

Approved:

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Date: October 13, 2006

Information Bulletin 052



**SANTA ROSA FIRE DEPARTMENT
FIRE PREVENTION BUREAU**

**CONSTRUCTION AND DEFENSIBLE
SPACE STANDARDS WITHIN**

DESIGNATED VERY HIGH FIRE SEVERITY ZONES

References: California Government Code Section 51182, CBC Chapter 7A, CFC Article 86A & 86B



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I – HIGH FIRE SEVERITY ZONE CONSTRUCTION STANDARDS

A. Purpose of Guidelines

The purpose of this Chapter is to establish minimum standards for the protection of life and property by increasing the ability of a building located in any Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area to resist the intrusion of flame or burning embers projected by a vegetation fire and contributes to a systematic reduction in conflagration losses.

B. Definitions

WILDFIRE is any uncontrolled fire spreading through vegetative fuels that threatens to destroy life, property, or resources as defined in Public Resources Code Sections 4103 and 4104.

WILDFIRE EXPOSURE is one or a combination of radiant heat, convective heat, direct flame contact and burning embers being projected by vegetation fire to a structure and its immediate environment.

C. Building and Fire Code Regulations

General. Roofs shall comply with the requirements of Chapter 7A and Chapter 15. Roofs shall have a **roofing assembly** installed in accordance with its listing and the manufacturer's installation instructions.

Roof Coverings. Where the roof profile allows a space between the roof covering and roof decking, the spaces shall be constructed to prevent the intrusion of flames and embers, be fire-stopped with approved materials or have one layer of No. 72 ASTM cap sheet installed over the combustible decking.



Cap provided to restrict intrusion of brands onto the roof deck. The other option is to provide one layer of No. 72 ASTM cap sheet installed over the combustible decking.

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704A.1.3 Roof Valleys. When provided, valley flashings shall be not less than 0.016-inch (0.41 mm) (No. 28 galvanized sheet gage) corrosion-resistant metal installed over a minimum 36 inches (914 mm) wide underlayment consisting of one layer of No. 72 ASTM cap sheet running the full length of the valley.



704A.1.5 Roof Gutters. Roof gutters shall be provided with the means to prevent the accumulation of leaves and debris in the gutter.



Leave accumulation in gutter



Example of a Gutter Protector

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704A.2 Attic Ventilation.

704A.2.1 General. When required by Chapter 15, roof and attic vents shall resist the intrusion of flame and embers into the attic area of the structure, or shall be protected by corrosion resistant, non-combustible wire mesh with ¼ inch (6 mm) openings or its equivalent.

704A.2.2 Eave or Cornice Vents. Vents shall not be installed in eaves and cornices.
Exception: Eave and cornice vents may be used provided they resist the intrusion of flame and burning embers into the attic area of the structure and shall be protected by corrosion resistant, non-combustible wire mesh with ¼ inch (6 mm) openings or its equivalent.



Flame intrusion into attic through a vent

II – DEFENSIBLE SPACE STANDARDS



Effective defensible space

A. Purpose of Guidelines

Recent changes to Government Code (GC) 51182 expanded the defensible space clearance requirement maintained around buildings and structures from 30 feet to a distance of 100 feet or to the property line.

These requirements are intended to provide property owners with examples of fuel modification measures that can be used to create a defensible space area around buildings or structures.. A defensible space perimeter around buildings and structures provides firefighters a working environment that allows them to protect buildings and structures from encroaching wildfires as well as minimizing the chance that a structure fire will escape to the surrounding wildland.

The requirements apply to any person who owns, leases, controls, operates, or maintains a building or structure in, upon, or adjoining any mountainous area, forest-covered lands, brush-covered lands, grass-covered lands, or any land that is covered with flammable material, which area or land is located within a designated very high fire severity zone (VHFSZ).

The vegetation surrounding a building or structure is fuel for a fire. A building or structure itself is considered fuel. Research and experience have shown that fuel reduction around a building or structure increases the probability of it surviving a wildfire.

