

RAPID CITY SURVIVABLE SPACE INITIATIVE WILDLAND URBAN INTERFACE STANDARD

This standard strives to advance community resilience in the wildland urban interface through fire resistant construction, fire adapted landscapes; and to help homeowners better understand the role of fire so as to coexist with wildland fire safely.

A Best Practices
Guide for Fire
Resilient
Landscapes and
Home
Construction for
the Rapid City
Community.

RAPID CITY WILDLAND URBAN INTERFACE SAFETY STANDARD

The Purpose of the Standard

Looking back at wildland fires it is obvious that actions taken before a fire to protect the home and surrounding vegetation can make a significant difference in reducing damage from a wildland fire.

Homeowners who use fire resistant construction on the outside of buildings have a decreased danger of fire from airborne embers. Reducing the amount of fuel for the fire around the home can keep a fire small and far enough away to protect the home and trees without a fire fighter present.

Rapid City has identified areas of the community at highest risk of devastation from a wildland fire. This Wildland Urban Interface Zone is determined by the affected properties proximity to hazardous fuel types, topography, and heavy fuel loading consistent with severe fire behavior and significant fire brand production during wildfires.

A second zone, the Ember Zone, is where embers and brands from a wildland fire, most likely in the Wildland Urban Interface Zone, are likely to land on roofs and blow under eaves to start home fires. These guidelines are for those in the Wildland Urban Interface Zone but those in the Ember Zone should consider similar actions, especially hardening the roof, attic vents, and eaves, and removing dead vegetation from the roof, rain gutters, and under decks and porches.

Each homeowner's actions or inaction within the wildland urban interface zone affects a fire in the area and can either help protect or endanger not only their property but also nearby homes.

This standard strives to provide an environment safe from wildfire while maintaining the aesthetic qualities of the native hillside by providing homeowners both knowledge and guidance for Fire Adaptation, home protection, and landscaping. Utilizing this standard and understanding the role of fire naturally in the landscape can have a profound impact on our ability to coexist successfully with wildland fire.

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Landscaping/Fuels around your home

Landscaping/Fuel reduction needs differ as you move farther from your home. We talk about these differences in circular zones around your home or other significant buildings such as a barn or shop. These are rough boundaries and guidelines. While it is best practice to have the described safety area in all directions around your home, property lines and terrain might prevent this.

Zone 1: The area within 30 feet from the home or other significant buildings.

Around the house

- Keep leaves and other debris from gutters, eaves, porches and decks. This prevents embers from igniting your home.
- Remove dead vegetation and other items from under your deck or porch, and within 10 feet of the house. A screen around the bottom of the deck can keep leaves and other dead vegetation from being blown underneath.
- Regularly remove deadwood and litter from the area.
- Remove firewood stacks, propane tanks, and other flammable materials; they should be in Zone 2, at least 30 feet from your home and outbuildings including garages and sheds.

Ground covering and plants, shrubs and bushes

- Ground cover the first 2 feet around the structure, including around decks and other accessories or extensions, will be noncombustible. A good choice is a rock border, as well as a well irrigated lawn kept 4 inches or shorter.
- Fire-resistive vegetation or plants listed on the Firewise plant list for Western South Dakota is recommended in zone 1. Plants, brush and bushes should be at least 10 feet apart with noncombustible materials or grass kept 4 inches or shorter between the plants though they can be planted in clusters or groups not larger 100 square feet.
- If you must have combustible brush or shrubs, keep them at least 30 feet from the building and accessory structures such as sheds, decks, and pergolas. Common combustible plants are cedar, conifers, junipers, and other species with high concentrations of flammable resins within the plant.

Trees

- A few deciduous trees, large older growth pines, spruce trees, and other character trees are fine in this area. Character trees are mature trees with trunks more than 12 inches in diameter, unique species for your property, or a tree used as a wildlife nesting habitat.
- The crown of trees should be at least 20 feet apart. This means that there should be at least 20 feet (30 feet is ideal) between the branches of a tree and the branches of nearby trees.
- Branches should not reach under the roof or eaves and should not be within 10 feet of the roof, deck or similar combustible accessory, wood burning appliance, or chimney.
- Do not allow ladder fuels to grow in this zone, where a smaller plant spreads fire to a larger, higher plant. Prune large trees so that there are no limbs on the lower 10 feet of the trunk while maintaining 70% of the crown. Keep small trees or brush from growing under larger trees.

