

Ignition Resistant Construction Design Manual

A guide to smart construction and wildfire mitigation in
Colorado Springs Wildland Urban Interface



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Division of the Fire Marshal



“Sharing the Responsibility!”

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Ignition Resistant Construction Design Manual for the Wildland Urban Interface

Purpose

This manual is to be used in conjunction with the 2015 International Fire Code Appendix K, as adopted by the City of Colorado Springs, which together serves to provide all users with both legal requirements, as well as recommended guidance for optimal ignition resistant construction features. All requirements found in Appendix K supersede or override less-restrictive homeowner associations (HOA) and neighborhood covenants and shall apply to all new residential building construction or reconstruction in the Wildland Urban Interface (WUI), regardless of development plan or initial construction plan approval date. This design manual does not cover fire protection system requirements such as monitored residential fire alarm or residential fire sprinkler systems already covered through the original Hillside Ordinance and/or fire suppression requirements for construction.

Scope

The Waldo Canyon fire has and will continue to be examined for lessons learned, not only by local residents but also by distant neighborhoods, cities, states, government agencies, students of fire science, and more. As such, all users of this manual need to understand that a concerted effort was made by the contributors of this document (listed on the last page of this manual) to achieve a balance between common sense ignition resistant construction and landscaping, common construction methods, and homeowner desires.

The material found in this manual is intended to follow the provisions of the Wildland Fuels Management Requirements (Ordinance No. 18-50, Appendix K) and provide the reader with a clear understanding as to why the ordinance was created. In addition, this document will provide the reader with information they can use in preparing their home against the threat of wildfire. The two primary sections of this document include ignition resistant construction through home hardening requirements and landscaping/vegetation management.

It is important to note and understand that **ALL** of the provisions included in this manual are intended to function as a system or design package. Eliminating just one element or feature from the system approach may increase a home's vulnerability to a wildfire or urban conflagration event. For example, a home could be constructed with ignition resistant materials, but if vegetation is allowed to grow under decks or if tree branches extend over the roof, the ignition resistant construction materials may not be enough to protect the home from wildfire. Likewise, if a home has good defensible space but has combustible construction materials, the home is still subject to ignition from fire embers and brands from open space or adjacent properties. In any case, the provisions outlined in this document do not guarantee that every home will survive a wildfire event. Wildfire will always be a dynamic and unpredictable event, influenced by several factors including fire weather, fuels, topography, and human activity.

Each of the provisions listed in this manual apply to all new or reconstructed residential structures located within the City of Colorado Springs WUI (see Annex C). These provisions do not apply to small detached accessory structures such as storage sheds, dog houses, and children's playhouses.

Introduction

The City of Colorado Springs is a wonderfully diverse community in terms of landscape, architecture and topography. This diversity and the majestic mountains are a few of the things that entice people to call this community home. Many people enjoy the opportunity to reside within the WUI areas of this community as a way to embrace the beauty of nature and wildlife, while still having the convenience of city living. However, what most people don't realize when they move into the WUI areas of this community, is that they have chosen to reside in one of the largest WUI zones in the entire country. In fact, there are roughly 38,639 parcels in the WUI and roughly 34,926 of those parcels are residential lots or addresses that have been identified as at-risk of wildfire in Colorado Springs.

Residing within a WUI comes with some unique risks not generally found in other parts of this community. One such risk is the ever present threat of wildfire. Wildfire is an event nature uses to improve the overall health of our forests. Fire removes dead, diseased, and overgrown vegetation, which in return provides nutrients for new growth and improved wildlife habitat. It is impossible to prevent wildfires from impacting communities in the WUI; as such, homeowners need to learn to live within that ever changing environment without increasing the risk or subjecting their homes to an increased level of threat.

As a result of the Waldo Canyon fire and the disastrous outcomes that were experienced, the Colorado Springs Fire Department, in partnership with the Colorado Springs Housing and Building Association (HBA), collaborated to address some critical issues in house design and construction. The need for this partnership was largely due to the fact current concepts of defensible space do not account for the hazards of burning primary structures, hazards presented by embers and the hazards outside of the home ignition zone¹. The result of the collaborated effort was the modification of City Code language to safely and reasonably protect those residents who are rebuilding homes in the Waldo Canyon Fire Burn Area, or building new homes in any portion of the City of Colorado Springs WUI.

The Colorado Springs Fire Department has written this manual with the goal of reasonable design that will improve the odds of a home surviving a wildfire event with little or no firefighter intervention. In Colorado Springs, thirteen firefighters respond on the initial dispatch of every reported house fire. Additional resources are brought in as needed based upon the severity of the fire. During a wildfire event, there are not enough resources available to protect each home as we would for an isolated house fire incident. Firefighters must make difficult decisions on deploying appropriate resources to provide the most effective fire attack. A home constructed with ignition resistant materials and adequate defensible space requires fewer resources to defend than a home that is more vulnerable to wildfire. It is everyone's duty to *"Share the Responsibility!"* in protecting this community.

¹ NIST Technical Note 1910, "A Case Study of a Community Affected by the Waldo Fire – Event Timeline and Defensive Actions,"(2015): 3-4

Colorado Springs History

Our region is no stranger to natural and human caused wildfires. Some significant fires the Pikes Peak Region has experienced over the years are:

- The Big Burn, 1854
- Camp Carson Fire, 1950
- Hayman Fire, 2002
- Westwood Fire, 2005
- Manitou Incline Fire, 2007
- Turkey Creek Fire, 2008
- Waldo Canyon Fire, 2012
- Black Forest Fire, 2013
- 117 Fire, 2018

The Colorado Springs Fire Department has been actively involved in wildfire mitigation efforts since 1993 when the City passed the Hillside Fire Mitigation Ordinance. This ordinance was primarily intended to protect homes against geological hazards such as landslides, and to protect natural vegetation from unnecessary disturbance; it also included some fire prevention features.

In 2000, a Tri-Data Consulting study identified wildfire risk as one of the greatest threats to the City of Colorado Springs. The Colorado Springs WUI covers 32,460 acres and includes roughly 24% of the City's population. Currently, the Colorado Springs Wildfire Mitigation program works in stewardship with 124 homeowner associations and neighborhoods. As part of a cohesive strategy, wildfire mitigation includes a wildfire risk model that identifies 25 weighted values to determine risk ratings at the lot level. Each individual lot in the City of Colorado Springs' WUI and its associated wildfire risk rating can be viewed at the Colorado Springs Fire Department website at coloradosprings.gov/wildfiremitigation. In addition to identifying wildfire risk, the Wildfire Mitigation program has grown to include education and outreach, planning, fuels management, contracting, development review process, grant administration and volunteer program management.

The information and design provisions provided in this design manual are the result of many years of research, observations, and studies of actual fire events, to include the Waldo Canyon Fire, which forever changed the landscape of Colorado Springs on June 26, 2012. In order to understand fire's impact on building construction, we must first have an understanding on basic fire behavior. During a wildfire event, fire propagates through direct flame contact, radiant heat transfer from structure to structure, radiant heat transfer from vegetation to structure, and fire brands and embers that ignite vegetation and structures. However, the most prominent method of initial ignition is through fire brands and embers. The industry term for fire embers is "an ember storm," which can be compared to a snow storm with blizzard like conditions.

Waldo Canyon Fire Findings

The driving force behind the Ignition Resistant Construction and Fuels Management Ordinance was the lessons learned over the past decade nation-wide and the local evidence from the Waldo Canyon Fire. The findings from the Waldo Canyon Fire highlighted the need for additional effort in reducing the effects and impacts of future fires that will someday again threaten this community.

On June 23, 2012, a wildfire was reported burning in Waldo Canyon to the west of the City of Colorado Springs. After three long days of hard work to keep the fire outside of the city limits and in the National Forest, the Waldo Canyon Fire took a turn for the worse. There was a wind shift, driven by thunderstorm activity over Woodland Park, which caused significant down slope winds. On the afternoon of June 26, the weather front pushed the fire into the Mountain Shadows neighborhood, ultimately destroying 346 homes and significantly damaging 45 others, with a structure ignition rate of 79 structures per hour or 1.3 structures per minute².

Colorado Springs Fire Investigators reported the following summary of structural ignition sources.

Ignition Source	Percentage of Burned Structures*
Fire Brands/Embers	54%
Vegetation Exposure	22%
Structural Exposure	16%
Fire Front / Direct Flame Contact	8%

*The percentage reported in this table are estimated based upon investigation findings. This table does not include home counts from the Parkside Neighborhood, Courtney Drive or Yankton Place. The homes lost in these two neighborhoods were the result of primary ignition of homes from brands/embers, which led to conflagration of the entire neighborhoods through vegetation and structure exposure.

Fire Brands/Embers

Based upon the investigation findings, structural ignition from fire brands/embers accounted for more than half of all homes burned in the non-conflagration areas (see Figure 1 below for an example of a roof ignited by brands/embers). As fires burn, they produce fire brands/embers that are pushed by the winds generated by the fire. It is not uncommon to have fire brands/embers igniting spot fires as much as one-half mile or more ahead of the fire front. Some studies have reported spotting fire as much as ten miles ahead of the fire front. The brands/embers can carry enough heat energy to ignite combustible structures as they blow against or land upon the combustible surfaces of a home. The findings support and stress the importance of ignition resistant construction. Specifically, features such as screened attic vents, composite decking and Class A roofing provide significant defense against brand/ember initiated ignition of homes.



Figure 1 – Example of a shake shingle roof that was ignited from an ember in the 2012 Waldo Canyon fire.

² NIST Technical Note 1910, “A Case Study of a Community Affected by the Waldo Fire – Event Timeline and Defensive Actions,”(2015): 4

Vegetation Exposure

The next highest source of initial ignition to homes was burning vegetation in close proximity to structures as represented in Figure 2. Trees such as dense conifers and similar vegetation tend to become a catching point for fire embers/ brands, and when located adjacent to, or in close proximity of the homes, can be a significant fire exposure to the structure. The Fuels Management Features portion of this manual provides specific and reasonable steps a homeowner can take to reduce the likelihood that burning vegetation will ignite their home. The fuels management features work in concert with ignition resistant siding and similar construction features to improve the odds of a home surviving a wildfire event without firefighter intervention.



Figure 2 - Example of vegetation that is in close proximity to a structure siding.

Structural Exposure

Similar to the vegetation exposure, home to home ignition is a common event in WUI fires. During the Waldo Canyon Fire, the two neighborhoods that experienced the most loss were a result of home to home ignition. The single greatest thing a homeowner can do is to ensure adequate distance between their home and their neighbor's house. That said, most homeowners don't have the luxury of adequate clearance to their neighbor's home due to lot sizes. However, the same features used to protect a home against a vegetation exposure fire are also effective against a structural exposure fire. Figure 3 shows the density of structure in the Parkside Neighborhood prior to the Waldo Canyon Fire, this was one of the neighborhoods hit the hardest during the fire. "Features such as combustible decks, fences, railroad ties, secondary buildings, re-entrant corners, and readily ignitable roof coverings represent significant hazards to the structure and surrounding parcels³."



Figure 3 - Photo of before and after destruction in the Mountain Shadows community. Courtesy of Bing Maps and the Denver Post RJ Sangosti.

³ NIST Technical Note 1910, "A Case Study of a Community Affected by the Waldo Fire – Event Timeline and Defensive Actions," (2015): 5

Fire Front/Direct Flame Contact

The smallest percentage of home ignitions was due to direct flame contact or impact from the forest fire front. Typically, in these cases, the fire front approaches from open space or forest land. A fast moving crown fire through a forested area burns with intense radiant heat that pre-heats everything within its path. As the fire front approaches the houses on the perimeter of the neighborhood, the houses can be very vulnerable to easy ignition (Figure 4). Good forest health goes a long way in keeping forest fires small and preventing crown fires. Unfortunately, this type of fire is the hardest to mitigate, and in most urban environments is beyond the capability of a homeowner to mitigate against.



Figure 4 - Ignition of homes along the northern fire front. Photo courtesy of the Denver Post.

During the Waldo Canyon Fire, and in the days following, there were many examples of successful wildfire mitigation work revealed. Fire crews were able to defend structures because homeowners had taken time to create defensible space. Some neighborhoods or portions thereof, sustained little to no fire damage because of mitigation work prior to the fire in open spaces adjacent to the threatened neighborhoods. “The effective and successful response to the Peregrine blowup on Wednesday, June 27 demonstrated the advantages of pre-fire mitigation...⁴.”

It is the professional opinion of the Colorado Springs Fire Department that the loss of structures would have been less had the provisions in this document been implemented prior to the Waldo Canyon Fire.

⁴ NIST Technical Note 1910, “A Case Study of a Community Affected by the Waldo Fire – Event Timeline and Defensive Actions,”(2015): 5

Hardened Structure Requirements

This section of the design manual specifically addresses the construction materials and finishes used to reduce the likelihood of ignition of a home from an exposure fire.