Good defensible space allows firefighters to protect and save buildings or structures safely without facing unacceptable risk to their lives. Fuel reduction through vegetation management is the key to creating good defensible space. Terrain, climate conditions and vegetation interact to affect fire behavior and fuel reduction standards. The diversity of California's geography also influences fire behavior and fuel reduction standards as well. While fuel reduction standards will vary throughout the State, there are some common practices that guide fuel modification treatments to ensure creation of adequate defensible space:

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- Properties with greater fire hazards will require more clearing. Clearing requirements will be greater for those lands with steeper terrain, larger and denser fuels, fuels that are highly volatile, and in locations subject to frequent fires.
- Creation of defensible space through vegetation management usually means reducing the amount of fuel around the building or structure, providing separation between fuels, and or reshaping retained fuels by trimming. Defensible space can be created removing dead vegetation, separating fuels, and pruning lower limbs.
- In all cases, fuel reduction means arranging the tree, shrubs and other fuels sources in a way that makes it difficult for fire to transfer from one fuel source to another. It does not mean cutting down all trees and shrubs, or creating a bare ring of earth across the property.
- A homeowner's clearing responsibility is limited to 100 feet away from his or her building or structure or to the property line, which ever is less, and limited to their land. While individual property owners are not required to clear beyond 100 feet, groups of property owners are encouraged to extend clearances beyond the 100 foot requirement in order to create communitywide defensible spaces.
- Homeowners who do fuel reduction activities that remove or dispose of vegetation are required to comply with all federal, state or local environmental protection laws and obtain permits when necessary. Environmental protection laws include, but are not limited to, threatened and endangered species, water quality, air quality, and cultural/archeological resources.

A tree removal permit may be required from the Community Development Department when cutting trees over a specified size. The methods used to manage fuel can be important in the safe creation of defensible space. Care should be taken with the use of equipment when creating your defensible space zone. Internal combustion engines must have an approved spark arresters and metal cutting blades (lawn mowers or weed trimmers) should be used with caution to prevent starting fires during periods of high fire danger. A metal blade striking a rock can create a spark and start a fire, a common cause of fires during summertime.

- Vegetation removal can also cause soil disturbance, soil erosion, re-growth of new vegetation, and introduce non-native invasive plants. Always keep soil disturbance to a minimum, especially on steep slopes. Erosion control techniques such as minimizing use of heavy equipment, avoiding stream or gully crossings, using mobile equipment during dry conditions, and covering exposed disturbed soil areas will help reduce soil erosion and plant re-growth. Areas near water (riparian areas), such as streams or ponds, are a particular concern for protection of water quality. To help protect water quality in riparian areas, avoid removing vegetation associated with water, avoid using heavy equipment, and do not clear vegetation to bare mineral soil.

B. Definitions

Defensible space: The area within the perimeter of a parcel where basic wildfire protection practices are implemented, providing the key point of defense from an approaching wildfire or escaping structure fire. The area is characterized by the establishment and maintenance of emergency vehicle access, emergency water reserves, street names and building identification, and fuel modification measures.

Aerial fuels: All live and dead vegetation in the forest canopy or above surface fuels, including tree branches, twigs and cones, snags, moss, and high brush. Examples include trees and large bushes.

Building or structure: Any structure used for support or shelter of any use or occupancy.

Flammable and combustible vegetation: Fuel Vegetative material, live or dead, which is combustible during normal summer weather. For the purposes of these guidelines, it does not include fences, decks, woodpiles, trash, etc.

Homeowner: Any person who owns, leases, controls, operates, or maintains a building or structure in, upon, or adjoining any mountainous area, forest-covered lands, brush-covered lands, grass-covered lands, or any land that is covered with flammable material, and located within a Very High Fire Severity Zone.

Ladder Fuels: Fuels that can carry a fire vertically between or within a fuel type.

Reduced Fuel Zone: The area that extends out from 30 to 100 feet away from the building or structure (or to the property line, whichever is nearer to the building or structure).

Surface fuels: Loose surface litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed enough to lose their identity; also grasses, forbs, low and medium shrubs, tree seedlings, heavier branches and downed logs.

C. Vegetation Maintenance and Fuel Treatment Guidelines

Tree Maintenance –

- Remove that portion of any tree that extends within 10 feet of the outlet of any chimney or stovepipe.
- Maintain any tree adjacent to or overhanging any building free of dead or dying wood.

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Roof Maintenance –

- Maintain the roof of any structure free of leaves, needles, or other dead vegetative growth.