- If you must have combustible trees the trunk should be at least 15 feet from the building and accessory structures such as sheds, decks, and pergolas. Common combustible plants are cedar, conifers, junipers, and other species with high concentrations of flammable resins within the plant.
- Crown spacing is based on flat terrain. Slopes increase the spread of fire and therefore the space between branches of trees needs to be further apart. Distances increase as slope increased per the following:
 - 0 – 20 percent – as defined in this standard.
 - 21 – 40 percent – two times the distance as defined in this standard.
 - More than 40 percent – three times the distance as defined in this standard.

Zone 2 – The area 30 – 100 feet from the home or other significant buildings.

- Ground covering and plants, shrubs and bushes
- Do not allow ladder fuels to grow in this zone. Keep the area under trees clear from brush, smaller trees, and other vegetation that could spread a fire from the ground to the tree.
- Keep grass within 10 feet of every public right of way no more than 8 inches tall.

Trees

- Trees in Zone 2 should be the same as in Zone 1 except they can be closer together, keeping the crowns at least 15 feet apart (20 feet is recommended).
- Regularly remove deadwood and litter from the area.
- Crown spacing is based on flat terrain. Slopes increase the spread of fire and therefore the space between branches of trees needs to be further apart. Distances increase as slope increased per the following:
 - 0 – 20 percent – as defined in this standard.
 - 21 – 40 percent – two times the distance as defined in this standard.
 - More than 40 percent – three times the distance as defined in this standard.

Flammable materials

- Store firewood stacks, propane tanks, and other flammable materials in Zone 2, at least 30 feet from your home and outbuildings including garages and sheds, and at least 15 feet from the crown of trees.

Zone 3 – The area 100 – 200 feet from the home or other significant buildings.

- Zone 3 landscaping requirements have a lot of variables. We recommend having a site visit to recommend any changes that might be needed. In general, trees are similar to those in Zone 2 and smaller trees growing between taller trees should be removed. Remove heavy accumulation of woody debris.
- Zone 3 often impacts neighboring properties. Work with your neighbors to provide protection to both their and your home.
- Keep grass within 10 feet of every public right of way no more than 8 inches tall.
- Regularly remove deadwood and litter from the area.

Buildings

Hardening a structure is a key part of wildland fire safety. An existing home or shed may not be ready to withstand a wildland fire today but as you can make improvements invest in these recommendations. In many cases, an alternative is offered so that you can improve existing conditions when you cannot yet recommendations.

Where possible, homes should be at least 50 feet from a slope with no part of the deck extending over a slope.

Roof Coverings

- Homes and out buildings need to have a steel or minimum Class A roof covering as per ASTM E 108/UL 790 (excluding solid wood roofing products). Common Class A roof materials are common fiberglass laminate shingles and composite style shingles made to look like tile or slate.
- Chimneys for fireplaces or other heating appliances for solid or liquid fuel need to have a spark arrestor or cap.

Exterior walls, doors, windows, and gutters

- Exterior cladding, open eaves, and soffits are of classified ignition-resistant or noncombustible materials. Ignition resistant materials must meet criteria defined in this document.
 - Recommended noncombustible materials include, but are not limited to: Steel (Bridger Steel TruTen A606), fiber-cement board (James Hardie), traditional stucco, masonry/brick, concrete synthetic stone, and similar materials.
 - Recommended ignition resistant classified materials include, but are not limited to: fire retardant treated wood (FRTW) and similar materials.
 - A Class A flame spread rating does not automatically meet ignition resistant criteria.
 - Open eaves are NOT recommended, and all exposed components, if not clad in noncombustible material, shall be FRTW or of heavy timber dimensions.
 - Dimensional log/heavy timber architectural features (entryway structure) are acceptable because large-size wood members form a protective coating of char that insulates the inner portion of the member from the fire. While it is combustible it burns very slowly and does not spread fire the way lightweight construction does.
 - Alternatives
 - Natural wood products used for window trim; corbels, shutters, and decorative vents are allowed when clad with noncombustible material. Solid PVC based plastic products used for window trim; corbels, shutters, and decorative vents may also be painted. Natural wood or solid PVC based plastic products used for fascia in conjunction with gutters and soffits are allowed when clad with noncombustible material.

