative firebreaks will be bare soil, gravel, road-surfacing material, waterbodies, or other noncombustible material.

Nonvegetative firebreaks should be developed on the contour or on short gentle slopes (less than six percent) that will keep water erosion at or below tolerable levels. If additional erosion control is necessary, water bars or diversions shall be installed within the bare soil area to divert water from the non-vegetative firebreak to the vegetation along the edges. Ensure water bars extend into the vegetated area for several feet so that outlet water will not create a gully along edge of bare soil. Water bars will be spaced according to the steepness of slope and soil texture as follows:

Table 1. Spacing Between Water Bars (ft.)

| Soil Texture | C Slope (6-9%) | D Slope (9-15%) | E Slope (>15%) |
|--------------|----------------|-----------------|----------------|
| Sand | 250 | 150 | 100 |
| Sandy loam | 350 | 225 | 150 |
| Loam | 425 | 250 | 200 |
| Clay loam | 475 | 300 | 225 |

Water bars shall be at least six inches high, measured from the upstream toe to the top, which shall be at least one foot wide. The borrow area will be taken from the downhill

side and they shall be reformed as needed to maintain effectiveness.

Temporary nonvegetative firebreaks (tilled) can provide effective protection with minimal risk and costs in situations where fire risk is only for a limited time of the year. These are typically used in conjunction with burned firebreaks when implementing a prescribed burn.

Temporary nonvegetative firebreaks will be designed to the width of nonvegetative firebreaks as found in Table 2. To be effective, the total width of the combined firebreak should still meet the total width of the non-vegetative and vegetative or burned firebreak as found in Table 2.

Temporary nonvegetative firebreaks (tilled) shall be reseeded to vegetation similar to pre-existing composition, or using species as mentioned under "Vegetative Firebreaks" above.

Temporary nonvegetative firebreaks (tilled) shall not be used on previously untilled land or land that is considered rangeland.

Burned firebreaks

A successful burned firebreak consumes all fine fuels to mineral soil resulting in bare soil and rapid green-up. Burned firebreaks are normally used only during prescribed burning operations.

Weather conditions for burning firebreaks is somewhat different than for a typical prescribed burn. The normal prescription for burning firebreaks is referred to as the "40-60 Rule." In other words, air temperatures between 40 and 60 degrees Fahrenheit, and humidity between 40 and 60 percent. Wind speed shall be 0 to 10 miles per hour.

Burned firebreaks, as part of a combination firebreak, shall be the width shown in Table 2 for a vegetative/burned firebreak. Normally, when using in conjunction with a prescribed burn, a minimum of five-foot wide nonvegetative firebreaks will be used on each side of the burned firebreak. Depending on downwind conditions of areas being protected,

the area adjacent to the burned firebreak may be established with other methods (i.e., low mowing and spraying with water or fire resistant material).

If burned firebreaks are to be used alone to reduce fuels or to promote early green-up, the width shall be the sum of the non-vegetative and the vegetative/burned firebreak as found in Table 2.

Burned firebreaks may be used only when they have been planned according to the CPS Prescribed Burning (338, as found in the South Dakota Technical Guide (SDTG), Section IV.

Design and placement

Use existing barriers such as streams, lakes, ponds, shale outcroppings, roads, drainage ditches, and cultivated land as natural/artificial firebreaks.

Generally, firebreaks should completely encircle high value areas, since damaging wildfires can originate from any direction. Depending on site-specific conditions, a firebreak may be installed to protect from only one to several directions.

Topography can be used to improve firebreak effectiveness. In general, locate firebreaks on ridge crests or valley bottoms. If prevailing wind direction is predictable, firebreaks should be located on the leeward side of ridge crests. In the case of a prescribed burn, and wind direction is known (burn will only take place with certain wind speeds and directions), locate firebreaks perpendicular to the wind, and on the windward side of the area to be protected.

For all situations, the vegetative or burned firebreak is on the fire hazard side of the nonvegetative firebreak. As the hazard class of the fuels and/or the slope increases it is imperative that vegetative firebreaks be wider to reduce radiant heat energy and flame lengths so that nonvegetative firebreaks are effective.

As a rule-of-thumb, the combination firebreak width should be six times the height of the vegetation.

Figure 2 below shows the typical design of a combination firebreak.

| Upwind Hazardous Fuel Type | Firebreak Widths (feet) Modified by Slope | | | | | | | |
|--------------------------------------|---|-----|----------------------|-----|-----------------------|-----|---------------------|-----|
| | Downwind on level | | Downwind 1-20% slope | | Downwind 20-40% slope | | Downwind >40% slope | |
| | NV | V/B | NV | V/B | NV | V/B | NV | V/B |
| Herbaceous Vegetation <18" high | 5 | 20 | 6 | 30 | 8 | 40 | 10 | 50 |
| Herbaceous Vegetation 18" – 48" high | 8 | 30 | 10 | 40 | 12 | 50 | 15 | 60 |
| Herbaceous Vegetation >48" high | 10 | 40 | 15 | 50 | 20 | 60 | 25 | 70 |
| Shrubs and Brush <10' high | 10 | 50 | 15 | 75 | 20 | 100 | 25 | 125 |
| Deciduous Trees >10', Conifers <10' | 10 | 50 | 15 | 75 | 20 | 125 | 25 | 150 |
| Conifers >10' high | 10 | 100 | 15 | 125 | 20 | 150 | 30 | 200 |