Fuel Treatment Guidelines -

The following fuel treatment guidelines comply with the requirements of GC 51182

Owners shall implement General Guidelines 1., 2., 3., and either 4a or 4b., as described below.

General Guidelines:

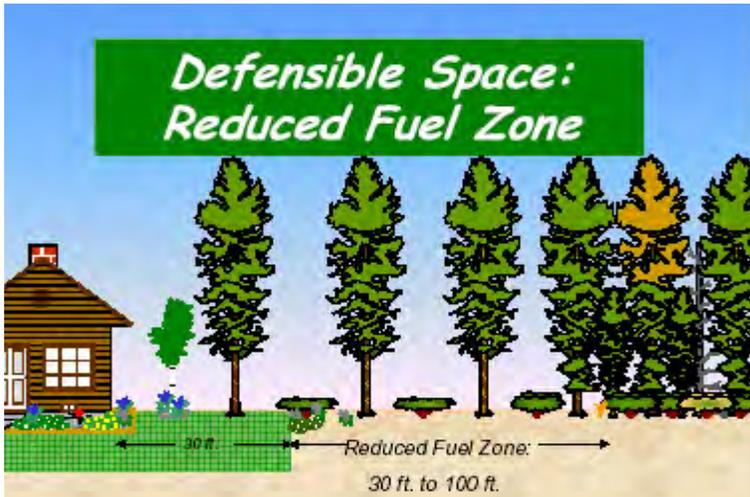
1. Maintain a firebreak by removing and clearing away all flammable vegetation and other combustible growth within 30 feet of each building or structure, with certain exceptions pursuant to GC 51182. Single specimens of trees or other vegetation may be retained provided they are well spaced, well-pruned, and create a condition that avoids spread of fire to other vegetation or to a building or structure.
2. Dead and dying woody surface fuels and aerial fuels within the Reduced Fuel Zone shall be removed. Loose surface litter, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches, shall be permitted to a depth of 3 inches. This guideline is primarily intended to eliminate trees, bushes, shrubs and surface debris that are completely dead or with substantial amounts of dead branches or leaves/needles that would readily burn.
3. Down logs or stumps anywhere within 100 feet from the building or structure, when embedded in the soil, may be retained when isolated from other vegetation. Occasional (approximately one per acre) standing dead trees (snags) that are well-space from other vegetation and which will not fall on buildings or structures or on roadways/driveways may be retained.
4. Within the Reduced Fuel Zone, one of the following fuel treatments (4a. or 4b.) shall be implemented. Properties with greater fire hazards will require greater clearing treatments. Combinations of the methods may be acceptable under GC 51182 as long as the intent of these guidelines is met.

4a. Reduced Fuel Zone: Fuel Separation

In conjunction with General Guidelines 1., 2., and 3., above, minimum clearance between fuels surrounding each building or structure will range from 4 feet to 40 feet in all directions, both horizontally and vertically. Clearance distances between vegetation will depend on the slope, vegetation size, vegetation type (brush, grass, trees), and other fuel characteristics (fuel compaction, chemical content etc.). Properties with greater fire hazards will require greater separation between fuels. For example, properties on steep slopes having large sized vegetation will require greater spacing between individual trees and bushes (see Plant Spacing Guidelines and Case Examples below).

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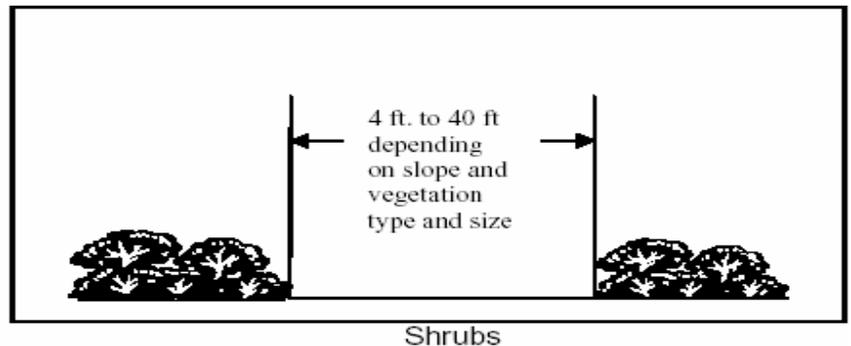
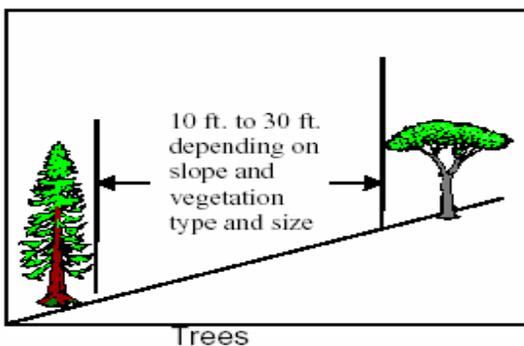
Groups of vegetation (numerous plants growing together less than 10 feet in total foliage width) may be treated as a single plant. For example, three individual manzanita plants growing together with a total foliage width of eight feet can be “grouped” and considered as one plant and spaced according to the Plant Spacing Guidelines in this document.



