


**FUEL MODIFICATION PLAN**  
**KELLER CROSSING – TRACT 38163**  
**APN's: 472-110-034, 472-110-002, 472-110-003, 472-110-004,**  
**472-110-007, 472-110-008, 472-110-009, 472-110-033 &**  
**472-110-034**  
**Unincorporated Riverside County, California**  
**5/26/2021 - Revised 4/7/2022**



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*Table of Contents*

<u>Section</u>	<u>Page</u>
<b>1.0 General Description</b>	<b>1</b>
<b>1.1 General Information</b>	<b>2</b>
<b>1.2 Project Overview</b>	<b>2</b>
<b>2.0 Wildland Fire Hazard and Risk Assessment</b>	<b>3</b>
<b>2.1 Weather Review and Assessment</b>	<b>3</b>
<b>2.2 Off-Site Fire Hazard and Risk Assessment</b>	<b>5</b>
<b>2.3 On-Site Fire Hazard and Risk Assessment</b>	<b>8</b>
<b>3.0 Predicting Wildland Fire Behavior</b>	<b>8</b>
<b>3.1 Wildland Fire Behavior Calculations for the Off-site and         On-site Vegetative Fuels</b>	<b>8</b>
<b>4.0 Assessing Structure Ignitions in the Wildland/Urban Interface</b>	<b>11</b>
<b>4.1 Firebrands</b>	<b>11</b>
<b>4.2 Radiant Heat/Direct Flame Impingement</b>	<b>11</b>
<b>4.3 Fire Resistant Plant Palette</b>	<b>12</b>
<b>5.0 Fire Department Response Times</b>	<b>12</b>
<b>6.0 Fuel Modification Zone Descriptions and Recommended Treatments</b>	<b>13</b>
<b>6.1 Fuel Treatment Zone 1A - Lot Owner Maintained</b>	<b>13</b>
<b>6.2 Fuel Treatment Zone 1B – Valley-Wide Recreation &amp; Park District         Maintained</b>	<b>14</b>
<b>6.3 Fuel Treatment Zone 2</b>	<b>15</b>
<b>6.4 Roadside Fuel Treatment</b>	<b>15</b>
<b>6.5 Temporary Roadside Fuel Treatment</b>	<b>16</b>
<b>6.6 No Build Zone</b>	<b>16</b>
<b>6.7 Zone Markers</b>	<b>16</b>
<b>7.0 Construction Requirements</b>	<b>16</b>
<b>7.1 Additional Construction Requirements</b>	<b>17</b>
<b>8.0 Infrastructure</b>	<b>18</b>
<b>8.1 Water Supply</b>	<b>18</b>
<b>8.2 Access Roads/Driveways and Gates</b>	<b>18</b>
<b>9.0 Homeowner Education</b>	<b>19</b>
<b>10.0 Fuel Modification Map</b>	<b>20</b>

## **APPENDICES**

**Prohibited Plant List**

**APPENDIX 'A'**

**Literature Referenced**

**APPENDIX 'B'**

**Non-combustible & Fire-Resistant Building Materials**

**APPENDIX 'C'**

**Ignition Resistant Construction Requirements**

**APPENDIX 'D'**

**Zone Marker Detail**

**APPENDIX 'E'**

**Non-Combustible Wall Example**

**APPENDIX 'F'**

# FUEL MODIFICATION PLAN

## KELLER CROSSING – TRACT 38163

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472-110-034

Unincorporated Riverside County, California  
5/26/2021 - Revised 4/7/2022

### 1.0 General Description

The proposed project is located northwest of the intersection of Highway 79 and Keller Road in the unincorporated area of Riverside County, California (see Photo #1). The area designated for development is Keller Crossing, which is located within a Very High Fire Hazard Severity Zone. The project consists of 196 acres of undeveloped land broken out as follows: Residential 83.8 acres, Commercial (Retail) 17.6 acres, and Open Space 78.5 Acres and 16 acres for roadways. The fire protection agency is the Riverside County Fire Department (RCFD).



Photo #1: Aerial Photo of the Project. Note the Scattered Development to the East and West.