Class A Roofing

Ordinance Section K104.1 (1)

A Class A roof covering (excluding solid wood materials) shall be installed on all Residential Occupancies and a minimum Class B roof coverings shall be installed on remaining occupancies, unless otherwise permitted.

In 2002, the Colorado Springs Fire Department convened a working committee to study a ban on wood shake roofs and require Class A roofing installations for all residential properties. There was representation on this committee from the Council of Neighbors and Organizations (CONO), local builders, roofing contractors, Housing and Building Association (HBA), and various regulatory agencies. City Council passed the Class A roofing ordinance prohibiting wood shake roofs from being installed on residential

occupancies in this community. Since the ordinance was adopted, more than 69,000 roofs have been replaced and/or upgraded to Class A materials throughout the city.

A Class A roof is not just the roof covering itself, but is an overall assembly required to achieve a Class A rating. Roofing products are tested by submitting a roofing mock up to a testing lab where they subject the roofing assembly to a fire brand test. This test involves placing a burning fire brand upon the roof. Figure 5 shows the three sizes of fire test brands – the largest is Class A (12"x12"), Class B (6"x6"), Class C (1"x1"). During the test, the fire cannot penetrate the roof or cause the roof structure/underlayment to ignite before the brand is consumed and burns out.



Figure 5 – Photo 1, left, displays the size classes of fire brands that are utilized for roof testing. Photo 2 and 3, middle and right, display how the ignition of the brand impacts roofing and decking materials.

Combustible roofing materials, to include wood, fiberglass, etc. are subject to ignition from fire embers and brands. Many homes that ignite in WUI fires burn from the top down, this is a result of ignition of the roofing materials or the combustible roof decking from embers that are generated from other structures or the flame front. During the Waldo Canyon Fire in 2012, embers were recorded landing six miles away from the flame front.

There are many types and architectural styles of Class A roofing materials available on the market today. The variety of styles allow for flexibility in achieving the desired look of the home and complying with HOA

architectural design standards while providing for fire resistive properties that are so important in the WUI.

Typical Class A roofing products include, but are not limited to the following types:

- Asphalt Shingles
- Metal / Stone-coated Metal
- Clay Tile
- Concrete (standard weight and lightweight)
- Synthetic
- Slate
- Hybrid Composite

Exterior Cladding, Siding, Eaves and Soffits

Ordinance Section K104.1 (2)

Exterior cladding, eaves and soffits shall be constructed of ignition-resistant materials approved by the fire code official. Approved materials include, but are not limited to: fiber-cement board, stucco, masonry/brick, manufactured stone, and similar materials. Natural wood/cedar siding, hardboard, vinyl, and similar combustible materials are not allowed.

Exception: *Natural wood or plastic products used for fascia, trim board materials and trim accents, such as corbels, false rafter tails, faux trusses, shutters and decorative vents material are allowed when painted or as approved.*

The home's siding is the largest overall surface area and receives the greatest exposure to heat during a wildfire. The materials in which the exterior of the home are wrapped, play a significant role of preventing home-to-home, or vegetation-to-home ignition. In exposure fires, the siding of a home is subject to extremely high radiant heat, which can ultimately ignite the home. This is the same problem experienced throughout history in terms of conflagrations such as the Great London Fire and Great Chicago Fire that consumed entire cities.

Ignition resistant siding helps prevent home-to-home ignition, thereby slowing the fire's progress and giving the fire department an opportunity to contain a fire to the original structure of origin. Just as critical as the siding, are the soffits and eaves. These create areas of vulnerability due to exposure from vegetation upon ignition. The siding, soffits and eaves shall be constructed out of approved ignition-resistant materials.

There are many different exterior cladding and siding products available to satisfy a variety of architectural styles. The most common, as shown in Figure 6 below, are natural or fabricated stone/rock, stucco, and cement board.



Stone



Stucco



Cement Board

Figure 6 – These photos depict some of the many natural and fabricated products for ignition resistant home siding.



Figure 7 – Example of a corbel on a home

As indicated in the ordinance exception, decorative construction features such as fascia, trim board materials and trim accents, corbels, false rafter tails (Figure 7), faux trusses, and shutters are not required to be ignition resistant. These features can be constructed of wood, vinyl, composite materials, or non-combustible products. Colorado Springs Fire Department strongly encourages the use of non-combustible products when they are available. Vinyl decorative features can be used when installed on ignition resistant surface. When wood products are used they must be painted or sealed with approved products to protect the wood from drying out and cracking or splitting. Cracks or splits in wood create a void for ember ignition. As a preventative measure, check these

areas and products frequently and make repairs or seal the gaps when cracks become evident.

Protection of Overhangs and Structural Projections

Ordinance Section K104.1 (3)

For any portion of the attached structure with projections or overhangs, the area below the structure shall have all horizontal under-floor areas enclosed with ignition resistive materials such as those allowed in Section K104.1 (2) (above).

Exception: Heavy timber or dimensional log construction is allowed.

Projections of homes are areas that are vulnerable to heat and embers collection. While not common in this area, the undersides of some building projections are left open to expose the structural members. The exposed structural members are generally combustible and can act as a heat collection and ignition point on the home.

Enclosing the underside of projections with ignition resistant products will help to reduce the likelihood of fire starting in these areas. See Figure 8 below for examples on how to properly protect the underside of

the projections. In the example photos, the horizontal surface is constructed with cement board as would commonly be used for soffit and fascia material.

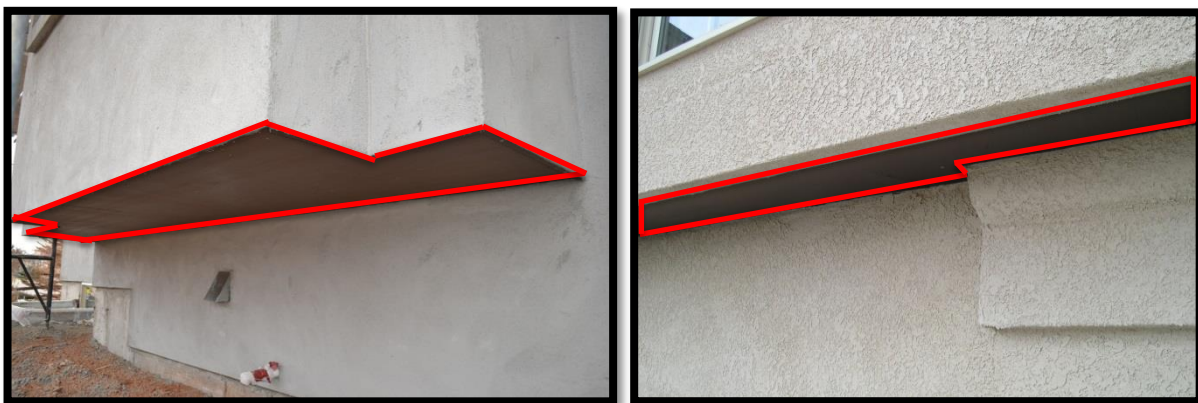


Figure 8 – The red lines depict the areas that would be required to be built of ignition resistant materials

Exterior Doors

Ordinance Section K104.1 (4)

Exterior doors shall be noncombustible or solid core not less than 1 ¾-inches thick. Windows within doors and glazed doors shall be tempered safety glass or multi-layered glazed panels.

Exception: *Decorative single pane glazing in front entry doors is allowed.*



Figure 9 – Example of an approved front door with tempered glass.

As with any entry point into a home, exterior doors can leave the house vulnerable to fire intrusion. The International Residential Code requires that exterior doors meet or exceed specific industry testing standards in terms of deflection caused by wind. A solid core door not only provides the best protection against deflection by wind, but it also provides protection against radiant heat as compared to a lighter weight hollow core door. Doors should be constructed of non-combustible products such as metal or composites. Wooden doors are acceptable when they are solid core construction.

Sliding glass doors or decorative front doors with glass panels shall have tempered glass that are designed to withstand impact and meet the design standards required by building codes (Figure 9). In an effort not to restrict architectural design and curb appeal, the exception to this section allows for entry doors with decorative glass, which may or may not be tempered.

Windows

Ordinance Section K104.1 (5)

Exterior windows shall be a minimum double pane. Tempered panes are preferable but not required.

There are two main components of windows that are vulnerable to fire: the first is the frame construction (Figure 10 A), and the second is the glazing (or glass surface) (Figure 10 B). While not specifically addressed by the Ignition Resistant Construction Ordinance, if vinyl windows are used, they should contain an aluminum sub-frame to help the window frame retain its shape when exposed to increased heat. Melting or distortion of the frame can cause the glass panes to shift or fall out.

The primary area of concern addressed by the ordinance related to windows is the glass surface. Today's windows are constructed to be very energy efficient in terms of insulation properties and UV reflection.

The primary area of concern addressed by the ordinance related to windows is the glass surface. Today's windows are constructed to be very energy efficient in terms of insulation properties and UV reflection.

As such, most modern windows perform extremely well during a wildfire. Dual pane windows can successfully withstand a flame front as it moves quickly into or through a community by reflecting

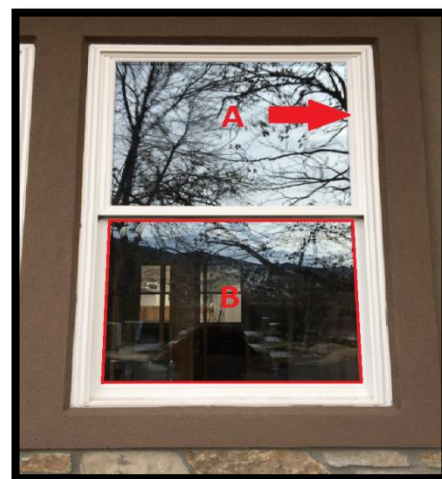


Figure 10 – Double pane window example with proper frame construction (A) and tempered glass pane (B).

the radiant heat energy. Just like placing a hot glass in cold water, the extreme temperature fluctuation in a wildfire will cause the glazing in a window to crack. The insulating factor of a dual pane window will help protect against the temperature differences. Single pane windows do not perform as well and are vulnerable to cracking and breaking due to the intense heat of a wildfire.

Most homes built today already include dual pane windows as an energy conservation and efficiency feature. Similar to the section on exterior doors, windows must meet or exceed rigorous testing of national standards to be approved for use in a home.

Attic Vents

Ordinance Section K104.1 (6)

All attic vents shall be screened with wire mesh or hardware cloth having openings no larger than 1/8-inch unless an alternative design or product is allowed by the fire code official. Soffit vents are allowed. Gable vents may be allowed but only as approved by the fire code official.

Ember intrusion is a very significant factor in determining whether or not a home will survive a wildfire event. Attic venting is critical in preventing excessive temperatures and moisture in attics; however, the venting also leaves homes very vulnerable to ember intrusion. Using vents with 1/8" screening is important in restricting the size and overall number of embers able to enter the attic (Figure 11). This screening will not stop all embers, but generally speaking, embers less than 1/8" do not have the heat energy needed to ignite combustible framing or insulation within the attic space.

Consider a camp fire; as the fire pops and cracks, small embers fly out of the fire. The small embers will generally burn out before falling to the ground. The small embers do not have enough heat energy to continue to burn. Now, think of the larger embers or brands that pop from a campfire and land on the ground. Many of the larger embers will still be glowing, if not flaming, when they land. These larger embers or brands are the ones that need to be kept out of attic spaces as they have enough heat energy to ignite combustible structural members. Even with the smaller vent screens, potentially hundreds of smaller embers will enter the attic. The primary goal is to prevent large amounts of larger/hotter embers and brands from entering the home, as there will be a much higher risk of ignition.

As an added safety measure, homeowners should not use attics for the storage of combustible materials as the stored items may ignite from embers as well.

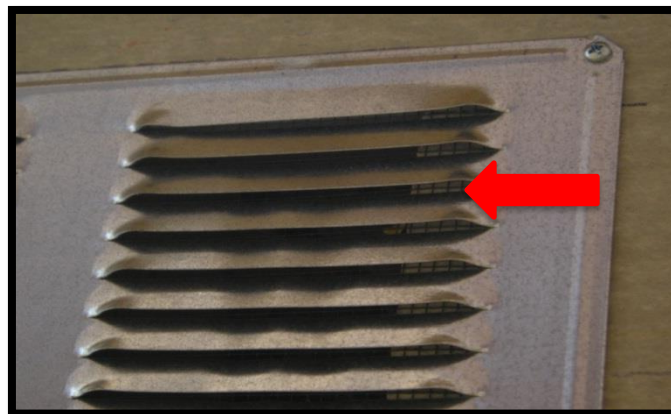


Figure 11 – The 1/8" screening can be seen where it contrasts with the wood on the inside of the vent.