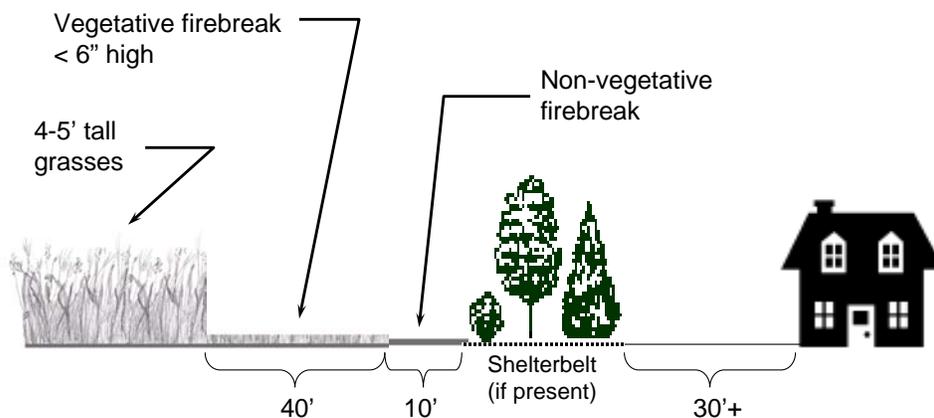
NV – Nonvegetative

V/B – Vegetative or Burned Firebreaks

Downwind – Slope away from the fire hazard towards the area needing protection.

These widths are appropriate for most conditions found in SD. In areas of dense forest covering many contiguous acres, or with extreme fire hazard conditions consider increasing each firebreak component width by 50-100 percent.

Figure 2. Combination firebreak



CONSIDERATIONS

The need for a firebreak is dependent upon the value of the resource to be protected. The cost of installation and maintenance based on fire risk should be weighed against the loss of the resource should a wildfire occur.

Firebreaks are usually installed to protect structures, developed areas, and other areas of high value. As the value of the property at

risk to wildfire increases, fire prevention efforts become more intense.

Firebreaks provide a certain level of protection; however, it must be recognized that firebreaks alone may not stop wildfires during extreme conditions. Figure 1 refers to other possible fire control efforts that will enhance the protection. For more information on wildfire control systems, please refer to

<http://www.firewise.org/>, the SD Department of

Agriculture, Resource Conservation and Forestry Division, or your local fire department.

Use aerial photographs, topographic and soil survey maps, climate, and other resource data to assist in determining firebreak location and design.

Ask state and local fire control officials to assist in determining firebreak location and design.

Plan firebreaks to minimize erosion.

Consider measures that will reduce fire hazard around high value resources. These could include: clipping and removing tall vegetation, setting up a sprinkler system adjacent to buildings which can be turned on in the event of a fire, or irrigating surrounding vegetation to keep it green and growing throughout the year (may also require more frequent clipping and removal of vegetation).

Work with neighbors to develop a community-wide fire prevention program.

Approval may be required for establishing and maintaining firebreaks on lands enrolled in various government programs. Rules regarding the removal of vegetation may influence firebreak design.

Evaluate physiography, topography, field and facility locations, land use, prevailing wind direction, fuel type and amount, and soil factors when determining firebreak location.

Electric lines can be hazardous in heavy smoke as they may conduct electricity.

When using barriers consider the effects on wildlife and fisheries.

Consider using diverse species combinations which best meet locally native wildlife and pollinator needs.

Design and layout should include multiple uses.

Consider the beneficial and other effects of installation of the firebreak on cultural resources and threatened and endangered species, natural areas, riparian areas, and wetlands.

For smaller areas, such as parks or where needed to protect exceptionally high value property, nonvegetative firebreaks may be covered with gravel, rock, asphalt, or concrete. Such firebreaks can be used as walking or biking paths. Surface thickness should be thick enough to withstand the weight of maintenance and fire-fighting equipment. Consider placing weed control fabric under gravel or rock surfaces to reduce vegetation emergence.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan and the burn plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

When nonvegetative firebreaks are no longer needed, reseed following the recommendations of the CPS Forage and Biomass Planting (512), Section IV of the SDTG.

Mow, disk, or graze vegetative firebreaks to avoid a build-up of excess litter and to control weeds. Treatment should be timed to reduce impacts to nesting when possible.

Animal dung is highly flammable during conditions of high fire risk. If concentrations of dung exist, they should be raked and removed from the firebreak.

Inspect all firebreaks for woody materials such as dead limbs or blown down trees and remove them from the firebreak.

Inspect firebreaks at least annually and rework bare ground firebreaks as necessary to keep them clear of flammable vegetation.

Repair erosion control measures as necessary to ensure proper function.

Access by vehicles or people will be controlled to prevent damage.