This Fuel Modification Plan (FMP) assesses the overall (on-site and off-site) wildland fire hazards and risks that may threaten life and property associated with the proposed residential development. In addition, the FMP establishes both short and long-term fuel modification actions to minimize any projected fire hazard and risk and assigns annual maintenance responsibilities for each of the recommended fuel modification actions. The purpose of this FMP is to provide hazardous fuel treatment and construction feature direction for developers, architects, builders, the RCFD, Riverside County and the future individual lot owners to use in making the structures in the proposed project relatively safe from future wildfires. Appendices attached to this FMP, which provide additional information, shall be considered part of this FMP.

This FMP is based upon requirements of the RCFD; California Code of Regulations Title 24, Part 9 and Title 14, Section 1280; 2019 California Fire Code and Local Amendments including Appendices to Chapters 1 & 4 and Appendices B, F & H; Chapter 7A-California Building Code; 2019 California Residential Code (CRC) R337; California Government Code, sections 51175 through 51189; California Public Resources Code Sections 4201 through 4204 and 4291; the California State and Local Responsibility Area Fire Hazard Severity Zone Map; the National Fire Protection Association (NFPA) Standard 13D, and NFPA Standard 1144.

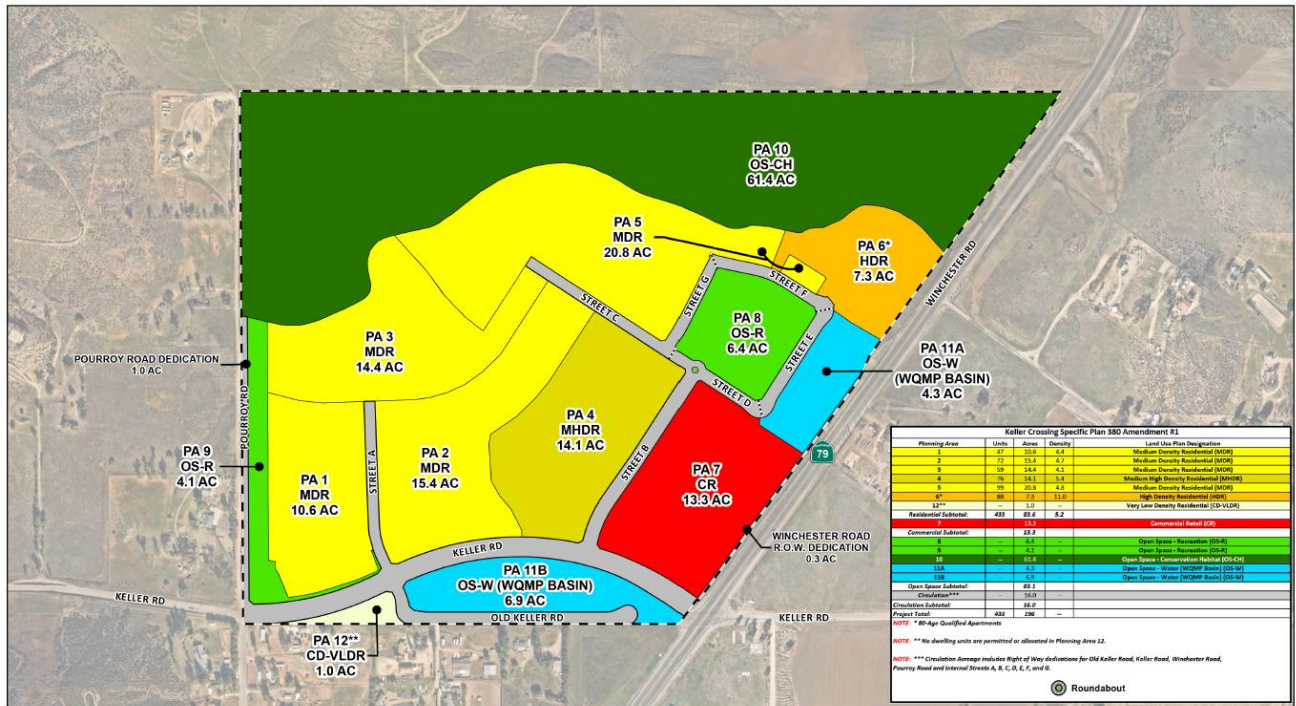
## **1.1 General Information**

Owner:	D.R. Horton 2280 Wardlow Circle, Ste. 100 Corona, CA 92880
Approving Departments: Fire Authority:	Riverside County Fire Department