Figure 12 – Example of a soffit vent.



Figure 13 – Example of a roof vent.

There are several different types of vents commonly used for attics, which include soffit (Figure 12), roof (Figure 13), ridge (Figure 14), and gable (Figure 15) vents. Each of these vents types are required to include 1/8" screening.

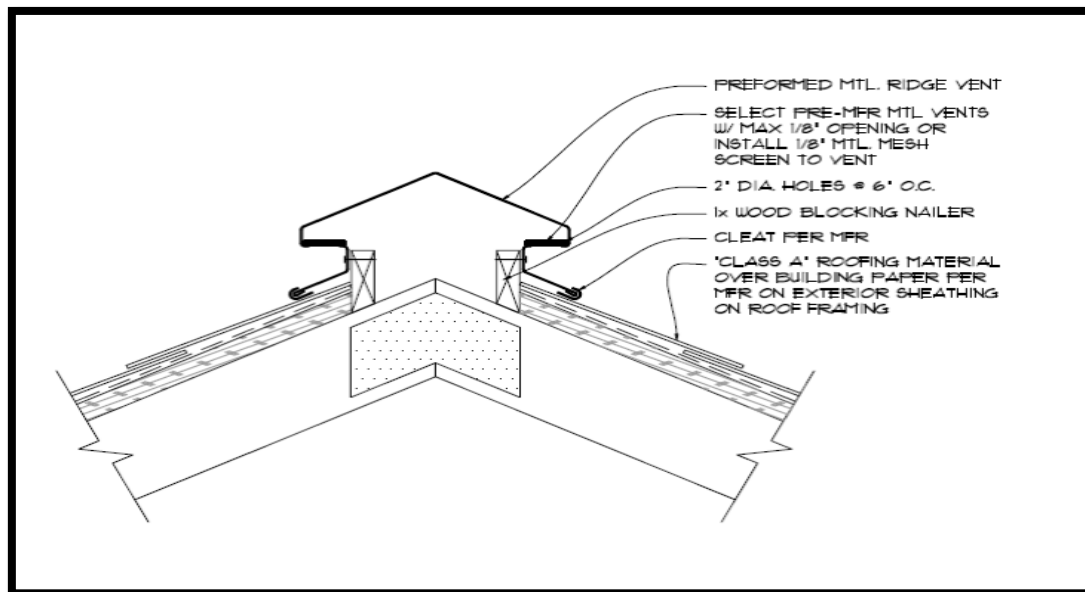


Figure 14 – Example of a ridge vent drawing with proper screening.

Gable vents (Figure 15) are highly discouraged as they are more susceptible to ember intrusion and should only be considered on sides of homes that do not face steep slopes or typical prevailing winds. An example of a faux gable vent (Figure 16) is for decorative purposes only. The decorative vent does not penetrate the attic and therefore does not require screening but must have non-combustible construction as the faux vents can collect or hold burning embers.



Figure 15 – Example of a gable vent for attic ventilation.



Figure 16 – Example of a faux gable vent for decorative purposes only.

While not specifically addressed in the ordinance, other types of vents, such as those for crawlspaces are also vulnerable to ember intrusion. The same screening practices for these areas are a critical part of home hardening against wildfire would be a wise choice.

Gutters

Ordinance Section K104.1 (7)

Gutters and downspouts that are of non-combustible construction shall be installed such that the leading edge of the roof is finished with a metal drip edge so that no wood sheathing is exposed. The drip edge shall extend into the gutter. Vinyl gutters may be allowed, but must have a non-combustible landing area below the roof line, that is a minimum 5 foot distance from the side of the structure or foundation.

NOTE: gutter caps are highly encouraged as a home-owner maintenance item to prevent combustible debris from collecting in the trough.



Figure 17 – One example of a gutter cover or guard to protect against debris accumulation.

Studies have been conducted to evaluate the performance of both metal and vinyl gutters during wildfires. While the gutter material certainly has an impact, of greater concern is the combustible debris (leaves, pine needles, etc.) that can accumulate in gutters and ignite during a fire. Although preventative measures can be made by selecting preventative materials, constant maintenance and cleaning may be necessary to ensure gutters remain clear and clean.

Metal gutters will not burn, and they tend to stay in place during a fire. Any debris within the gutter that ignites will burn and expose the roof decking and fascia to heat and direct flame contact. Vinyl gutters tend to ignite when exposed to significant heat or fire, but they will melt away from the structure, thus limiting the amount of heat or flame exposure to the roof decking or fascia. From a fire safety standpoint, it is more important to prevent the accumulation of combustible debris in the gutter than to be concerned with the actual material of the gutter itself. If gutter caps are not used to prevent accumulation of foreign combustible debris (Figure 17), then homeowners must be vigilant to ensure the gutters are cleaned out on a regular basis.

Standard construction practice by roofers is to install a piece of metal flashing, otherwise known as a drip edge along the exposed face of the roof decking. This design is common for moisture prevention efforts, but it is also found to be very effective in preventing flame exposure or ember intrusion along the exposed edge of the combustible roof decking under the shingles of roofing material. This drip edge shall cover the edge of the roof deck, extend into the gutter, and shall be installed tightly against the gutter material (Figure 18). In cases of a very long roof line, additional flashing may need to be installed behind the gutter and drip edge to prevent exposure of the fascia when the gutter slopes enough to drop below the roof flashing.

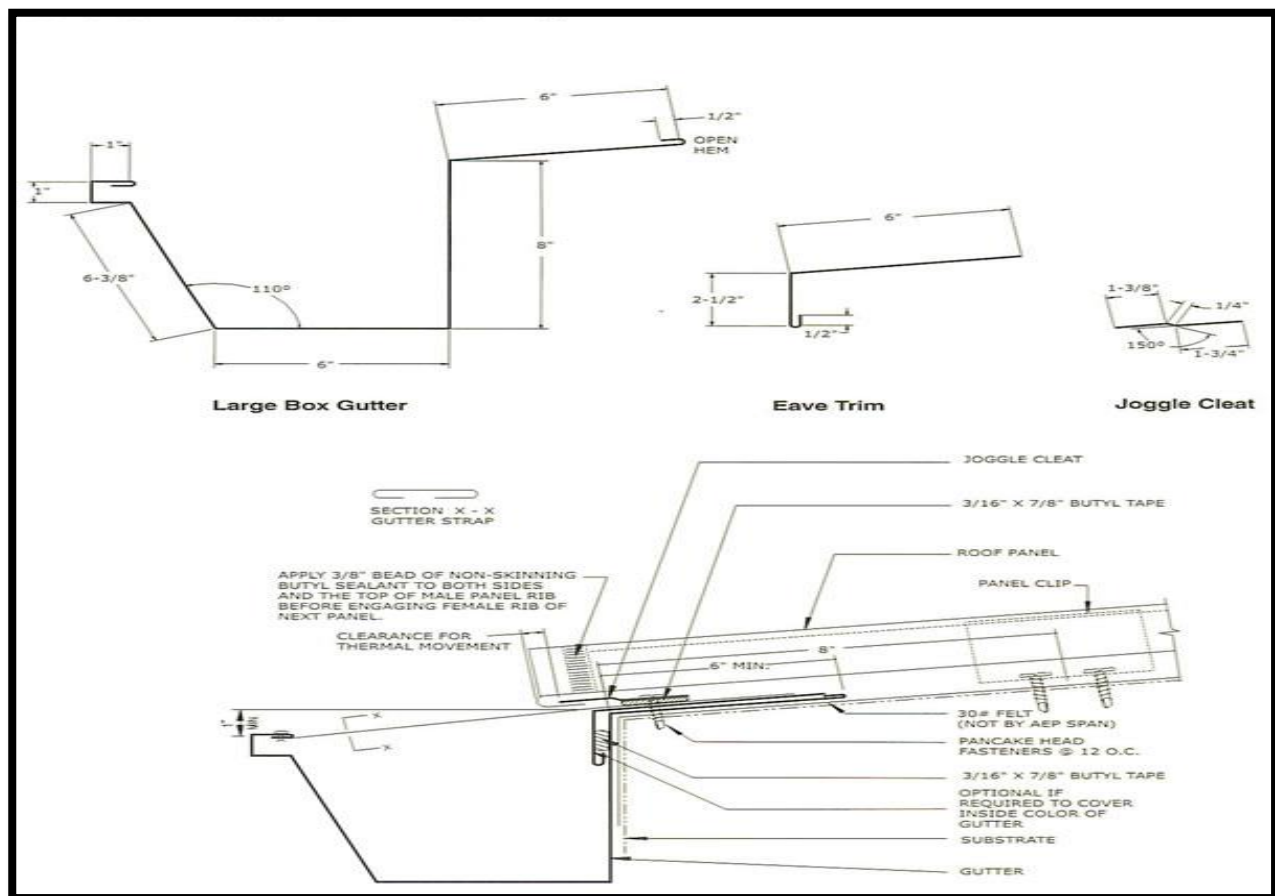


Figure 18 – Example drawings of the proper attachment of the drip edging to the eave.

Decks

Ordinance Section K104.1 (8)

Decks and other habitable spaces shall be of ignition resistant or non-combustible decking materials, such as composite or metal decking. Wood is not permitted to be used for the decking surface, but can be used for all large structural components and railings.

Decks and outdoor living spaces are an important aspect of Colorado living. Many homes throughout this community utilize decks and other outdoor living spaces to take full advantage of the beautiful views and climate our community has to offer. As such, residents desire to retain decks as an important aspect of WUI homes. When choosing decking material it is important to understand that deck safety is not just about the decking material itself, but is a package design to include smart storage and landscaping practices as well. Decks are most vulnerable to ignition from direct flame impingement from adjacent combustible material such as firewood, bushes, trees, etc., and

from fire brands or embers landing on the horizontal surfaces of the deck. The point at which the deck connects to the home should have adequate metal flashing to provide additional protection against ignition where there is potential for an increased accumulation of embers and brands.



Figure 19 – Example of an artificial decking surface and metal spindles.

When choosing decking surfaces there are two primary material types on the market: wood and composite or PVC. Wood is the most common product found in the construction of decks. Wood is generally fairly easy to work with; however, it does require significant maintenance to keep it from drying out and splitting. The dry and split wood is very susceptible to capturing embers and igniting. Composite decking on the other hand is relatively maintenance free and does not rot or split, making it a much better product in terms of fire safety.

Like roofing materials, building products are tested for the surface burning characteristics and given a rating classification depending upon how well they resist ignition and spread of flame across the surface. The classification has three levels; Class A, Class B and Class C, with Class A having the best performance at resisting flame spread. Many natural wood products inherently have a Class C rating, with the exception of some exotic hardwoods or other products not typically selected for decking materials. Many of the composite or PVC decking materials are available with a Class B rating – some even have a Class A rating (Figure 19).



Figure 20 – Example of composite decking after the structure was lost during the Waldo Canyon fire



Figure 21 – Example of a wood deck ignition on a wood deck.

During the Waldo Canyon fire, many of the decks that ignited or burned were due to direct flame contact from ignition of combustible storage under the deck or adjacent trees and bushes. In this case, both wood and composite decks burned. Where decks were subject to embers and fire brands, wooden deck surfaces were much more susceptible to ignition than the composite decks, which tended to melt but not ignite. Figure 20 shows a composite deck that was attached to a home completely destroyed by fire. The deck

did receive damage, but for the most part was intact as the composite deck itself did not burn. In contrast, Figure 21 shows a combustible deck that was ignited due to embers/brands. Firefighter intervention prevented further damage to the deck and structure. Examples of composite or ignition resistant decking products may be found in Annex A towards the back of this document.

The ordinance itself does not regulate the structural components of the deck. While standard lumber is common, many builders and home owners are utilizing alternative materials for the construction of their decks. Figure 22 shows a deck built with metal framing member in lieu of wood. Although not shown in the photo, this deck also has a concrete decking surface. In addition, they chose to wrap the support columns in stucco rather than leaving them exposed. Like the base of walls, it is also important to enclose the base of any exterior columns as discussed in the next section. These areas are vulnerable to debris and ember collection inside the base of the column.



Figure 22 – The arrow depicts the metal floor joists used on this example deck.

Base of Walls

Ordinance Section K104.1 (9)

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 1/8-inch to protect them from ember intrusion and still allow for weeping and moisture control.

