

NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE SPECIFICATIONS

FUEL BREAK

(Ac.)

CODE 383

Fuel Break

A strip or block of land on which the vegetation, debris and detritus have been reduced and/or modified to control or diminish the risk of the spread of fire crossing the strip or block of land.

Purpose

Control and reduce the risk of the spread of fire by treating, removing or modifying vegetation, debris and detritus.

Where Used

This practice applies on all land where protection from wildfire is needed. A fuel break is typically an easily accessible strip of land of varying width (depending on fuel and terrain), in which fuel density is reduced, thus improving fire control opportunities.

Conservation Management System

Fuel breaks are planned and located at strategic locations on the landscape as part of a conservation management system for a land unit where there is a need to control the risk of the spread of fire. Typically, they break up large, continuous tracts of dense natural fuels, thus limiting uncontrolled spread of fire, and are commonly associated with firebreaks (permanent or temporary strips of bare or vegetated land planned to retard fire).

Fuel breaks aid firefighters by slowing fire spread under normal burning conditions. However, under extreme conditions, even properly designed fuel breaks stand little chance of arresting a large fire, regardless of firefighting efforts. Such fires, in a phenomenon called “spotting,” can drop firebrands ahead of the main fire, causing very rapid fire spread. These types of large fires may continue until there is a major change in weather conditions, topography, or fuel type.



Figure 1 – A fuel break on forest land involves the reduction of flammable materials, elimination of ladder fuels, and increasing the spacing of residual trees to minimize risk of crown fires.



Figure 2 – Brush concentrations on rangeland can ignite and increase the intensity of uncontrolled fires and threaten buildings and other structures in downwind locations.

SPECIFICATIONS

Fuel breaks shall comply with the following items, any additional specifications based on purpose(s) and requirements listed for applicable slash treatment techniques.

1. All activities associated with applying this practice shall comply with federal, state, tribal and local forestry and related laws and regulations. It is the landowner's responsibility to obtain appropriate permits and/or applications prior to commencing an activity.
2. Identify the purpose for protection and provide a brief explanation of what is being protected, why it is being protected and where the protection is needed.
3. Locate all potential ignition sources that could create hazardous or catastrophic fires. These sources may include public roads, railroads, urban developments, recreation sites, utilities, etc.
4. Locate fuel break(s) between the potential ignition source and the resources/structures to be protected and as close as feasible to the ignition source. In areas of heavy fuels without an obvious ignition source, located the fuel break(s) below or adjacent to areas where protection is needed. Favor locations for fuel break(s) that are below valleys or canyons leading up to saddles to reduce the risk of fires moving upslope (chimney effect) and spreading to adjacent areas. Also, favor locations along ridgelines.
5. The dimensions of the fuel break (width and length) shall be sufficient to reduce fire spread and intensity. Width on level ground shall be a minimum of 150 feet for cropland, rangeland, and other non-forestland sites and a minimum of 300 feet on forest land sites. Add 10 feet to the width for every 10 percent increase in slope (e.g., a width of 360 feet would be used on a 60 percent slope). Length shall match the length of the ignition source to the extent feasible.
6. Connect fuel break(s) to natural or artificial fire barriers such as rivers, creeks, large rock outcrops, wet meadows, roads, or areas with low fuel loads/cover or flammability. Existing natural or artificial barriers are included in the total fuel break acres. Favor locations that are linked to road systems to facilitate fire-fighting access.
7. Reduce or modify the existing fuel load (vegetation and debris) sufficiently using local fire control authority guidance and criteria. To diminish the risk and/or rate of the spread of fire crossing the strip or block of land, use techniques suitable to the material to be treated, e.g., mowing, prescribed grazing (re. NRCS practice code 528), pruning (re. NRCS practice code 660), removal, chipping, prescribed burning (re. NRCS practice code 338), and masticating. Removal will target dead, diseased, dying, or poorly formed trees before any healthy trees are removed. On forest land sites, coordinate remaining slash and debris amounts with specifications developed for forest slash treatment (re. NRCS practice code 384.)
8. Feather the edges of the fuel break(s) as feasible into the adjacent protected areas for aesthetic purposes.
9. For fuel break(s) where revegetation is needed to supplement treatment of existing vegetation (e.g., reseeding of disturbed areas, road cuts and fills), reference the [Fire Wise Plant Materials](#) (Quick Facts #6.305, CSFS), [Grass Seed Mixes to Reduce Wildfire Hazard](#) (Quick Facts #6.306, CSFS) and follow NRCS Standard & Specification 550 – Range Seeding or 342 – Critical Area Planting for species and planting specifications.
10. Soils, site factors, and timing of application must be suitable for any ground-based equipment utilized for creating a fuel break to avoid excessive compaction, rutting, or damage to the soil surface layer. Equipment will be used on the contour where feasible. For safety purposes and to protect site resources, treatment methods involving equipment are generally not applied on slopes exceeding 35 percent.
11. Regrowth of natural or planted vegetation will be controlled by pruning, mowing, or other technique to maintain the specified reduced fuel load.
12. Remove all standing dead trees and shrubs except for a limited number of large, dead trees (14" diameter-at-breast-height or larger) that may be retained for wildlife use. Remove all downed dead trees and shrubs within the zone if they are solid (not rotten) and are not yet embedded into the ground. Downed trees that are embedded into soil and which cannot be removed without soil disturbance will be left in place. Chipping and masticating of dead material can be used as an alternative to removal provided materials are not contiguous or exceed a depth of 3 inches.