## **1.2 Project Overview**

The project consists of the building of 432 residential units, 80 of which are planned in a future phase as high-density residential homes. As shown in Illustration #1, a large area of open space will also exist along the entire northern perimeter. This Multi-Species Habitat cannot be touched for the purposes of fuel treatments described in Section 6.0. For structures that have less than 100 feet of fuel treatment, additional fire protection features will be needed to provide an equivalent level of protection. The area shown in red is approximate 18 acres in size and is to be sold as land for future commercial development.

To the projects benefit, a significant roadway, Highway 79, exists along the entire eastern boundary. Keller Road is scheduled to be realigned along the southern boundary and another road, Pourroy Road, currently exists to the west. The realignment of Keller Road will result in the creation of a Water Quality Management Plan Basin between old Keller Road and the new alignment.



**KELLER CROSSING SPECIFIC PLAN SP380 A1**

Date: 03-30-2022  
Job #: 472-067



**Conceptual Land Use Plan**

**Illustration #1 – Keller Crossing Land Use.** Most of the site will be used for residential housing purposes with a significant portion being dedicated Open Space.

**2.0 Wildland Fire Hazard and Risk Assessment**

The following hazard and risk assessment is based upon historical weather data and existing and forecasted vegetation growth.

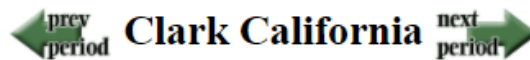
**2.1 Weather Review and Assessment**

Weather has a dramatic influence on wildland fire behavior. The most critical weather pattern to the project area is a hot, dry offshore wind, typically called a Santa Ana. Such wind conditions are usually associated with strong (>50 MPH), hot, dry winds with very low (<15%) relative humidity (See Illustration #2). Santa Ana winds originate over the dry desert land and can occur anytime of the year; however, they generally occur in the late fall (September through November). This is also when non-irrigated vegetation is at its lowest moisture content. Riverside County is one of the areas in southern California that is strongly influenced by powerful Santa Ana winds.

Fire Agencies throughout the western United States rely on a sophisticated system of Remote Automated Weather Stations (RAWS) to monitor weather conditions and aid in the forecasting of fire danger. The closest RAWS to the Keller Crossing project is the Clark RAWS located at Latitude 33° 52' 36" N and Longitude 117° 18' 32" W at an elevation of 1,720 feet. This is approximately 240 feet higher than the project location. Data for all RAWS is archived in the Western Region Climate Center in Reno, Nevada.

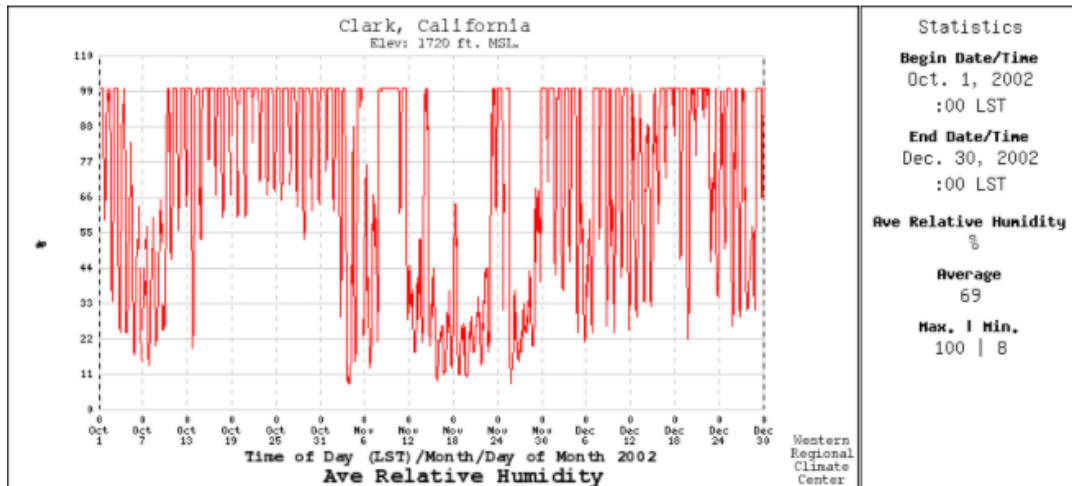
The typical prevailing summer time wind pattern is out of the west/southwest and normally is of a much lower velocity (5-10 MPH with occasional gusts to 20 MPH) and is associated with relative humidity readings ranging between 20% and occasionally more than 50% due to the sites proximity to onshore winds from the ocean.