Traditional building construction methods have the tendency to leave gaps under the lower edge of siding at the base of walls, posts, columns, etc. Figure 23 shows a close up view, looking up from the bottom of the wall, which reveals vulnerable gaps at the base of walls. In the picture on the left you can see the exposed combustible sheathing (green) and foam board insulation (blue). In the picture on the right you can see the combustible wood sheathing (brown). This gap, while typically not noticeable, provides an entry point for embers and flames to enter the exterior walls of the home. As winds and embers blow up against the foundation of the home, the gap left between the siding and foundation can leave the stud wall cavity exposed. The gap provides for a point of ember intrusion into the

combustible wall cavities and concealed spaces of the home. Fire can burn undetected and unimpeded in the concealed spaces for long periods of time before venting to the exterior where it is discovered. This gap needs to be protected with screening or sealed off with caulking, fire resistive foam, mortar, or similar product.

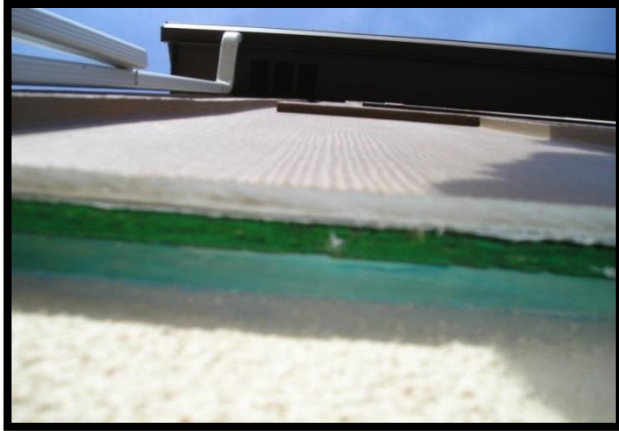


Figure 23 – Example of the base of a wall that reveals exposed plywood and insulation where the foundation and siding meet at the base of the house.



Figure 24 – Example of the base of the siding properly sealed with stucco and flashing to prevent exposure to the base of the house.

In Figure 24, the builder utilized metal flashing and stucco to seal the exposure where the wall connects to the foundation. Be advised that there may be a need or desire to provide provisions for a weep or drainage to prevent moisture and condensation collection within the wall. Make sure these drains or weeps are not closed off when sealing the bottom side of the walls if moisture control is needed.

Chimneys

Ordinance Section K104.1 (10)

Chimneys serving fireplaces, as well as other heating appliances in which solid or liquid fuels are used, shall have an approved spark arrester or cap.

Spark arresters are required to be installed in accordance with the mechanical and building codes for all new installations of solid fuel and wood burning appliances. We highly recommend them to be installed on existing chimneys. While spark arresters are important from a wildfire prevention standpoint, they are different for the other provisions in this guidebook. These are not for protecting your home from wildfire, but preventing a wildfire from starting due to embers from your wood burning appliances.

Spark arresters are designed to catch embers and brands that are produced during normal operation of a fireplace or wood burning appliance. Prevention of embers and brands from exiting a chimney reduces the risk of ignition outside of the home and potentially causing a wildfire event. Code compliant spark arresters shall be constructed of woven or welded wire screening of 12 USA standard wire gauge having openings not exceeding ½ inch (Figure 25).



Figure 25 – Example of a chimney top spark arrester

Alternative Methods and Materials

The Colorado Springs Fire Department recognizes that there are many different construction methods and materials available in the construction of a home. As with everything else, technology continues to improve and new products and construction methods are frequently introduced into the home building markets. As such, we are open to discussion and evaluation of methods or materials not specifically addressed within this document. Our goal is smart construction with ignition-resistant design that will increase a home's ability to stand alone with limited or no firefighter intervention during a wildfire event. Nothing in this design manual is intended to prevent the use of products that have been tested and proven to provide equivalent or greater levels of protection and design than what have been called out in this manual. Consideration of alternative building products will generally require manufacturer's literature and independent product testing reports describing the flame spread characteristics of the proposed materials.

For additional information and updated lists of potentially acceptable construction materials, please visit the California Office of the State Fire Marshal, California Department of Forestry and Fire Protection.⁵ This site will include many of the product suggestions listed in this document, as well as any additional products that may have been added since the publication of this document. The City of Colorado Springs does not endorse any specific product or material, but rather looks subjectively at each product for compliance with code and documented testing performance when considering its use in a local application. If there are questions or concerns regarding regulations or approved materials, contact the Division of the Fire Marshal beforehand for pre-approval or to ask questions.

Construction Permit Review Requirements

All requirements must be reviewed and approved by the Colorado Springs Fire Department, Fire Construction Services prior to building permit issuance. WUI homes are reviewed through the plot plan/site plan process through City Planning. After Planning completes their review of the plot, the plan will be routed to Fire Construction Services for review. Information regarding the building materials, compliance with applicable development plan conditions associated with the specific lot, and compliance with ignition resistant construction and fuels management practices shall be indicated on the plot plan at the time of submittal.

Two inspections are required during the construction process. A preliminary inspection around the time of the framing inspection is important to allow the inspector to look at roof vents and construction materials such as soffits/fascia material before they are concealed. In addition, the preliminary inspection allows us to provide feedback on the existing landscaping and native vegetation. A final fire department inspection to verify compliance with all the provisions of the Ignition Resistant Construction Ordinance, to include any vegetation and landscaping, will be required prior to issuance of the Certificate of Occupancy.

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⁵ California Office of the State Fire Marshal, “Building Material Listings – Search Listing Services”; 2020.

<<https://osfm.fire.ca.gov/divisions/fire-engineering-and-investigations/building-materials-listing/bml-search-building-materials-listing/>>

Fuels Management Requirements

This section of the design manual specifically addresses landscaping and natural vegetation surrounding houses, and how to apply smart landscaping design to reduce the likelihood of ignition of a home from an exposure fire. Fuels management includes selecting plant materials that have a greater resistance to wildfire in terms of susceptibility to ignition and providing adequate clearance to homes. Fuels management also includes the maintenance of existing and other vegetation that could pose a risk to your home.

Plant Selection

Proper selection of plants and trees is critical when creating a defensible space around your home. However, it's not just how you landscape, but the selection of plants and materials is of equal importance. Colorado Springs is a semi-arid climate and prone to drought conditions. Selection of plants that are drought resistant and tend to maintain greater fuel moisture is a good start. Deciduous plants are a great choice because they generally have higher moisture content, and can shed their leaves when they go dormant due to drought or during the winter months. The shedding of leaves allows the structure of the plant or tree to retain higher moisture content.

Other attributes and considerations for fire resistant landscaping include:

- Avoid plants with volatile oils and resins like pine and juniper
- Choose plants that are native to the area and are drought tolerant for our climate
- Choose plants with a naturally higher moisture content
- Consider mature size and spacing as they may encroach into safety zones in the future
- Select a diversity of species (as different plants are more susceptible to burning at various times of the year)

For additional information on FireWise Plant Materials, refer to Annex B toward the back of this manual.

Safety Zone

Ordinance Section K102.1.1

Brush patches or clusters may be left in the safety zone, but shall be separated by clear areas of at least ten feet (10') or more of noncombustible materials and/or grass mowed to not more than four inches (4") in height.

The safety zone (or home ignition zone) is defined as the first thirty feet immediately surrounding a structure including roofline and decks. Contrary to false impression, this area does not have to be clear cut. Fuels management is about making smart choices in selecting the plants within the safety zone, and maintaining the existing healthy vegetation using the techniques covered in this section. There are three primary fuel layers of vegetation to be considered when evaluating the safety zones. These layers include ground cover, bushes, and

trees. Figure 26 illustrates an overgrown lot. This image is typical of an unmitigated property. The adjacent image, Figure 27, provides an example of a well mitigated lot with plenty of clearance within the safety zone.



Figure 26 – Example of vegetation that is overgrown and contains vegetation too close to the home.



Figure 27 - Example of a well mitigated lot that is not clear cut but has adequate spacing between trees and the home.

Figure 28 is a good example of the various layers of vegetation within the safety zone. Note the separation of fuels and the use of features such as rock walls, rock paths, irrigated lawn, and planting beds to create defined fuel breaks.

Ground Cover

Ground cover includes any materials or surfaces at grade. Native or planted grasses are the most common type of ground cover. Considerations regarding ground cover include height of the materials, clearance to structures, and fuel moisture. Ground cover is predominantly considered to be light, flashy fuels. These fuels generally don't have very high heat energy, but they do provide for very rapid fire spread when the fuel moisture is low. Keeping grasses mowed to a height of less than four inches and well irrigated within close proximity to the home will reduce the rate of spread as well as the intensity.

A significant consideration in the safety zone, is ground cover mulch. While mulch might not seem like a big deal, combustible mulch near homes can be receptive to ignition from embers and fire brands. Avoid mulches that tend to be light weight. Denser bark or even rock and stone are a much better choice for mulch around the perimeter of the home. Rock or stone mulch should always be used when vinyl gutters are present on the home as discussed in the gutters section on page 17.



Figure 28 – Example of properly mitigated vegetation within the safety zone.

Bushes

Bushes and other low level vegetation are those intermediate level plants that generally grow in the two to six foot high range. The intermediate plants, also known as ladder fuels, become a conduit for flame transfer from ground cover to larger plants and trees. Bushes are an important consideration when evaluating the overall safety zone of the home. Care should be taken to select plants from the FireWise Plant Materials list from Annex B, towards the back of this document.

Maintenance of bushes includes removing debris and dead branches from the base (understory) of the plant and limiting the size of clusters of multiple plants to no more than one hundred (100) square feet. Gambel oak, or scrub oak, grows in clumps and share root systems. Limiting the size of and separating the clumps from other vegetation is intended to break up the continuity of brush leading up to structures. By removing the debris and dead branches from the brush, the likelihood of ignition from a ground cover fire is reduced.

Trees

Trees are obviously the largest and often times most sought after vegetation within the safety zone. Strong, healthy trees provide many benefits to homeowners, including curb appeal, shade, wildlife habitat, and soil stabilization.

There are several factors to consider when selecting trees to plant or maintain around a home. First and foremost, select types and species of trees that are found on the FireWise Plant Materials list in Annex B, toward the back of this document. Care should be taken to avoid trees such as conifers or evergreens, including pines, firs, spruces and junipers in the safety zone. These trees have characteristics that make them prone to fire including resin and oil content, low hanging limbs, needles, thin bark, and low fuel moisture. Some pines, like Ponderosas, have thicker bark and higher limbs that make it the better choice when selecting an evergreen. Deciduous trees are always a much better choice in the safety zone.

The next thing to consider is the maturity and health of existing trees. A certified arborist can be a great resource in determining the overall health of trees around a home. Some indicators of stressed or unhealthy trees include obvious sign of disease such as mistletoe as shown in Figure 29,⁶ or pest infestation such as pine beetle⁷ as indicated by the sap in Figure 30.



Figure 29 - Example of dwarf mistletoe in a ponderosa pine.



Figure 30 – Insect infestation in a ponderosa pine.

⁶ Colorado State Forest Service; Dwarf Mistletoe: Parasitic Plants; 2019. <<https://csfs.colostate.edu/forest-management/common-forest-insects-diseases/dwarf-mistletoe/>>

⁷ Colorado State Forest Service; Mountain Pine Beetle; 2019. <<https://csfs.colostate.edu/forest-management/common-forest-insects-diseases/mountain-pine-beetle/>>

The biggest consideration in terms of trees within the safety zone is to provide plenty of clearance between trees, other vegetation, and structures. In the previous section, bushes are described as ladder fuels because they can be a conduit for flame transfer from ground cover to larger plants and trees. The most dangerous and rapid fire spread during a wildfire is known as a crown fire, which allows fire to jump from bush to bush or tree top to tree top, covering large areas of land in very short timeframes. Trees can also be a method of fire spread to structures and homes when adequate clearance is not provided as described in the following sections.

Clearance to Main Structure

Ordinance Section K102.1.2

No hazardous brush or trees (i.e. junipers and conifers) shall be allowed within fifteen feet (15') of the main structure or significant accessory structure. Conifers or other similarly combustible plants shall not be planted under soffit vents.

Exception: *When approved by the Fire Code Official, small brush patches or trees, not exceeding one hundred (100) square feet in size and no more than fifteen (15) linear feet in any direction, may be allowed to encroach into this zone. Vegetation must be maintained in accord with the applicable Colorado Springs Community Wildfire Protection Plan. Plants with fire resistant characteristics found on the Colorado State Forest Service list of FireWise Plants are allowed within 15' of the main structure or significant accessory structure.*

The intent of the fifteen foot clearance of trees or brush is to provide spacing between the tree limbs in relation to the eaves, roofline or deck. The fifteen foot distance should be measured from the main trunk of the tree to the structure or significant accessory structure. Mature height considerations must also be made given the species and vegetation characteristics to ensure the tree does not violate other requirements as the tree continues to grow closer to the structure over time. Figure 31 and 32 show illustrations that compare and contrast adequate clearance to the home. The fifteen foot clearance also accounts for several tree characteristics including mature height, shape, leaf type, moisture

content, resins, and additional plant characteristics that make trees less ignition resistant. In some instances based on property lines, the fifteen foot clearance is not possible. In certain circumstances, tree, brush and plant species identified as FireWise plants by Colorado State Forest Service are allowed within fifteen feet. See Annex B, towards the back of this manual or visit extension.colostate.edu/firewise-plant-materials for more information on FireWise plant materials.