13. For areas with trees 13 feet in height or greater, horizontal crown separation is more critical for fuel breaks than a fixed tree canopy cover. Trees shall have a minimum of 10-foot spacing between the edges of tree crowns on level ground (see figure 3 below). Spacing will be increased by 2 feet for each 5 percent increase in slope. Small, isolated groups of trees may be retained for visual diversity. For species in a condition that is subject to windthrow or snow breakage or bending, e.g., heavily stocked Lodgepole pine greater than 40 years old, either remove all trees or retain small, isolated groups. Additionally, trees and understory shrubs shall be horizontally separated by two times the height of the representative shrubs as shown in figure 4. Vertical separation between the lower bound of the tree crowns and upper bound of the understory fuel layer shall average 3 times the height of understory fuel layer as in shown in see figure 4 below and never closer than 2 times the height. For sites where vertical separation cannot be consistently achieved, remove that part of the overstory and/or understory fuel layer to maintain the minimum separation.

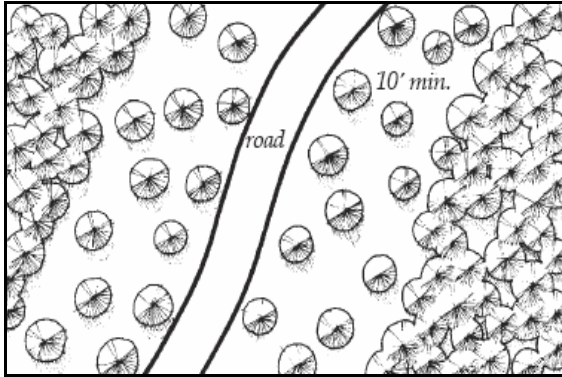


Figure 3 – Plan view showing tree crown separation.

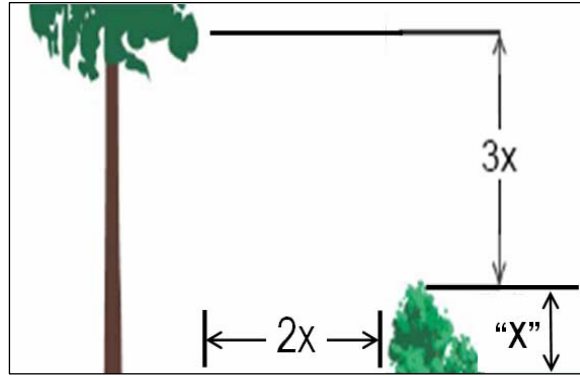


Figure 4 – Separation between fuel layers.