In addition to Santa Ana winds, there is a historic pattern of wildland fires burning from the southwest to northeast. Every 5-10 years, a “rare event” hot dry, southwest to west wind of 30 MPH will occur. This moderately strong, dry wind condition usually occurs in the late afternoon or early evenings on very hot days, especially during the normal summertime (June through September) months.

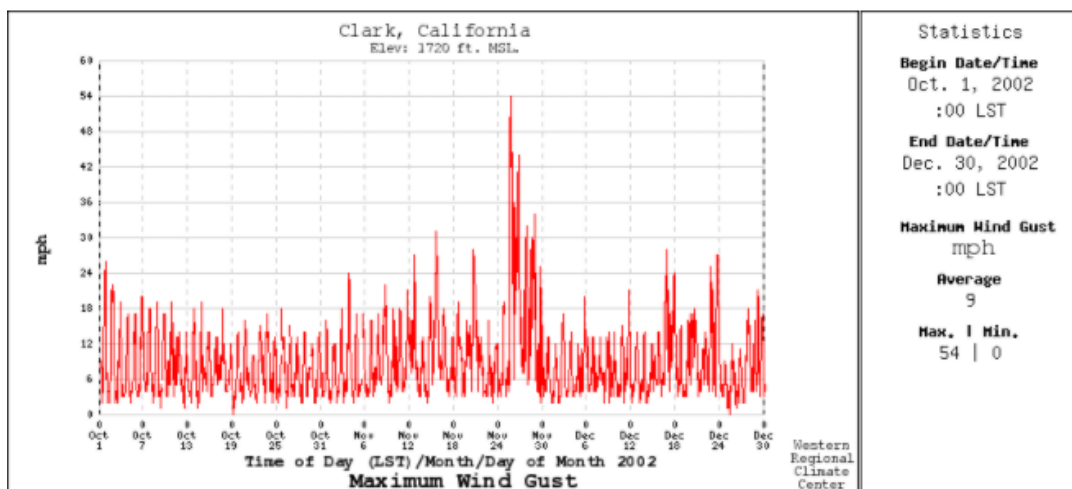


## Clark California

### Ave Relative Humidity



### Maximum Wind Gust

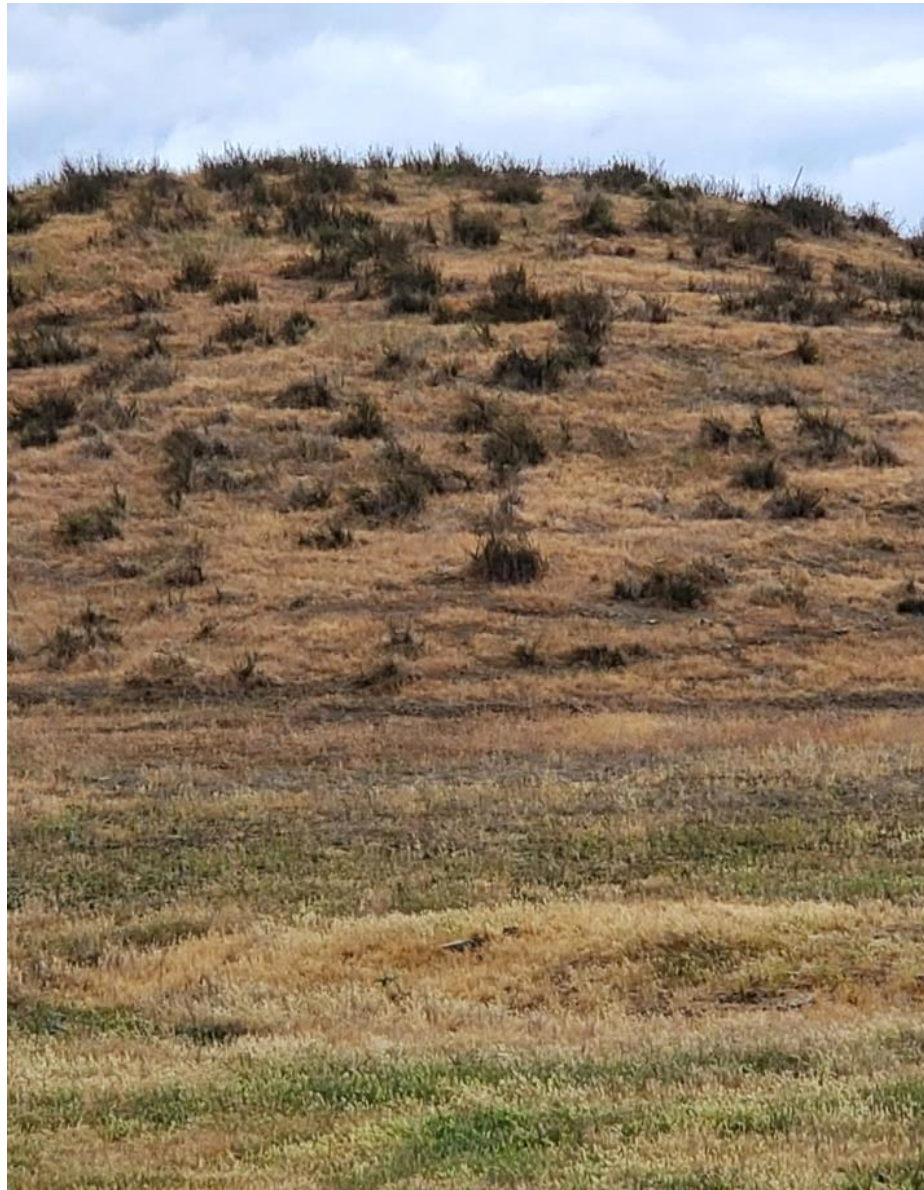


**Illustration #2 – Relative Humidity and Maximum Wind Gust for the Clark RAWs.** Note the 54 MPH Wind Gust on November 26 with Relative Humidity in the Teens.

All other (northwest, southeast and south) wind directions may be occasionally strong and gusty; however, they are generally associated with cooler moist air and have higher relative humidity (>40%). They are considered a serious wildland fire weather condition when wind speeds reach >20-MPH.

## **2.2 Off-Site Fire Hazard and Risk Assessment**

Much of the Keller Crossing project is located on lightly vegetated nearly level terrain. Steeper terrain containing protected open space is located to the north. Additional small areas of open space that are not protected are located along portions of the western and eastern boundary. The last major wildland fire to burn over the area