Figure 31 – Example of vegetation that is overgrown and has inadequate spacing between the home and vegetation.



Figure 32 – Example of cleared vegetation that has adequate spacing between the home and other vegetation within the safety zone.

Figure 33 and 34 shows two examples where the fifteen foot clearance to the main structure is not provided. In both of the examples provided, the homes are at significant risk of vegetation to structure ignition in the event of a wildfire.



Figure 33 & 34 – These two photos depict examples of vegetation that does not provide adequate clearance or separation distances between brush patches.

Pruning of Dead Limbs

Ordinance Section K102.1.3

Large trees shall not be allowed to have limbs overlap another tree and shall be pruned of limbs to a height of up to ten feet (10') above the ground. Tree clusters may be allowed if sufficient clear area is provided and approved.

Pruning up to ten feet in height is intended to remove ladder fuels and prevent fire spread from the ground into the crowns of trees and brush. Both live and dead limbs can act as ladder fuels. The ten foot height limit for pruning is intended to reduce the threat of ladder fuels while providing adequate foliage on the tree to survive. It is also intended to provide a limit for residents to safely prune up to, without climbing the tree or cutting overhead. While pruning is limited to ten feet the recommendation is always to maintain at least 70% of the crown to ensure good health and sustainability of the tree.

Figure 35 shows an actual example of a home site before fuels mitigation. This lot is overgrown and creates a significant fire risk. Figure 36 is the same lot after fuels mitigation. This lot is now safer for the property owner and is esthetically pleasing and no longer overgrown.



Figure 35 – Example of dense overgrown vegetation before mitigation.



Figure 36 – Example of vegetation after mitigation work.

Figure 37 provides a great example of how adequate clearance to the structure and pruning of limbs successfully protected a home from ignition. The arrow in the photo identifies where the fire burned along the ground but stopped short of the home. The scrub oak was properly pruned and limbed up to prevent the ground cover from extending into the taller plants.



Figure 37 – Example of how understory vegetation burned but did not burn the canopy of the trees and due to mitigation efforts, did not burn the structure.

Clearance of Tree Branches to Structures or Appurtenances

Ordinance Section K102.1.4

Tree branches shall not extend over or under the roof or eaves, and shall not be within fifteen feet (15') of a deck or similar combustible projection, wood burning appliance or chimney.

While house plans and landscape plans note the relation of vegetation to the structure, it again does not address the size, shape, or future growth of the tree. Figure 38 represents how dense vegetation and landscaping create a means of continuity for a ground fire to spread to bushes and trees. In contrast, Figure 39 shows how good fuels management is design to limit the spread of fire, thus keeping the fire small and manageable. Regardless of the planting location, no limbs should reach on,

over, or under rooflines, decks, eaves or chimney (Figure 40).



Figure 38 – Dense and overgrown vegetation poses a hazard due to continuous continuity that carries to the home.



Figure 39 – Proper fuels management limits fire spread continuity and reduces the fire spread to the home.



Figure 40 – Example of a home that has pruned branches from the roofline of their home.

Like building construction, good fuels management practices include a systems approach within the safety zone. Overall clearance to the main structure is essential in providing a buffer or fire break between combustible vegetation and the home. Pruning of limbs helps to reduce the ladder fuels, which prevents ground cover fires from moving to the crowns of trees where the fire can spread much more freely. Keeping tree branches from touching or being in close proximity to a home will provide protection from a crown fire and reduce the likely ignition of the home. Overlooking just one piece of the fuels management model will reduce the overall protection of the home.



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Additional Tips to Reduce Your Wildfire Risk

1. Create defensible space around your home. Colorado Springs Fire Department recommends thinning out thirty feet (30') or to your property line, whichever comes first.
2. Keep rain gutters clear of leaves and pine needles.
3. Do not store combustibles on or under decks, including fire wood.
4. Rake up pine needles and leaves within thirty feet (30') of any structure.
5. Select plant species with fire resistant characteristics.
6. Keep grasses mowed to a maximum height of four inches (4").
7. Incorporate landscaping designs to break up fuel continuity (i.e. paths, rock walls, gravel mulch.
8. Keep addresses clearly marked and visible from both directions of traffic. (Firefighters can't help you if they can't find you.)
9. Prune lower branches. Removing ladder fuels will help keep the fire from getting into the crowns of the trees. Remove dead or diseased trees and brush.
10. When making home improvements or repairs, consider wildfire safety. Refer to this manual and incorporate ignition resistant design whenever possible.
11. Maintenance! You have worked hard to protect your investment, make sure you continue those efforts through regular maintenance.
12. Get involved with your HOA or community and participate in the Wildfire Mitigation's Neighborhood Chipping Program.
13. Work with your neighbors and encourage them to participate in wildfire mitigation efforts as well.
14. Contact the CSFD Wildfire Mitigation office at 385-7342 to request a free on-site consultation regarding specific wildfire threats on your property.

Summary

The Colorado Springs Fire Department is here to support and encourage the citizens of our city to do their part in keeping our community safe against the ever present threat of wildfire. Wildfire safety and prevention is EVERYONE'S responsibility and it is up to each and every homeowner to take the necessary steps to prepare their home against wildfire.

The information provided within this design manual is an overview, and by no means all-encompassing in terms of the methods and materials available for ignition resistant construction and smart landscaping practices. We encourage you to contact the Colorado Springs Fire Department if you have any questions or would like us to visit with you regarding your wildfire risk.

- For Ignition Resistant Construction questions, please contact the Fire Construction Services office at (719) 385-5982, Ext. 2.
- For Wildfire Mitigation and landscaping questions, please contact the Wildfire Mitigation office at (719) 385-7342.
- For additional wildfire safety tips and information, please visit our website at coloradosprings.gov/wildfiremitigation
- For information on a property location or information on a home in the Wildland Urban Interface, refer to these website locations:
 - coloradosprings.gov/springsview
 - coloradosprings.gov/wildfiremitigation
- For information on new construction or a construction review status, refer to the website locations and phone information below:
 - coloradosprings.gov/fire-department/page/plan-and-construction-review-status?mlid=31136
 - Planning and Development Staff (719) 385-5982

Glossary of Terms

Brands: A burning piece of wood or other burning material generally distributed by wind currents. A brand is differentiated from an ember by its larger size and higher heat energy.

Character Tree: Character trees shall be defined as existing, mature over story trees that are unique to the site: ie. species specific or large diameter (12 inches at Diameter at Breast Height) or wildlife essential (nesting habitat).

Conflagration: A large, out of control and destructive fire, generally categorized by the loss of many continuous structures within a defined fire area.

Clusters: Clumps of trees and/or brush no more than one hundred (100) square feet in size and no more than fifteen (15) linear feet in any direction, separated by clear areas of ten (10) feet or more of non-combustible materials or grass mowed to not more than four (4) inches in height.

Crown Fire: A rapidly moving fire burning in the tops or crowns of trees, which is able to cover a significant area in a short amount of time.

Defensible Space: An area either natural or human-made, where material capable of allowing a fire to spread unchecked has been treated, cleared, or modified to slow the rate and intensity of an advancing wildfire and to create an area for fire suppression operations to occur.

Embers: A small piece of wood or other burning material generally distributed by wind currents. An ember is differentiated from a brand by its smaller size and lower heat energy

Exposure Fire: A direct flame contact or radiant heat energy substantial enough to ignite vegetation and/or the adjacent structures.

Fuels Management: The act or practice of controlling flammability and reducing resistance to control of wildland fuels through mechanical, chemical, biological, or manual means.

Fuel Moisture: The amount of moisture found in dead or living organic fuels (vegetation).

Hillside Overlay: An overlay zone characterized by ridgelines, bluffs, view corridors, foothills, mountain backdrop, excessive slope, unique vegetation, natural drainage, rock outcroppings, geologic conditions, wildlife habitats, and other physical hazards that are significant natural features worthy of preservation.

Ignition Resistant Construction: The use of materials and systems in the design and construction of a building or structure to safeguard or provide reasonable protection against the ignition and/or spread of fire to or from buildings or structures.

Ladder Fuels: Natural vegetation or other combustible materials that provide a conduit through direct contact or close proximity to allow for a fire in smaller plants to progress vertically into taller plants and trees.

Mitigation: The intentional act of reducing the threat or severity of a fire through ignition resistant construction, creation of defensible space, selective thinning of vegetation, and selecting plants that are

less susceptible to ignition.

Patches: See “Clusters” above.

Safety Zone: The first thirty feet (30') immediately surrounding a structure including roofline and decks.

Wildfire: An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.

Wildland Urban Interface: A geographically defined area where structures and other human development meets or intermingles with wildland or vegetative fuels. For the sake of this manual the wildland urban interface includes, but is not limited to, the Hillside Overlay Zone.

Annex A – Examples of Decking Materials

This list of products below is simply a representation of previously approved materials that have been used for decking material. CSFD does not promote nor endorse any specific product. Alternative decking material may be researched for applicability to current codes and ordinances, and then presented to CSFD for approval prior to construction. One example of a building materials research resource is Cal Fire’s Office of the State Fire Marshal Building Materials Listings webpage:

<https://osfm.fire.ca.gov/divisions/fire-engineering-and-investigations/building-materials-listing/bml-search-building-materials-listing/>

- Advanced Environmental Recycling Technologies, Inc.
 - “ChoiceDek® FR” composite wood plastic deck board - Class C Flame Spread
 - “MoistureShield® FR” composite wood plastic deck board - Class C Flame Spread
- Tamko Building Products, Inc.
 - “EverGrain” composite deck board - Class C Flame Spread
 - “Elements Dockboard” composite deck board, 1.4” thick x 5.25” width - Class C Flame Spread
 - Model Envision composite decking board - Class C Flame Spread
- Fiber Composites, LLC
 - “Fiberon” composite deck board - Class B Flame Spread
 - “Portico” composite deck board - Class B Flame Spread
 - “Veranda” composite deck board - Class B Flame Spread
 - “WeatherBest™” composite deck board, - Class B Flame Spread
 - “Sensibuilt™” cellular PVC composite deck board - Class A Flame Spread
 - Veranda ArmorGuard/Fiberon ProTect composite deck board - SFM 12-7A-4A
- Gossen Corporation
 - “Passport” Cellular PVC deck board - Class B Flame Spread.
 - “Weather Ready” Cellular PVC deck board - Class B Flame Spread
- Interplast World-Pak
 - “TUF DECK™” extruded PVC composite square edge deck board - Class A Flame Spread
- TimberTech Ltd.
 - “DockSider™ Plank” wood plastic composite (WPC) deck board - Class B Flame Spread
 - “ReliaBoard™” HDPE composite deck board - Class B Flame Spread
 - “TwinFinish™ Plank” wood plastic composite (WPC) deck board - Class B Flame Spread
 - “TimberTech XLM™” plastic composite deck board - Class B Flame Spread
- Enduris Extrusion Inc.
 - “Endeck” Cellular PVC deck board - Class A Flame Spread
- Trex
 - “Transcend” Wood Thermoplastic composite lumber – Class C Flame Spread