14. For live vegetation where trees/shrubs are less than 13 feet in height, spacing of small trees and shrubs shall be based on plant height and achieve minimum distances specified in see figure 5 below.

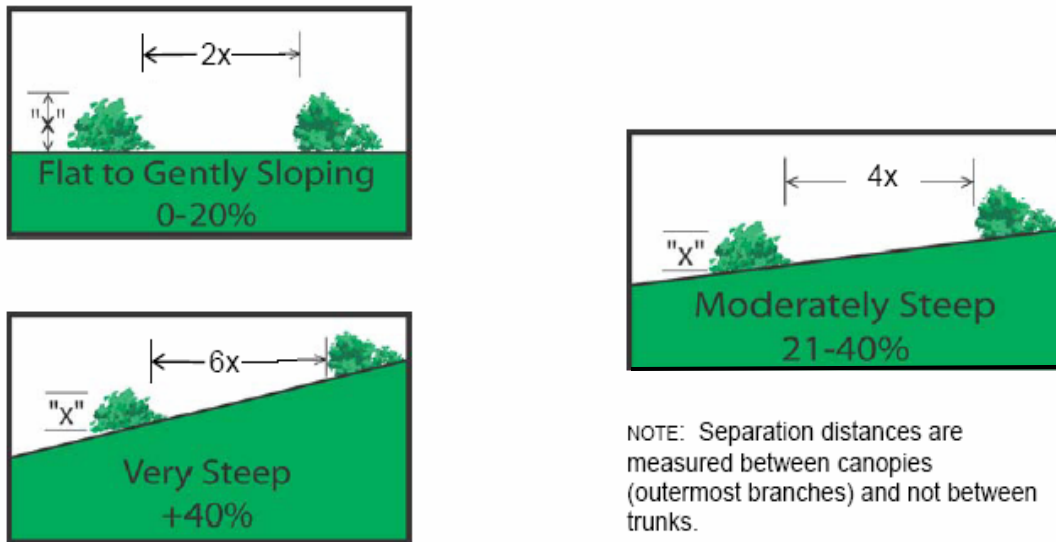


Figure 5 – Minimum spacing requirements for small trees and shrubs.

NOTE: Separation distances are measured between canopies (outermost branches) and not between trunks.

15. Clarification Notes: Fuel Break-383 specifications are designed primarily to reduce the spread of uncontrolled fire and will not meet defensible space guidelines (re. Creating Wildfire-Defensible Zones, Quick Facts #6.302, CSFS). However, specifications may meet partial requirements for zone 2. Additionally, Firebreak-394 may meet partial requirements for zone 1. Forest Stand Improvement-666 and associated conservation management system practices may meet partial requirements for zone 3.



FORESTRY

Fire-Resistant Landscaping

no. 6.303

by F.C. Dennis¹

Quick Facts...

More people are moving into Colorado's rural areas, increasing the chances of wildfire.

"Defensible space" is the primary determinant of a structure's ability to survive wildfire.

Native species are generally the best plant materials for landscaping in defensible space, but others can be grown successfully in Colorado.

To be a FireWise homeowner, plan well, plant well and maintain well.

Colorado's population is growing, its urban areas are rapidly expanding, and people are building more homes in what was once natural forest and brushlands. Newcomers to rural areas need to know how to correctly landscape their property to reduce wildfire hazards.

Improper landscaping worries land managers and fire officials because it can greatly increase the risk of structure and property damage from wildfire. It is a question of *when*, not *if*, a wildfire will strike any particular area.

Vegetative clearance around the house (defensible space) is a primary determinant of a home's ability to survive wildfire. Defensible space is, simply, room for firefighters to do their job. If grasses, brush, trees and other common forest fuels are removed, reduced, or modified to lessen a fire's intensity and keep it away from the home, chances increase that the structure will survive. It is a little-known fact that in the absence of a defensible space, firefighters will often bypass a house, choosing to make their stand at a home where their safety is more assured and the chance to successfully protect the structure is greater.