was in 1993 explaining to some degree the lack of a more mature vegetative cover on the hillsides. The past few decades have also had multi-year droughts that further reduce the speed of plant recovery following a wildfire.



**Photo #2 - Looking North Toward the Northern Boundary.** Protected Open Space is Located on the Steeper Terrain. Homes are Planned in the Foreground.



***Northern, Southern, Eastern and Western Boundary Fuels*** – The northern boundary abuts protected open space and habitat along the entire length of the northern boundary. The open space is lightly vegetated without any trees (See Photo #2). The eastern boundary abuts Highway 79, a major 4 lane highway (Photo #4) that is nearly 80 feet in width, shoulder to shoulder. Slopes are nearly level where the homes are to be built and then ranging from 15 - 35 percent in the protected open space (see Photos # 2 – 5). Plant species that grow on the site include both native and exotic grass and weeds, buckwheat, sage, mustard and a few cactuses. The more level parts of the site have been used for agricultural purposes for decades thus the lack of higher order plants and shrubs. The typical fuel model is a combined fuel model of SCAL 18 – Sage/Buckwheat with 1- hour fuels of 5.5 tons/acre and 10- hour fuels of .8 tons/acre and gr2 – Low Load Dry Climate Grass with 1- hour fuels of 0.1 tons/acre and no 10-hour fuels.