Grass generally should not exceed 4 inches in height. However, homeowners may keep grass and other forbs less than 18 inches in height above the ground when these grasses are isolated from other fuels or where necessary to stabilize the soil and prevent erosion.

Clearance requirements include:

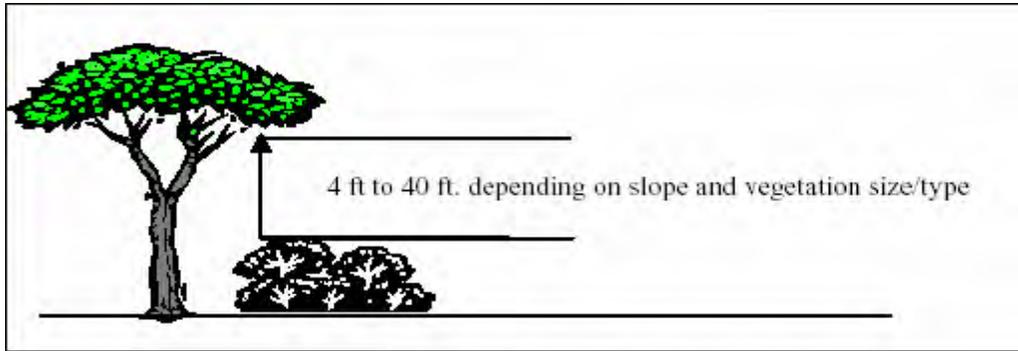
- Horizontal clearance between aerial fuels, such as the outside edge of the tree crowns or high brush. Horizontal clearance helps stop the spread of fire from one fuel to the next.



Horizontal clearance between aerial fuels

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- Vertical clearance between lower limbs of aerial fuels and the nearest surface fuels and grass/weeds. Vertical clearance removes *ladder fuels* and helps prevent a fire from moving from the shorter fuels to the taller fuels.



Vertical clearance between aerial fuels



*Effective vertical and horizontal fuel separation
Photo Courtesy
Plumas Fire Safe Council.*

Plant Spacing Guidelines

Guidelines are designed to break the continuity of fuels and be used as a "rule of thumb" for achieving compliance with Regulation 14 CCR 1299.

		Minimum horizontal space	
		from edge of one tree canopy to the edge of the next	
Trees	Slope	Spacing	
	0% to 20 %	10 feet	
	20% to 40%	20 feet	
	Greater than 40%	30 feet	
		Minimum horizontal space between edges of shrub	
Shrubs	Slope	Spacing	
	0% to 20 %	2 times the height of the shrub	
	20% to 40%	4 times the height of the shrub	
	Greater than 40%	6 times the height of the shrub	
Vertical Space	Minimum vertical space between top of shrub and bottom of lower tree branches: 3 times the height of the shrub		

Adapted from: Gilmer, M. 1994. California Wildfire Landscaping

Case Example of Fuel Separation: Sierra Nevada conifer forests

Conifer forests intermixed with rural housing present a hazardous fire situation. Dense vegetation, long fire seasons, and ample ignition sources related to human access and lightning, makes this home vulnerable to wildfires. This home is located on gentle slopes (less than 20%), and is surrounded by large mature tree overstory and intermixed small to medium size brush (three to four feet in height).



Application of the guideline under 4a. would result in horizontal spacing between large tree branches of 10 feet; removal of many of the smaller trees to create vertical space between large trees and smaller trees and horizontal spacing between brush of six to eight feet (calculated by using 2 times the height of brush).