Landscaping Defensible Space

People often resist creating defensible space because they believe that it will be unattractive, unnatural and sterile-looking. It doesn't have to be! Wise landowners carefully plan landscaping within the defensible space. This effort yields a many-fold return of beauty, enjoyment and added property value. Development of defensible space is outlined in fact sheet 6.302, *Creating Wildfire-Defensible Zones*.

Colorado has great diversity in climate, geology and vegetation. Home and cabin sites can be found from the foothills through 10,000-foot elevations. Such extremes present a challenge in recommending plants. While native plant materials generally are best, a wide range of species can be grown successfully in Colorado.

Many plant species are suitable for landscaping in defensible space. Use restraint and common sense, and pay attention to plant arrangement and maintenance. It has often been said that *how* and *where* you plant are more important than *what* you plant. While this is indeed true, given a choice among plants, choose those that are more resistant to wildfire.

Consider the following factors when planning, designing and planting the FireWise landscape within your home's defensible space:

- Landscape according to the recommended defensible-space zones. That is, the plants near your home should be more widely spaced and lower growing than those farther away.
- Do not plant in large masses. Instead, plant in small, irregular clusters or islands.

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The best tree species to plant generally are those naturally occurring on or near the site.

Mow grass short around shrubs.

Plant low-growing, nonresinous shrubs near structures.

Keep grass mown around structures to a maximum of 8 inches.

Plant wildflowers near structures only if they are well-irrigated and cut back during the dormant season.

Gravel area or mow grass short next to the structure.

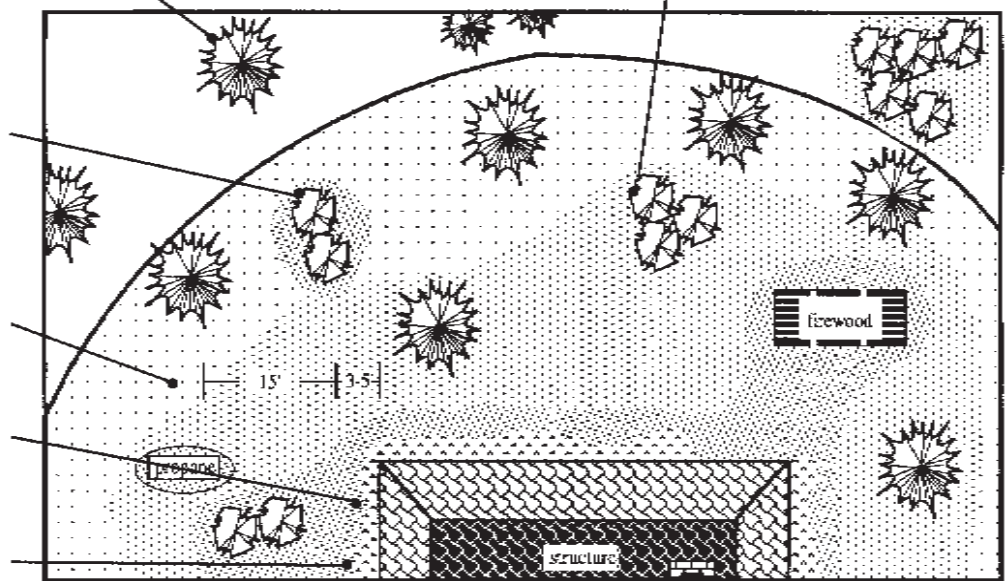


Figure 1: Forested property surrounding a homesite; shows optimum placement of vegetation near the structure.

- Use decorative rock, gravel and stepping stone pathways to break up the continuity of the vegetation and fuels. This can modify fire behavior and slow the spread of fire across your property.
- Incorporate a diversity of plant types and species in your landscape. Not only will this be visually satisfying, but it should help keep pests and diseases from causing problems within the whole landscape.
- In the event of drought and water rationing, prioritize plants to be saved. Provide available supplemental water to plants closest to your house.
- Use mulches to conserve moisture and reduce weed growth. Mulch can be organic or inorganic. Do not use pine bark, thick layers of pine needles or other mulches that readily carry fire.
- Be creative! Further vary your landscape by including bulbs, garden art and containers for added color.