In most wind conditions a fire beginning in the open space area north of the project will burn downhill on manufactured slopes towards the homes and or be pushed parallel to the northern subdivision boundary and therefore are a lesser concern than areas where slopes are uphill into the development.



**Photo #3 – Looking North Along the Western Boundary.** Pourroy Road is Gravel for Most of its Length. Homes Are Planned to be Located to the Right of the Telephone Poles.



**Photo #4 – Looking South along the Eastern Boundary and Highway 79. The Development is Located to the Right of the Fence.**



**Photo #5 - Looking East Along Old Keller Road. The Project is Located to the Left of the Roadway. This Portion of Keller Road is Scheduled to be Realigned.**

### **2.3 On-Site Fire Hazard and Risk Assessment**

All the native and exotic vegetation within the project area has been cleared and graded. Therefore, there is no significant wildland fire issues within the development footprint.

The greatest fire concern for the proposed project interior are embers from a fire burning outside the tract or a structure fire within the tract that could land on homes or vegetation within the tract, especially during high winds and periods of low humidity.

### **3.0 Predicting Wildland Fire Behavior**

The BEHAVE Plus 6.0.0 Fire Behavior Prediction and Fuel Modeling System developed by USDA–Forest Service research scientists Patricia L. Andrews and Collin D. Bevens at the Intermountain Forest Fire Laboratory, Missoula, Montana, is one of the best systematic methods for predicting wildland fire behavior. The BEHAVE Plus fire behavior computer modeling system is utilized by wildland fire experts nationwide.

Wildland fire managers use the BEHAVE Plus modeling system to project expected fire intensity, rate-of-spread and flame lengths with a reasonable degree of certainty for use in Fire Protection Planning purposes. *FIREWISE2000, LLC* used the BEHAVE Plus 6.0.0 Fire Behavior Prediction Model to make the fire behavior assessments for the Keller Crossing project discussed below.

#### **3.1 Wildland Fire Behavior Calculations for the Off-site and On-site Hazardous Vegetative Fuels**

Wildland fire behavior calculations have been projected for the hazardous vegetative fuels located adjacent to and bordering the proposed Keller Crossing project. These projections were based on “worst case” Riverside County fire weather assumptions in the vicinity of the project area and from project site observations and fuel moisture levels typically observed during the local fire season. Weather data was obtained from the RAWS (Remote Automatic Weather Station) network stations closest to the project area.

Four (4) scenarios are depicted below in Tables 3.1.1 through 3.1.4, for four (4) separate BEHAVE PLUS Fire Modeling System computer calculations of the wildland and treated fuels. All tables display the expected Rate of Fire Spread (expressed in feet/minute), Flame Length (expressed in feet), and Fireline Intensity (expressed in British Thermal Units/foot/second and include the calculation inputs used in the BEHAVE Plus program. The tables also show the effect of fuel treatment on the Rate of Fire Spread, Flame Length, and Fireline Intensity following the completion of the required fuel treatments.

**Table 3.1.1**  
**Fire Scenario #1 Northern Boundary**  
**Fire Approaching from the North or Northeast**  
**(Late Fire Season With 60 MPH North or Northeast Wind Conditions)**