Annex B – Approved Plant Materials

Scientific Name	Common Name	Approx. Water Needs	Sun/Shade Preference	Approx. Mature Height	Approx Bloom Month
Flowers and Ground Covers					
<i>Achillea lanulosa</i> ^a	Native yarrow	L-H	S/PS	1.5 – 2'	Jul
<i>Achillea millefolium</i>	Native Yarrow	L-H	S/PS	1.5 – 2'	Jul
<i>Aconitum spp.</i> ^c	Monkshood	M-H	S	2'	Jun-Jul
<i>Aconitum columbianum</i> ^{ac}	Columbian monkshood	M-H	S	2'	Jun-Jul
<i>Ajuga reptans</i> ^b	Bugleweed	H	Sh	< .5'	Jun-Jul
<i>Alchemilla sp.</i>	Ladys mantle	M-H	PS/Sh	1'	Jun-Jul
<i>Allium georgii</i> ^{ac}	Geyer onion	L-H	S/PS	1'	Jun
<i>Anaphalis margaritacea</i> ^a	Pearly everlasting	L-H	S	1.5 – 2.5'	Aug
<i>Anemone blanda</i>	Windflower	M-H	S/PS	1'	Apr-May
<i>Antennaria parvifolia</i> ^{ab}	Small-leaf pussytoes	M	S/PS	<.5'	Jun
<i>Aquilegia spp.</i>	Columbine	M-H	S/PS	1 – 2'	Jun-Jul
<i>Aquilegia coerulea</i> ^a	Colorado blue columbine	M-H	S/PS	1 – 2'	Jun-Jul
<i>Aquilegia chrysantha</i> ^a	Yellow columbine	M-H	S/PS	1 – 2'	Jun-Aug
<i>Arabis sp.</i> ^b	Rockcress	L-H	S	< 1'	May-Jun
<i>Armeria maritima</i>	Sea thrift	L-H	S/PS	.5'	Apr-Jun
<i>Artemisia arborescens</i>	Silver Sage	L	S	2' – 3'	n/a
<i>Artemisia schmidtiana</i>	Silver Mound Sage	L	S	6" – 12"	n/a
<i>Artemisia virides</i> 'Tiny Green'	Tiny Green Sage	L	S	6" – 12"	n/a
<i>Aster alpinus</i>	Alpine Aster	L-M	S	6" – 12"	Aug-Sep
<i>Aster x dumosus</i>	Woods Aster	L-M	S	6" – 12"	Aug-Sep
<i>Aster porteri</i> ^a	Porter aster	L-M	S	1'	Aug-Sep
<i>Aurinia sp.</i> ^b	Basket of gold	M	S/PS	1'	Apr-May
<i>Calochortus gunnisonii</i> ^a	Mariposa lily	M-H	S	.5 – 2'	Jul-Aug
<i>Campanula</i> 'Birch Hybrid'	Serbian Bellflower	M	S/PS	6" – 12"	May-Oct
<i>Campanula carpatia</i>	Tussock	M-H	S/PS	6" – 12"	May-Oct
	Bellflower				
<i>Campanula garganica</i>	Adriatic Bellflower	M	S/PS	6" – 12"	May-Oct
<i>Campanula glomerata</i>	Clustered Bellflower	M-H	S/PS	1' – 2'	May-Oct
<i>Centranthus ruber</i>	Jupiters beard	L-H	S/Sh	2 – 2.5'	May-Oct
<i>Cerastium strictum</i> ^{ab}	Mouse ear chickweed	M	S/PS	1'	May-Jun
<i>Cerastium tomentosum</i> ^b	Snow-in-summer	L-M	S/PS	1'	May-Jun
<i>Claytonia lanceolata</i> ^a	Spring beauty	M	Sh	.5 – 1.5'	Mar-Apr

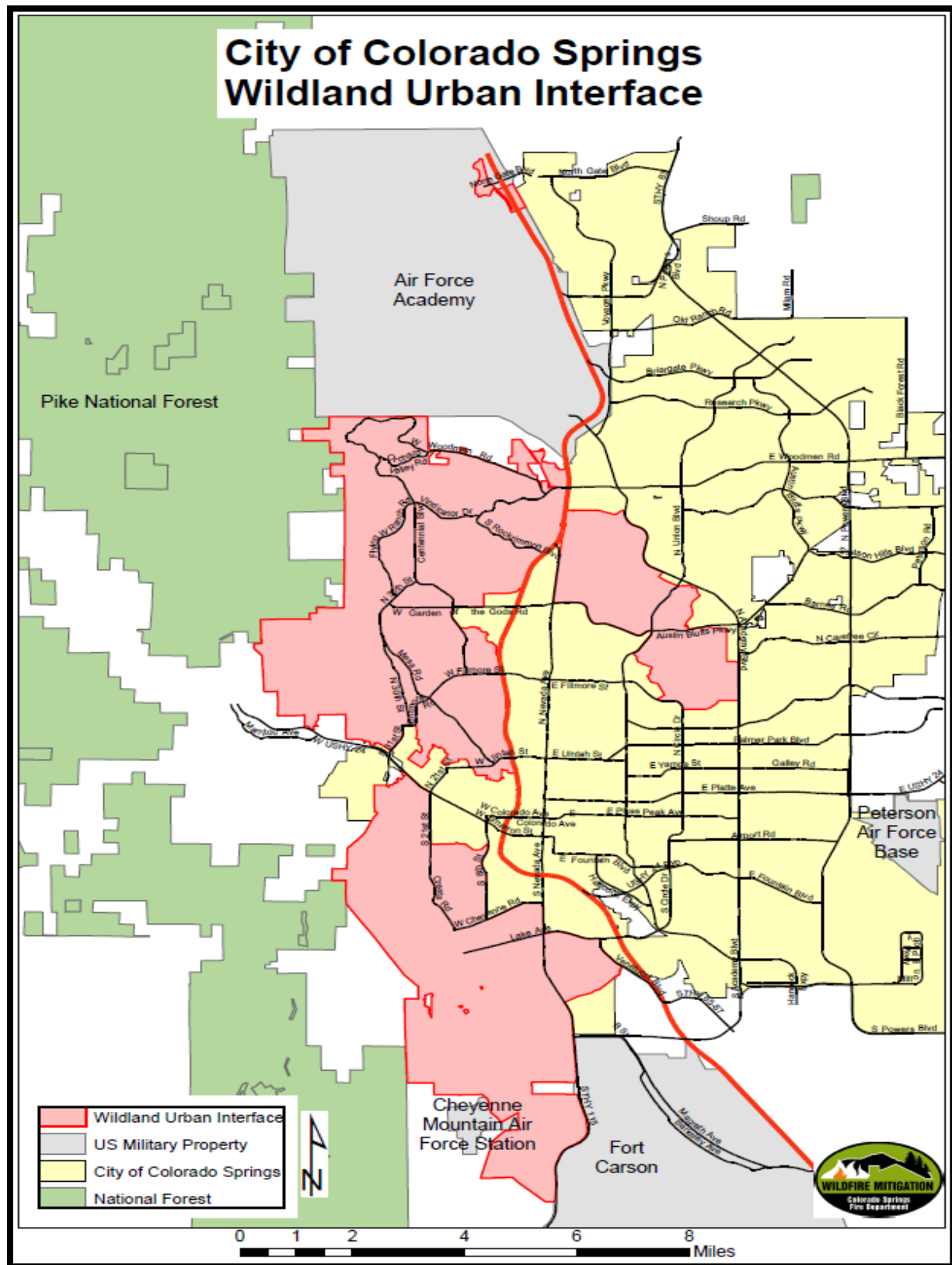
<i>Convallaria majalis</i> ^{bc}	Lily-of-the-valley	H	Sh	< 1'	May-Jun
<i>Delosperma nubigenum</i> ^b	Hardy yellow iceplant	M-H	S	.5'	Jun
<i>Delphinium spp.</i> ^c	Delphinium	M-H	S/PS	.5 – 3'+	Jun-Jul
<i>Dianthus spp.</i>	Pinks	L-H	S	<.5' – 2'	May-Aug
<i>Doronicum sp.</i>	Leopards bane	H	S/PS	2 – 3'	Jul-Aug
<i>Echinacea purpurea</i>	Purple coneflower	M	S	2 – 3'	Jul-Aug
<i>Erysimum asperum</i> ^a	Western wallflower	M	S/PS	1'+	Jun-Jul
<i>Gaillardia aristata</i> ^a	Blanket flower	L-M	S	1 – 1.5'	Jul-Sep
<i>Galium boreale</i> ^{ab}	Northern bedstraw	M-H	Sh	<1'	May-Jun
<i>Geranium spp.</i>	Hardy geraniums	M	Sh/PS	2'	May-Oct
<i>Geranium caespitosum</i> ^a	Wild geranium	M	Sh/PS	2'	May-Oct
<i>Geum triflorum</i>	Prairie smoke	M-H	S/PS	1.5'	Jun
<i>Helianthella quinquenervis</i>	Aspen sunflower	M	S	1'	Jul-Sep
<i>Helianthemum nummularium</i>	Rockrose	M-H	S	< 1'	May-Jun
<i>Heuchera spp.</i>	Coral bells	M-H	PS/Sh	1 – 2'	Jun-Aug
<i>Ipomopsis aggregata</i> ^a	Scarlet gilia	M	S/PS	1 – 2'	Jun-Aug
<i>Iris germanica</i>	Bearded iris	L-M	S	1 – 3'	May-Jun
<i>Iris sibirica</i>	Siberian iris	M-H	S	2' – 3'	May-Jun
<i>Lamium sp.</i> ^b	Dead nettle	M-H	Sh	< 1'	May-Jun
<i>Lavandula spp.</i>	Lavender	L-M	S	1 – 2'	Jun-Nov
<i>Liatri spicata</i>	Prairie gayfeather	L	S/PS	2' – 3'	Jun-Oct
<i>Linum perenne</i>	Perennial Flax	L	S/PS	1' – 2'	May-Sep
<i>Monarda didyma</i>	Bee Balm	M-H	S/PS	1 – 3'	Jul-Oct
<i>Monardella macrantha</i> 'Marian Sampson'	Hummingbird Trumpet Mint	M	S/PS	< 1'	Jul-Oct
<i>Oenothera</i>	Silver Blades Primrose	L-M	S	< 1'	Jun-Aug
<i>Oenothera missouriensis</i>	Ozark Sundrop Primrose	L	S/PS	< 1'	Jun-Aug
<i>Papaver alpinum</i>	Alpine Poppy	L-M	S/PS	< 1'	May-Jun
<i>Papaver nudicaule</i>	Iceland Poppy	M	S/PS	1 – 2'	May-Jun
<i>Papaver orientale</i>	Oriental poppy	H	S/Sh	2 – 3'	May-Jun
<i>Penstemon barbatus</i>	Beardlip Penstemon	L-M	S/PS	1 – 3'	May-Sep
<i>Penstemon digitalis</i> 'Husker Red'	Husker Red Penstemon	L-M	S	2 – 3'	May-Jun
<i>Penstemon x mexicali</i>	Mexicali Penstemon	L-M	S	1 – 2'	Jun-Oct
<i>Penstemon pinifolius</i>	Pineleaf Penstemon	L	S	< 1'	May-Jul
<i>Penstemon rostriflorus</i> 'Bridges'	Bridges Penstemon	L	S	2 – 3'	Jun-Oct
<i>Phlox paniculata</i>	Tall Garden Phlox	M	S	1 – 3'	Jun-Sep
<i>Phlox subulata</i>	Moss phlox	M	S	< .5'	May
<i>Polemonium sp.</i>	Jacobs ladder	H	S/PS	1 – 2'	May-Aug
<i>Potentilla neumanniana</i>	Alpine Potentilla	L	S	< 1'	May-Jun

<i>Potentilla x tonguei</i>	Trailing Potentilla	L	S	< .5'	May-Jun
<i>Pulsatilla patens</i> ^a	Pasque flower	M	S/PS	1'	Mar-May
<i>Ratibida columnifera</i> ^a	Prairie coneflower	L-M	S	2'	Jul-Sep
<i>Rudbeckia hirta</i> ^a	Black-eyed Susan	M-H	S	2 – 3'	Jul-Sep
<i>Scutellaria resinosa</i>	Prairie Skullcap	L	S	< 1'	May-Aug
<i>Scutellaria scordifolia</i>	Skullcap	L	S	1 – 2'	May-Jul
<i>Sedum spp.</i> ^b	Stonecrop	M	S/PS	1 – 1.5'	Jul-Aug
<i>Sedum lanceolatum</i> ^a	Yellow stonecrop	M	S/PS	.5'	Jul-Aug
<i>Sempervivum sp.</i>	Hens and chicks	L-M	S/PS	.5'	n/a
<i>Solidago canadensis</i>	Goldenrod	L	S	1 – 2'	Jul-Oct
<i>Thalictrum fendleri</i> ^a	Fendler meadowrue	H	S/PS	2 – 3'	Jul-Aug
<i>Thermopsis divaricarpa</i> ^a	Spreading golden banner	M-H	S/PS	2'	May
<i>Tradescantia occidentalis</i> ^a	Western spiderwort	M	S/PS	1.5'	Jun-Aug
<i>Thymus spp.</i> ^b	Thyme	L-M	S	< .5'	Jun-Jul
<i>Veronica liwanensis</i>	Turkish Speedwell	L-M	S/PS	< .5'	May-Jul
<i>Veronica 'P018S'</i>	Snowmass Blue-Eyed Speedwell	L-M	S/PS	< .5'	May-Jul
<i>Veronica pectinata</i>	Woolly Speedwell	L-M	S	< .5'	Apr-Jul
<i>Veronica 'Reavis'</i>	Crystal River Speedwell	L-M	S/PS	< .5'	May-Jul
<i>Veronica Spicata</i>	Spike Speedwell	M	S/PS	1 – 2'	Jun-Sep
<i>Vinca minor</i> ^b	Periwinkle, myrtle	H	Sh	< 1'	Apr-Jun
<i>Waldsteinia sp.</i> ^b	Barren strawberry	M-H	Sh/PS	< 1'	May-Jun
Shrubs					
<i>Arctostaphylos nevadensis</i> ^{ab}	Pinemat manzanita	M	S/PS	1 – 2'	n/a
<i>Arctostaphylos patula</i> ^a	Greenleaf manzanita	M	S/PS	3 – 4'	n/a
<i>Arctostaphylos uva-ursi</i> ^{ab}	Kinnikinnick, bearberry	M	S/Sh	1'	n/a
<i>Betula glanulosa</i> ^a	Bog birch	H	S/PS	6 – 8'	n/a
<i>Ceanothus fendleri</i> ^a	Buckbrush, mountain lilac	M	S	2'	Jul
<i>Cercocarpus intricatus</i>	Little-leaf mountain mahogany	VL-L	S	4 – 6'	n/a
<i>Cercocarpus ledifolius</i>	Curl-Leaf Mountain Mahogany	L-M	S	10 – 20'	n/a
<i>Cercocarpus montanus</i> ^{ac}	True mountain mahogany	L-M	S	4 – 6'	n/a
<i>Chrysothamnus spp.</i> ^a	Rabbitbrush	VL-L	S	2 – 6'	Jul-Aug
<i>Cornus alba</i>	Tatarian Dogwood	M-H	S/PS	4 – 10'	n/a
<i>Cornus sericea</i>	Red Osier Dogwood	M-H	S/PS	4 – 10'	n/a
<i>Cornus stolonifera</i> ^a	Redtwig dogwood	M-H	S/PS	4 – 6'	n/a
<i>Cotoneaster apiculatus</i>	Cranberry Cotoneaster	L-M	S/PS	2 – 3'	May-Jun
<i>Cotoneaster horizontalis</i>	Spreading cotoneaster	M	S/PS	2 – 3'	May-Jun
<i>Cotoneaster lucidus</i>	Hedge Cotoneaster	L-M	S/PS	6 – 8'	May-Jun