- Class A flame Spread rated exterior cladding (Yakisugi with deep char, Ipe, Cumaru, Machiche) and trim materials could be used if all of the following apply:
 - Zones 1, 2, and 3 are properly managed to the recommendations in this standard, especially the first 100 foot radius around the structure. These types of cladding are likely to resist a fire if a crown fire is at least 100 feet away.
 - All neighboring property buildings are at least 60 feet away. A burning building can start neighboring buildings on fire. It is less likely to happen if the building is at least 60 feet away.
 - Where the building meets the ground and where any horizontal surfaces such as decks, concrete patios, or rooflines connect, the wall must be protected by at least 6 inches of solid noncombustible materials. Examples include one row of noncombustible siding or noncombustible frieze board trim detail. Noncombustible as defined in this standard.
 - Soffit materials are classified as noncombustible or ignition resistant.
- Any structural projections or overhangs where the building sits over combustible materials, such as a bay window or a roofline covering a deck or patio must be enclosed with ignition-resistant materials. Fire can easily spread from the grass to the bottom of the overhanging box window or from a deck to the roof unless the underside is protected. Exposed heavy timber or dimensional log construction can be used instead of ignition-resistant materials.
- The base of exterior walls, posts or columns shall be protected on the bottom side with provisions such as fire resistant foam or wire mesh having openings no larger than one-eighth inch (1/8") to protect from ember intrusion and still permit weeping and moisture control. This provision includes the installation of fire resistive siding over and/or on top of siding that is not fire resistive and the installation of products such as synthetic stucco or EFIS.
 - Many types of exterior finishing and fascia have a gap for air exchange and moisture weeping. An ember in this gap has led to the loss of many homes.
- Exterior doors will be solid core construction with a fire resistive exterior or solid wood at least 1 3/4 inches thick.
 - Windows within doors and glazed doors should be tempered safety glass or multi-layered glazed panels.
 - Decorative single pane glazing in a front entry door is acceptable though not recommended.
- Exterior windows will be at least double pane and tempered panes are preferable.
 - Alternative: Add separate storm windows in the window unit to provide more protection to single pane windows.
- Screen all attic vents with wire mesh or hardware cloth having openings no larger than one-eighth inch (1/8") or use a product specifically designed to stop the entrance of burning embers.
 - Soffit vents are acceptable.
 - Gable vents are NOT recommended, but are acceptable if screened with wire mesh having a mesh size no greater than 18 x 16, or specifically designed to stop the entrance of burning embers.

- Install non-combustible gutters and downspouts where the leading edge of the roof is finished with a metal drip edge so that no wood sheathing is exposed. The drip edge needs to extend into the gutter.
 - Solid style gutter caps that work with water surface tension are highly encouraged as a home-owner maintenance item to prevent combustible debris from collecting in the trough.

Porch, deck, and other accessories

- Decks and other similar accessories need to be built of ignition resistant or non-combustible materials such as metal decking. Ignition resistant materials must meet criteria defined in this document. Wood can be used for all large structural components and railings.
 - Cover the structure where it meets the ground with 6 inches of noncombustible material, or rest wood structural members on concrete piers at least 6 inches proud of the ground surface.
 - Class A flame spread does not automatically meet ignition resistant criteria.
 - Alternatives
 - Fire resistive decking materials, such as certain composites marked as fire resistive, Deck Heart Grade redwood, Ipe, or Cumaru deck boards, are permitted if all the following apply:
 - All landscaping/vegetative safety measures are met.
 - Decking material has a heat release rate of not more than 25kw/ft² and a flame spread rating of Class A (Ipe, Cumaru, Versadeck, AmeraDeck) or Class B (Composites-Trex TimberTech).
 - Hardened structure requirements for exterior cladding are met.
 Note: Ipe or Cumaru deck boards are Class A fire rated, attractive real wood, and when combined with a metal railing system make a very attractive fire resistive deck.
- When any portion of an attached accessory such as a deck projects over a descending slope of more than ten percent, the area below the structure needs to have all underfloor areas enclosed with ignition-resistant materials. Fire builds up heat quickly when moving uphill and can easily ignite unprotected structures that sit over the hill slope.
- Wrap a screen around the bottom of a deck that is built close to the ground to prevent embers from blowing under the deck and to prevent dead vegetation and other debris from piling under the deck. Screen should be a mesh no larger than one-eighth inch (1/8").