References

- 6.302, Creating Wild-Fire Defensible Zones
- 6.304, Forest Home Fire Safety
- 6.305, FireWise Plant Materials
- 6.306, Grass Seed Mixes to Reduce Wildfire Hazard
- 7.205, Pruning Evergreens
- 7.206, Pruning Shrubs
- 7.207, Pruning Deciduous Trees
- 7.233, Wildflowers for Colorado
- 7.406, Flowers for Mountain Communities
- 7.423, Trees and Shrubs for Mountain Areas
- 7.413, Ground Covers for Mountain Communities

Grasses

During much of the year, grasses ignite easily and burn rapidly. Tall grass will quickly carry fire to your house. Mow grasses low in the inner zones of the defensible space. Keep them short closest to the house and gradually increase height outward from the house, to a maximum of 8 inches. This is particularly important during fall, winter and before green-up in early spring, when grasses are dry, dormant and in a “cured” fuel condition. Given Colorado’s extremely variable weather, wildfires can occur any time of the year. Maintenance of the grassy areas around your home is critical.

Mow grasses low around the garage, outbuildings, decks, firewood piles, propane tanks, shrubs, and specimen trees with low-growing branches.

Ground Cover Plants

Replace bare, weedy or unsightly patches near your home with ground covers, rock gardens, vegetable gardens and mulches. Ground cover plants are a good alternative to grass for parts of your defensible space. They break up the monotony of grass and enhance the beauty of your landscape. They provide a



Figure 2: Ladder fuels enable fire to travel from the ground surface into shrubs and then into the tree canopy.

Structural Elements of a FireWise Landscape

When building a deck or patio, use concrete, flagstone or rock instead of wood. These materials do not burn and do not collect flammable debris like the space between planks in wooden decking.

Where appropriate on steeper ground, use retaining walls to reduce the steepness of the slope. This, in turn, reduces the rate of fire spread. Retaining walls also act as physical barriers to fire spread and help deflect heat from the fire upwards and away from structures.

Rock or masonry walls are best, but even wooden tie walls constructed of heavy timbers will work. Put out any fires burning on tie walls after the main fire front passes.

On steep slopes, consider building steps and walkways around structures. This makes access easier for home maintenance and enjoyment. It also serves as a physical barrier to fire spread and increases firefighters' speed and safety as they work to defend your home.

variety of textures and color and help reduce soil erosion. Consider ground cover plants for areas where access for mowing or other maintenance is difficult, on steep slopes and on hot, dry exposures.

Ground cover plants are usually low growing. They are succulent or have other FireWise characteristics that make them useful, functional and attractive. When planted in beds surrounded by

walkways and paths, in raised beds or as part of a rock garden, they become an effective barrier to fire spread. The ideal groundcover plant is one which will spread, forming a dense mat of roots and foliage that reduces soil erosion and excludes weeds.

Mulch helps control erosion, conserve moisture and reduce weed growth. It can be organic (compost, leaf mold, bark chips, shredded leaves) or it can be inorganic (gravel, rock, decomposing granite).

When using organic mulches, use just enough to reduce weed and grass growth. Avoid thick layers. When exposed to fire, they tend to smolder and are difficult to extinguish. Likewise, while your property might yield an abundance of needles from your native pines or other conifers, don't use them as mulch because they can readily catch and spread wildfire. Rake, gather and dispose of them often within your defensible space.

Wildflowers

Wildflowers bring variety to a landscape and provide color from May until frost. Wildflower beds give a softer, more natural appearance to the otherwise manicured look often resulting from defensible space development.

A concern with wildflowers is the tall, dense areas of available fuel they can form, especially in dormancy. To reduce fire hazard, plant wildflowers in widely separated beds within the defensible space. Do not plant them next to structures unless the beds are frequently watered and weeded and vegetation is promptly removed after the first hard frost. Use gravel walkways, rock retaining walls or irrigated grass areas mowed to a low height to isolate wildflower beds from each other and from other fuels.