<i>Daphne burkwoodii</i>	Burkwood daphne	M	S/PS	2 – 3'	Apr-Jun
<i>Erica sp.</i>	Heath	H	S/PS	1'	Jan-Mar
<i>Euonymus alatus</i>	Burning bush euonymus	M	S/Sh	1 – 6'	n/a
<i>Euonymus fortunei</i>	Winter Creeper Euonymus	M	PS/SH	1 – 8'	n/a
<i>Euonymus kiautschovicus</i>	Manhattan Euonymus	M	PS/SH	4 – 6'	n/a
<i>Fallugia paradoxa^a</i>	Apache plume	VL-L	S	2 – 4'	Jun-Oct
<i>Holodiscus dumosus^a</i>	Ocean spray, cliff/rock spirea	L-M	S/PS	4'	Jun
<i>Jamesia americana^a</i>	Wax flower	M-H	S/Sh	2 – 6'	Jun
<i>Lonicera korolkowii</i>	Blue Leaf Honeysuckle	L-M	S/PS	8 – 10'	May-Jun
<i>Lonicera xylosteum</i>	Dwarf Honeysuckle	L-M	S/PS	2 – 4'	May-Jun
<i>Mahonia aquifolium</i>	Oregon grape holly	M-H	S/Sh	4 – 6'	May-Jun
<i>Mahonia repens^{ab}</i>	Creeping grape holly	L-H	S/Sh	1 – 2'	Mar-May
<i>Philadelphus lewisii</i>	Wild Mockorange	L-M	S/PS	6 – 9'	Jun
<i>Philadelphus microphyllus^a</i>	Little-leaf mockorange	M	S	2 – 3'	Jun
<i>Philadelphus virginialis</i>	Virginal Mockorange	M	S	3 – 5'	Jun
<i>Physocarpus monogynus^a</i>	Mountain ninebark	M	S/Sh	2 – 4'	Jun
<i>Physocarpus opulifolius</i>	Common Ninebark	L-M	S/PS	3 – 10'	Jun
<i>Potentilla fruticosa^a</i>	Shrubby cinquefoil	M	S/PS	2 – 3'	May-Sep
<i>Prunus besseyi^a</i>	Western sand cherry	L-M	S	1 – 3'	May
<i>Purshia tridentata^a</i>	Antelope bitterbrush	L-M	S	1 – 2'	Jun-Aug
<i>Ribes alpinum</i>	Alpine Currant	L-M	S/PS	3 – 5'	Apr-May
<i>Ribes aureum^a</i>	Golden currant	M	S/PS	2 – 3'	Apr-May
<i>Ribes x gordonianum</i>	Gordon's Currant	L	S/PS	5 – 6'	Apr-May
<i>Ribes odoratum</i>	Golden Currant	L	S/PS	5 – 6'	Apr-May
<i>Rosa woodsii^a</i>	Woods' or native wild rose	M	S/PS	2 – 3'	Jun-Jul
<i>Symphoricarpos spp.^d</i>	Snowberry, coralberry	M	S/PS	2 – 3'	n/a
<i>Yucca baccata^a</i>	Banana or broad-leaf yucca	VL-L	S/PS	2 – 3'	Jun
<i>Yucca filamentosa</i>	Adams needle	M	S/PS	2 – 3'	Jun
<i>Yucca glauca^a</i>	Spanish bayonet, small soapweed, Great Plains yucca	VL-L	S/PS	2 – 3'	Jun
Large Shrubs and Trees					
<i>Acer ginnala</i>	Ginnala maple	M-H	S	6 – 10'	n/a
<i>Acer glabrum^a</i>	Rocky Mountain maple	M-H	S/Sh	6 – 10'	n/a
<i>Acer grandidentatum^a</i>	Wasatch maple	M	S/PS	10 – 20'	n/a
<i>Alnus tenuifolia^a</i>	Thinleaf alder	H	S/PS	6 – 8'	Apr
<i>Amelanchier alnifolia^{ac}</i>	Saskatoon alder-leaf serviceberry	M	S/PS	6 – 8'	Apr-May
<i>Amelanchier canadensis</i>	Shadblow Serviceberry	L	S/PS	6 – 20'	Apr-May
<i>Amelanchier x grandiflora</i>	Apple Serviceberry	L-M	S/PS	15 – 25'	Apr-May

<i>Amelanchier utahensis</i> ^a	Utah serviceberry	VL-M	S	4 – 6'	May
<i>Betula fontinalis</i>	River birch	H	S/PS	6 – 8'	n/a
<i>Betula occidentalis</i>				15 – 20'	
<i>Cercocarpus ledifolius</i> ^a	Mountain mahogany	VL-L	S	6 – 15'	n/a
<i>Cercocarpus ledifolius</i>	Curl-Leaf Mountain Mahogany	L-M	S	10 – 20'	n/a
<i>Corylus columa</i>	Turkish Hazel or Turkish Filbert	L-M	S/PS	30 – 40'	n/a
<i>Crataegus spp.</i> ^a	Hawthorn (several native)	M	S	6 – 8'	May
<i>Fraxinus pennsylvanica</i>	Green ash	M-H	S	20 – 25'	n/a
<i>Gleditsia triacanthos</i>	Honeylocust	M-H	S	60 – 70'	May
<i>Malus sp.</i>	Crabapple	M	S	10 – 15'	Apr-May
<i>Physocarpus opulifolius</i> ^a	Tall ninebark	M	S/PS	4 – 6'	May
<i>Populus tremuloides</i> ^a	Aspen	M	S	8 – 25'	n/a
<i>Prunus americana</i> ^a	American wild plum	M	S/PS	4 – 6'	Apr
<i>Prunus cerasifera</i>	Flowering plum	M	S/PS	8 – 10'	Apr
<i>Prunus pennsylvanica</i> ^a	Pin/fire/wild/red cherry	M	S/PS	6 – 8'	May
<i>Rubus deliciosus</i> ^a	Boulder raspberry, thimbleberry	M	S/Sh	4 – 6'	Apr-May
<i>Salix amygdaloides</i> ^a	Peachleaf willow	H	S/PS	20 – 30'	n/a
<i>Shepherdia argentea</i> ^a	Silver buffaloberry	M	S/PS	4 – 6'	Apr
<i>Sorbus aucuparia</i>	European Mountain Ash	L-M	S/PS	20 – 30'	May
<i>Sorbus x hybrida</i>	Oakleaf Mountain Ash	L-M	S/PS	25 – 30'	May
<i>Sorbus scopulina</i> ^a	Western mountain ash	M-H	S/Sh	6 – 8'	May
<i>Syringa vulgaris</i>	Common lilac	M	S	6 – 8'	May
^a Native species.					
^b Ground cover plant.					
^c This species, or some species in this genus, may be poisonous to livestock, pets, wildlife and/or people under some conditions. Before planting, check with Colorado State University Extension, Colorado State Forest Service, or other knowledgeable personnel.					
^d Several species of symphoricarpos are native.					

Annex C – City of Colorado Springs Wildland Urban Interface Map



Annex D – Ordinance No. 18-50, Appendix K

Website - https://coloradosprings.gov/sites/default/files/inline-images/signed_ordinance_18-50.pdf

ORDINANCE NO. 18-50

AN ORDINANCE REPEALING AND REORDAINING PART 1 (FIRE PREVENTION CODE) OF ARTICLE 4 (FIRE PREVENTION) OF CHAPTER 8 (PUBLIC SAFETY) OF THE CODE OF THE CITY OF COLORADO SPRINGS 2001, AS AMENDED, ADOPTING THE 2015 EDITION OF THE INTERNATIONAL FIRE CODE WITH AMENDMENTS AND PROVIDING PENALTIES FOR THE VIOLATION THEREOF

WHEREAS, the City Council is committed to providing for the protection of the public health and safety; regulating the storage, use and handling of dangerous and hazardous materials, substances and devices; the operation, installation, construction, location, safeguarding and maintenance of adequate means of egress not provided for by other codes in the City of Colorado Springs, Colorado, and

WHEREAS, the Division of the Fire Prevention has been established providing officers therefore for the purpose of providing for the prevention and control of fires; the purpose of providing an International Fire Code describing regulations governing conditions hazardous to life and property from fire or explosion; and their powers and duties defined and providing for an International Fire Code, International Fire Code Appendices; adopting by reference the 2015 Edition of the International Fire Code, International Fire Code appendices, as amended; repealing all ordinances in conflict thereof,

NOW BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF COLORADO SPRINGS:

Section 1. Part 1 (Fire Prevention Code) of Article 4 (Fire Prevention) of Chapter 8 (Public Safety) of the Code of the City of Colorado Springs 2001, as amended, is repealed and reordained to read as follows:

8.4.101: SHORT TITLE:

This part may be known and cited as the *Fire Prevention Code and Standards*.

8.4.102: ADOPTION OF THE FIRE CODE, PREFACE AND APPENDICES AND FIRE CODE STANDARDS TO THE 2015 EDITION OF THE INTERNATIONAL FIRE CODE AND INTERNATIONAL FIRE CODE STANDARDS:

Pursuant to Part 2 of Article 16 of Title 31, Colorado Revised Statutes and pursuant to the Charter of the City there is hereby adopted by reference the International Fire Code, 2015 Edition of the International Code Council, 4051 West Flossmoor Road, Country Club

Hills, IL, 60478-5795, including all Appendices A, B, C, D, E, F, G, K, L, and N as set forth therein. These appendices are deemed included as a part of any reference to the International Fire Code or this Chapter. One copy of the 2015 International Fire Code, and one copy of all Amendments to these codes, are on file in the Office of the City Clerk, and may be inspected during regular business hours. The above code is adopted as if set out at length, subject to modifications, additions or deletions as set forth in Section 8.4.105 of this part.

8.4.103: APPLICATION AND INTERPRETATION OF PROVISIONS:

A. Application: The International Fire Code and the International Fire Code Standards hereby adopted shall apply to every building, structure or asset, either within or outside the corporate limits of the City, the use of which the City has jurisdiction and authority to regulate.

B. Interpretation: This part shall be so interpreted and construed as to effectuate its general purpose to make uniform the local fire regulations contained herein. Article and section headings of this part and of the adopted International Fire Code shall not be deemed to govern, limit, modify, or in any manner affect the scope, meaning or extent of the provisions of any article or section thereof.

8.4.104: DEFINITIONS:

A. Wherever the word jurisdiction is used in the International Fire Code, it shall be held to mean the City of Colorado Springs.

B. Wherever the term corporation counsel is used in the International Fire Code, it shall be held to mean the City Attorney/Chief Legal Officer.

C. Wherever the term Department of Fire Prevention is used in the International Fire Code, it shall be held to mean Division of the Fire Marshal.