Glossary and References

ASTM INTERNATIONAL www.astm.org ASTM International, formerly known as the American Society for Testing and Materials is a voluntary standards developing organization for materials, products, systems and services.

CHARACTER TREES – Character trees shall be defined as existing, mature over story trees that are unique to the site: e.g. species specific or large diameter (more than 12 inches) or wildlife essential (nesting habitat). Examples include all deciduous trees, large older growth pines, and spruce trees.

CLASS A, B ROOF COVERING – Pass fail test measuring penetration of flame in accordance with ASTM E 108 and UL 790.

COMBUSTIBLE BRUSH, TREES, SHRUBS – Combustible species include junipers, cedars, small pines growing in thick pockets, and other species with high concentrations of flammable resins present within the plant.

EMBER ZONE – the secondary risk area near the Wildland Urban Interface Zone. Property in the Ember Zone are at greatest risk of embers from nearby fires landing on roofs and in rain gutters, blowing in through open windows, and entering the attic through eaves and vents, and igniting homes on fire.

FIRE RESISTIVE – Any material designed to provide reasonable protection against fire.

FIREWISE PLANT LIST – [FireWise Plant Materials - 6.305 - Extension \(colostate.edu\)](http://www.colostate.edu/~firewise/)

FLAME SPREAD INDEX CLASS A,B,C – A comparative measure, expressed as a dimensionless number, derived from visual measurements of the spread of flame versus time for a material tested in accordance with ASTM E 84 and UL 723.

FUELS MANAGEMENT – the modification of landscaping and all vegetation within the Home Ignition Zones which include Zone 1, Zone 2, and Zone 3. These fuels management standards are intended to protect structures from wildfire as well as to reduce fire from spreading to the wildland.

IGNITION RESISTANT – Any Product designed for exterior exposure that, when tested in accordance with applicable standards, has a flame spread of not more than 25, shows no evidence of progressive combustion, and whose flame front does not progress more than 10 1/2 feet beyond the centerline of the burner at any time during the extended 30 minute test outlined in ASTM E 84 and UL 723 in accordance with ASTM D 2898 Accelerated Weathering.

INTERNATIONAL WILDLAND-URBAN INTERFACE CODE – much of this standard is based on the International Code Council Wildland-Urban Interface Code. www.iccsafe.org. The city and the state use International Code Council codes and standards for many regulatory functions.

NONCOMBUSTIBLE – Any material that will not ignite and burn when subjected to fire nor will add appreciable heat to an ambient fire. “Noncombustible” does not apply to surface finish materials.

SLOPE – The variation of terrain from the horizontal; the number of feet rise or fall per 100 feet measured horizontally, expressed as a percentage.

UNDERWRITERS LABORATORIES, INC (UL) www.ul.com UL develops consensus-based Standards for Safety and Standards for Sustainability for a variety of products and goods. UL also provides research and the testing of many products.

WILDLAND URBAN INTERFACE ZONE – the geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels designated by the Rapid City Fire Department as a high hazard area with respect to wildland fire behavior. The boundaries of the wildland urban interface zone are available from the Fire Code Official, and are determined by the affected properties proximity to hazardous fuel types, topography, and heavy fuel loading consistent with severe fire behavior and significant fire brand production during wildfires.

[Fire and Life Safety | Rapid City South Dakota \(rcgov.org\)](http://rcgov.org)

ZONE 1– the area within 30 feet of the main structure or significant accessory structures, not to extend beyond the property line.

ZONE 2 – the area beginning 30 feet from the structure and extending to 100 feet, not to extend beyond the property line.

ZONE 3 – the area beginning 100 feet from the structure and extending to 200 feet, not to extend beyond the property line.