Shrubs

Shrubs lend color and variety to the landscape and provide cover and food for wildlife. However, shrubs concern fire professionals because, as the next level in the "fuel continuum," they can add significantly to total fuel loading. Because of the woody material in their stems and branches, they are a potential source of fire brands. When carried in the smoke column ahead of the main fire, fire brands can rapidly spread the fire in a phenomenon known as "spotting."

But the primary concern with shrubs is that they are a "ladder fuel" – they can carry a relatively easy-to-control surface grass fire into tree crowns. Crown fires are difficult, sometimes impossible, to control (see Figure 2).

To reduce the fire-spreading potential of shrubs, plant only widely separated, low-growing, nonresinous varieties close to structures. Do not plant them directly beneath windows or vents or where they might spread under wooden decks. Do not plant shrubs under tree crowns or use them to screen propane tanks, firewood piles or other flammable materials. Plant shrubs individually, as specimens, or in small clumps apart from each other and away from any trees within the defensible space.

Mow grasses low around shrubs. Prune dead stems from shrubs annually. Remove the lower branches and suckers from species such as Gambel oak to raise the canopy away from possible surface fires.



FIREWISE is a multi-agency program that encourages the development of defensible space and the prevention of catastrophic wildfire.



This fact sheet was produced in cooperation with the Colorado State Forest Service.

¹Wildfire Hazard Mitigation Coordinator, Colorado State Forest Service.

Trees

Trees provide a large amount of available fuel for a fire and can be a significant source of fire brands if they do burn. Radiant heat from burning trees can ignite nearby shrubs, trees and structures.

Colorado's elevation and temperature extremes limit tree selection. The best species to plant generally are those already growing on or near the site. Others may be planted with careful selection and common sense.

If your site receives enough moisture to grow them, plant deciduous trees such as aspen or narrow-leaf cottonwood. These species, even when planted in dense clumps, generally do not burn well, if at all. The greatest problem with these trees is the accumulation of dead leaves in the fall. Remove accumulations close to structures as soon as possible after leaf drop.

When site or available moisture limits recommended species to evergreens, carefully plan their placement. Do not plant trees near structures. Leave plenty of room between trees to allow for their growth. Spacing within the defensible space should be at least 10 feet between the edges of tree crowns. On steep ground, allow even more space between crowns. Plant smaller trees initially on a 20- to 25-foot spacing to allow for tree growth. At some point, you will have to thin your trees to retain proper spacing.

As the trees grow, prune branches to a height of 10 feet above the ground. Do not overprune the crowns. A good rule of thumb is to remove no more than one-third of the live crown of the tree when pruning. Prune existing trees as well as ones you planted.

Some trees (for example, Colorado blue spruce) tend to keep a full crown. Other trees grown in the open may also exhibit a full growth habit. Limit the number of trees of this type within the defensible space. Prune others as described above and mow grasses around such specimen trees.

Maintenance

A landscape is a dynamic system that constantly grows and changes. Plants considered fire resistant and that have low fuel volumes can lose these characteristics over time. Your landscape, and the plants in it, must be maintained to retain their FireWise properties.

- Always keep a watchful eye towards reducing the fuel volumes available to fire. Be aware of the growth habits of the plants within your landscape and of the changes that occur throughout the seasons.
- Remove annuals and perennials after they have gone to seed or when the stems become overly dry.
- Rake up leaves and other litter as it builds up through the season.
- Mow or trim grasses to a low height within your defensible space. This is particularly important as grasses cure.
- Remove plant parts damaged by snow, wind, frost or other agents.
- Timely pruning is critical. Pruning not only reduces fuel volumes but also maintains healthier plants by producing more vigorous, succulent growth.
- Landscape maintenance is a critical part of your home's defense system. Even the best defensible space can be compromised through lack of maintenance. The old adage "An ounce of prevention is worth a pound of cure" applies here.

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