8.4.105: AMENDMENTS TO THE INTERNATIONAL FIRE CODE:

The International Fire Code and Appendices herein adopted, are adopted subject to the following modifications, additions or deletions as set forth:

Table of Contents. Amend the Table of Contents to add the following:

Chapter 38 Alcohol Beverage Production Facilities

3801 General
3802 Definitions
3803 General Requirements
3804 Equipment
3805 Existing Facilities

Chapter 39 Extraction and Grow Operations

3901 General

3. The fire code official is authorized to modify the requirement of two separate and approved fire apparatus access roads, when they are not possible due to location on property, topography, water ways, non-negotiable grades or similar.

Appendix E. Delete the subtitle of **Appendix E**.

Appendix F. Delete the subtitle of **Appendix F**.

Appendix G. Delete the subtitle of **Appendix G**.

Appendix K. Delete Appendix K and replace with the following:

APPENDIX K WILDLAND FUELS MANAGEMENT REQUIREMENTS

SECTION K101 GENERAL

K101.1 Scope. Wildfire Risk Mitigation: Wildfire risk reduction techniques shall include monitored smoke alarm systems, sprinkler systems, fire resistant roofing materials which are class A (excluding solid wood roofing products) for all residential occupancies, a minimum class B on all other occupancies, fire resistive construction materials, and fuels management measures. Within the wildland urban interface, fuels management measures shall be utilized within the safety zone of applicable new building construction. Fuels management is defined as the modification of the natural vegetation within the safety zone. Fuels management requirements, as set forth below, are intended to protect structures from wildfire as well as to reduce fire from spreading to the wildland. The safety zone is defined as the area within thirty feet (30') of the main structure or significant accessory structures, not to extend beyond the property line. As it is the City's desire to provide an environment safe from wildfire while maintaining the aesthetic qualities of the native hillside, the following wildfire risk reduction standards shall be required for all new building construction or reconstruction in the wildland urban interface, regardless of development plan approval date or initial construction plan approval, and in accordance with Section 7.3.504 of the Code of the City of Colorado Springs.

K101.2 Development plans and subdivision plats. All development plans and subdivision plats within the wildland urban interface approved on or after April 1, 1993, and wildland urban interface site plan/lot grading plans shall contain the following disclosure statements:

Residing in or near wildland urban interface or intermix areas involves increased wildfire risks that may not apply in urban or more urbanized types of developed communities.

All development plans and subdivision plats within the wildland urban interface approved on or after April 1, 1993, and wildland urban interface site plan/lot grading plans shall contain the following statement:

All lots within this development are subject to fuels management requirements. It is the responsibility of the builder to implement the fuels management procedures as defined in Chapter 8 of the City Code for each lot. Approval inspection must be obtained from the Fire Department prior to Final inspection by the Building Department and/or allowing occupancy of the residence. The initial fuels management inspection must be requested from the Fire Department prior to framing inspection with subsequent approval obtained prior to building final.

SECTION K102 FUELS MANAGEMENT REQUIREMENTS

K102.1 Fuels Management. All lots with homes constructed or reconstructed after the adoption of the ordinance, within the wildland urban interface, regardless of development plan approval date, shall be subject to the following fuels management requirements:

K102.1.1 Safety zone. Brush patches or clusters may be left in the safety zone, but shall be separated by clear areas of at least ten feet (10') or more of noncombustible materials and/or grass mowed to not more than four inches (4") in height.

K102.1.2 Clearance to main structure. No hazardous brush or trees (i.e. junipers and conifers) shall be allowed within fifteen feet (15') of the main structure or significant accessory structure. Conifers or other similarly combustible plants shall not be planted under soffit vents.

Exception: When approved by the fire code official, small brush patches or trees, not exceeding one hundred (100) square feet in size and no more than fifteen (15) linear feet in any direction, may be allowed to encroach into this zone. Vegetation must be maintained in accordance with the applicable Colorado Springs Community Wildfire Protection Plan. Plants with fire resistant characteristics found on the Colorado State Forest Service list of Firewise Plants are allowed within 15' of the main structure or significant accessory structure.

K102.1.3 Pruning of dead limbs. Large trees shall not be allowed to have limbs overlap another tree and shall be pruned of dead limbs to a height of up to ten feet (10') above the ground. Tree clusters may be allowed if sufficient clear area is provided and approved.

K102.1.4 Clearance of tree branches to structures or appurtenances. Tree branches shall not extend over or under the roof or eaves, and shall not be within fifteen feet (15') of a deck or similar combustible projection, wood burning appliance or chimney.

SECTION K103 ROOF COVERINGS

K103.1 Fire Resistive Roofing Materials. After January 1, 2003, a class A roof covering (excluding solid wood roofing products) shall be installed on all residential occupancies and a minimum class B roof covering shall be installed on all remaining occupancies (not to replace Class A where already required by the Building Code) at the time a permitted roofing or reroofing application is done within the limits of the City of Colorado Springs, Colorado, unless specifically approved by the fire code official.

SECTION K104 HARDENED STRUCTURE

Section K104.1 Structure Protection. The following requirements shall be enforced for all homes constructed or reconstructed, after the adoption of this ordinance, within the wildland urban interface for ignition-resistant construction and fuels management:

1. A Class A roof covering (excluding solid wood materials) shall be installed on all Residential Occupancies and a minimum Class B roof covering shall be installed on remaining occupancies, unless otherwise permitted.
2. Exterior cladding, eaves and soffits shall be constructed of ignition-resistant materials approved by the fire code official. Approved materials include, but are not limited to: fiber-cement board, stucco, masonry/brick, manufactured stone, and similar materials. Natural wood/cedar siding, hardboard, vinyl, and similar combustible materials are not allowed.

Exception: Natural wood or plastic products used for fascia, trim board materials and trim accents, such as corbels, false rafter tails, faux trusses, shutters and decorative vents material are allowed when painted or as approved.

3. For any portion of the attached structure with projections or overhangs, the area below the structure shall have all horizontal under-floor areas enclosed with ignition resistive materials such as those allowed in item 2 above.

Exception: Heavy timber or dimensional log construction is allowed.

4. Exterior doors shall be noncombustible or solid core not less than 1 3/4-inches thick. Windows within doors and glazed doors shall be tempered safety glass or multi-layered glazed panels.

Exception: Decorative single pane glazing in front entry doors is allowed.

5. Exterior windows shall be a minimum double pane. Tempered panes are preferable but not required.
6. All attic vents shall be screened with wire mesh or hardware cloth having openings no larger than 1/8-inch unless an alternative design or product is

allowed by the fire code official. Soffit vents are allowed. Gable vents may be allowed but only as approved by the fire code official.

7. Gutters and downspouts that are of non-combustible construction shall be installed such that the leading edge of the roof is finished with a metal drip edge so that no wood sheathing is exposed. The drip edge shall extend into the gutter. Vinyl gutters may be allowed, but must have a non-combustible landing area below the roof line, that is a minimum 5 foot distance from the side of the structure or foundation. NOTE: gutter caps are highly encouraged as a homeowner maintenance item to prevent combustible debris from collecting in the trough.
8. Decks and other habitable spaces shall be of ignition resistant or non-combustible decking materials, such as composite or metal decking. Wood is not permitted to be used for the decking surface, but can be used for all large structural components and railings.
9. 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 1/8-inch to protect them from ember intrusion and still allow for weeping and moisture control.
10. Chimneys serving fireplaces, as well as other heating appliances in which solid or liquid fuels are used, shall have an approved spark arrestor or cap.

Section K104.2 Alternative Materials. Alternative materials or construction methods not specifically addressed in section K104.1 may be considered on a case-by-case basis if found to have comparable ignition-resistant properties and as approved by the fire code official.

SECTION K105 REVIEW REQUIREMENTS

Section K105.1 Construction Permit Review Requirements. All requirements must be reviewed and approved by the fire code official prior to permit issuance and prior to final inspection. As part of the permit review process, the Colorado Springs Wildfire Mitigation Section will attach an assessment of wildfire hazard potential including a fire behavior index for the project as well as specific recommended wildfire mitigation measures. A final fire department inspection to verify compliance will be required prior to issuance of the Certificate of Occupancy.

SECTION K201 FIRE PROTECTION SYSTEMS

K201.1 Scope. Fire protection system requirements for wildland urban interface homes shall only apply to the conditions listed below as specifically addressed within Section 7.3.504.E.4 of the Code of the City of Colorado Springs.

K201.2 Fire Protection Systems. Homes upon lots within the wildland urban interface illustrated on development plans approved on or after April 1, 1993, shall be required to install a monitored fire alarm system or a fire sprinkler system when the lot lies beyond one thousand feet (1,000') along a cul-de-sac or lies beyond roadways with grades in excess of ten percent (10%) if roadways are the primary vehicular points of access to the home. Additionally, development plans which contain streets or lots which meet this criteria shall contain the following statement:

A monitored fire alarm system or a fire sprinkler system is required for residences built upon the following lot(s): The fire code official shall review all building plans, determine system requirements, and issue appropriate permits. A visual piping inspection must be secured through the fire code official prior to requesting the framing inspection. Final inspection and approval of the system must be secured through the fire code official prior to final inspection by the Building Department and/or occupancy of the residence.

Appendix L. Delete Appendix L in its entirety and replace with the following:

SECTION L101 GENERAL

L101.1 Scope. The design, installation and maintenance of fire fighter air replenishment systems (FARS) shall be in accordance with this section.

L101.2 Required installations. A fire fighter air replenishment system shall be installed in the following buildings:

1. Buildings classified as high-rise in accordance with the International Building Code.
2. Underground structures that are two or more floors below grade with an area greater than 10,000 square feet (929 m²).

SECTION L102 DEFINITIONS

L102.1 Definitions. For the purpose of this appendix, certain terms are defined as follows:

FIRE FIGHTER AIR REPLENISHMENT SYSTEM (FARS). A permanently installed arrangement of piping, valves, fittings and equipment to facilitate the replenishment of breathing air in self-contained breathing apparatus (SCBA) for fire fighters engaged in emergency operations.

SECTION L103 PERMITS

L103.1 Permits. Permits shall be required to install and maintain a FARS. Permits shall be in accordance with Section L103.2 and L103.3.


Introduced, read, passed on first reading and ordered published this 8th day of May, 2018.

Finally passed: May 22nd, 2018


Council President

Mayor's Action:

- ☒ Approved on May 24, 2018,
☐ Disapproved on _____, based on the following objections:



Mayor


Council Action After Disapproval:

- ☐ Council did not act to override the Mayor's veto.
☐ Finally adopted on a vote of _____, on _____.
☐ Council action on _____ failed to override the Mayor's veto.

Council President

ATTEST:


Sarah B. Johnson, City Clerk



I HEREBY CERTIFY, that the foregoing ordinance entitled "AN ORDINANCE REPEALING AND REORDAINING PART 1 (FIRE PREVENTION CODE) OF ARTICLE 4 (FIRE PREVENTION) OF CHAPTER 8 (PUBLIC SAFETY) OF THE CODE OF THE CITY OF COLORADO SPRINGS 2001, AS AMENDED, ADOPTING THE 2015 EDITION OF THE INTERNATIONAL FIRE CODE WITH AMENDMENTS AND PROVIDING PENALTIES FOR THE VIOLATION THEREOF" was introduced and read at a regular meeting of the City Council of the City of Colorado Springs, held on May 8th, 2018; that said ordinance was finally passed at a regular meeting of the City Council of said City, held on the 22nd day of May, 2018, and that the same was published by title and summary, in accordance with Section 3-80 of Article III of the Charter, in the Transcript, a newspaper published and in general circulation in said City, at least ten days before its passage.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the City, this 24th day of May, 2018.


Sarah B. Johnson, City Clerk



1st Publication Date: May 11th, 2018

2nd Publication Date: May 30th, 2018

Effective Date: June 4th, 2018

Initial: 
City Clerk

Referenced Documents

- International Code Council (ICC)
 - International Residential Code, 2015 Edition
 - International Wildland-Urban Interface Code, 2018 Edition
 - International Mechanical Code, 2015 Edition
 - International Building Code, 2015 Edition
- NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471
 - NFPA 1144, 2018 Edition – Reducing Structure Ignition Hazards from Wildland Fire
- Insurance Institute for Business & Home Safety
 - Wildfire Home Assessment & Checklist
- Protect Your Property from Wildfire – Rocky Mountain Edition
- Lessons Learned from Waldo Canyon – Fire Adapted Communities, Mitigation Assessment Team Findings
- California Office of the State Fire Marshal
 - Website: <https://osfm.fire.ca.gov/divisions/fire-engineering-and-investigations/building-materials-listing/bml-search-building-materials-listing/>
- Colorado State University
 - FireWise Plant Materials, Fact Sheet No. 6.305, National Resource Series – Forestry
- City of Colorado Springs Fire Department
 - Waldo Canyon Fire Investigations Summary memo, Nancy Gosch-Schanel, Fire Investigator

Special thanks to the following partners that made this design manual possible

The Colorado Springs Housing and Building Association

The Colorado South Chapter of the American Institute of Architects

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