Case Example of Fuel Separation: Southern California chaparral

Mature, dense and continuous chaparral brush fields on steep slopes found in Southern California represents one of the most hazardous fuel situations in the United States. Chaparral grows in an unbroken sea of dense vegetation creating a fuel-rich path which spreads fire rapidly. Chaparral shrubs burn hot and produce tall flames. From the flames come burning embers which can ignite homes and plants. (Gilmer, 1994). All these factors results in a setting where aggressive defensible space clearing requirements are necessary.



Steep slopes (greater than 40%) and tall, old brush (greater than 7 feet tall), need significant modification. These settings require aggressive clearing to create defensible space, and would require maximum spacing. Application of the guidelines would result in 42 feet horizontal spacing (calculated as 6 times the height of the brush) between retained groups of chaparral.

Case Example of Fuel Separation: Oak Woodlands

Oak woodlands, the combination of oak trees and other hardwood tree species with a continuous grass ground cover, are found on more than 10 million acres in California. Wildfire in this setting is very common, with fire behavior dominated by rapid spread through burning grass.

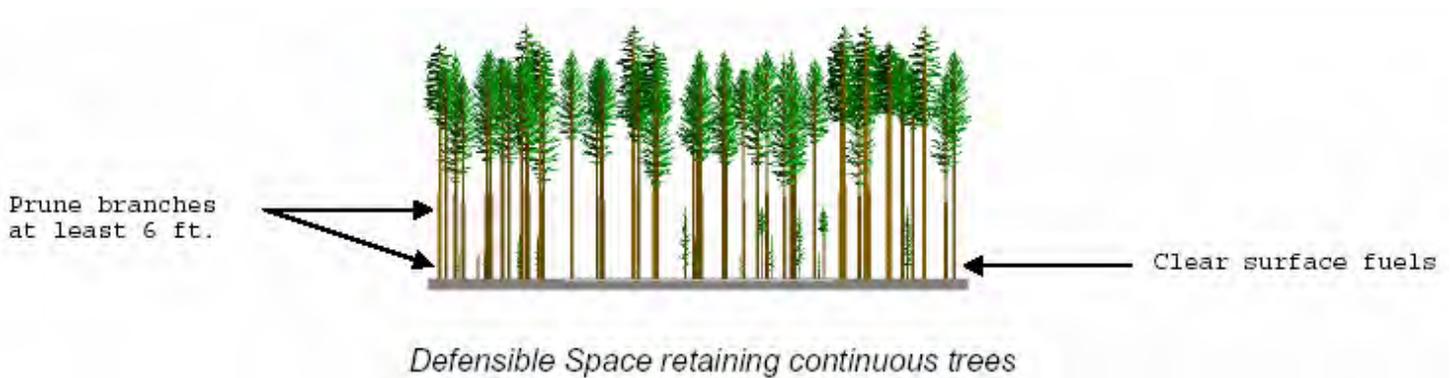
Given a setting of moderate slopes (between 20% and 40%), wide spacing between trees, and continuous dense grass, treatment of the grass is the primary fuel reduction concern. Property owners using these guidelines would cut grass to a maximum 4 inches in height, remove the clippings, and consider creating 20 feet spacing between trees.



4b. Reduced Fuel Zone: Defensible Space with Continuous Tree Canopy

To achieve defensible space while retaining a stand of larger trees with a continuous tree canopy apply the following treatments:

- Generally, remove all surface fuels greater than 4 inches in height. Single specimens of trees or other vegetation may be retained provided they are well-spaced, well-pruned, and create a condition that avoids spread of fire to other vegetation or to a building or structure.
- Remove lower limbs of trees (“prune”) to at least 6 feet up to 15 feet (or the lower 1/3 branches for small trees). Properties with greater fire hazards, such as steeper slopes or more severe fire danger, will require pruning heights in the upper end of this range.



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Photo Courtesy Plumas Fire Safe Council.



Defensible space with continuous tree canopy by clearing understory and pruning

Reference Documents:

The University of California Forest Products Laboratory has a listing of fire resistive vegetation available on their website, <http://www.prefire.ucfpl.ucop.edu/>.

Office of the State Fire Marshal. Wildland Urban Interface Regulations
<http://osfm.fire.ca.gov/UWIBS.html>

5. – Very High Fire Severity Zone Map