<p align="center"><b>Fire Behavior Calculation Input Data</b></p> <ul style="list-style-type: none"> <li>• 25 percent slope</li> <li>• 60 mph 20-foot wind speed</li> <li>• 315° slope aspect from north</li> <li>• 45° wind direction from north</li> </ul>	<p align="center"><b>Anticipated Fuel Moistures</b></p> <ul style="list-style-type: none"> <li>* 1-Hour Fine Fuel Moisture of.....2%</li> <li>* 10-Hour Fuel Moisture of.....3%</li> <li>* 100-Hour Fuel Moisture of.....5%</li> <li>* Live Herbaceous Fuel Moisture of.....30%</li> <li>* Live Woody Fuel Moisture of.....50%</li> </ul>
<p><b>Expected Fire Behavior</b>  <b>Combined Fuel Model [gr2 – Low Load, Dry Climate Grass 75% and Fuel Model SCAL18 – Sage/Buckwheat 25%]</b></p>	
<p><b>Rate of Spread - 640 ft/min</b></p>	
<p><b>Fireline Intensity - 23,729 BTU/ft/s</b></p>	
<p><b>Flame Length - 46.3 feet</b></p>	
<p><b>Expected Fire Behavior in Treated Fuels</b>  <b>Combined Fuel Model - [tl6 – Moderate Load Broadleaf Litter 50% and gr1 – Short Sparse Dry Climate Grass 50%]</b></p>	
<p><b>Rate of Spread - 175 ft/min</b></p>	
<p><b>Fireline Intensity - 591 BTU/ft/s</b></p>	
<p><b>Flame Length - 8.5 feet</b></p>	

**Table 3.1.2**  
**Fire Scenario #2 (Eastern Boundary)**  
**Fire Approaching from the East**  
**(Late Fire Season With 60 MPH East Wind Condition)**

<p align="center"><b>Fire Behavior Calculation Input Data</b></p> <ul style="list-style-type: none"> <li>• 30 percent slope</li> <li>• 60 mph 20-foot wind speed</li> <li>• 70° slope aspect from north</li> <li>• 225° wind direction from north</li> </ul>	<p align="center"><b>Anticipated Fuel Moistures</b></p> <ul style="list-style-type: none"> <li>* 1-Hour Fine Fuel Moisture of.....2%</li> <li>* 10-Hour Fuel Moisture of.....3%</li> <li>* 100-Hour Fuel Moisture of.....5%</li> <li>* Live Herbaceous Fuel Moisture of.....30%</li> <li>* Live Woody Fuel Moisture of.....50%</li> </ul>
<p><b>Expected Fire Behavior</b>  <b>Combined Fuel Model [gr2 – Low Load, Dry Climate Grass 80% and Fuel Model SCAL18 – Sage/Buckwheat 20%]</b></p>	
<p><b>Rate of Spread - 662 ft/min</b></p>	
<p><b>Fireline Intensity - 24,074 BTU/ft/s</b></p>	
<p><b>Flame Length - 46.6 feet</b></p>	
<p><b>Expected Fire Behavior in Treated Fuels</b>  <b>Combined Fuel Model - [tl6 – Moderate Load Broadleaf Litter 50% and gr1 – Short Sparse Dry Climate Grass 50%]</b></p>	
<p><b>Rate of Spread - 177 ft/min</b></p>	
<p><b>Fireline Intensity - 600 BTU/ft/s</b></p>	
<p><b>Flame Length - 8.5 feet</b></p>	

**Table 3.1.3**  
***Fire Scenario #3 (South Boundary)***  
***Fire Approaching from the South or Southwest***  
***(Late Fire Season With 30 MPH South and Southwest Wind Conditions)***

<p align="center"><b>Fire Behavior Calculation Input Data</b></p> <ul style="list-style-type: none"> <li>• 10 percent slope</li> <li>• 30 mph 20-foot wind speed</li> <li>• 180° slope aspect from north</li> <li>• 225° wind direction from north</li> </ul>	<p align="center"><b>Anticipated Fuel Moistures</b></p> <ul style="list-style-type: none"> <li>* 1-Hour Fine Fuel Moisture of.....2%</li> <li>* 10-Hour Fuel Moisture of.....3%</li> <li>* 100-Hour Fuel Moisture of.....5%</li> <li>* Live Herbaceous Fuel Moisture of.....30%</li> <li>* Live Woody Fuel Moisture of.....60%</li> </ul>
<p><b>Expected Fire Behavior</b>  <b>Combined Fuel Model [gr2 – Low Load, Dry Climate Grass 80% and Fuel Model SCAL18 – Sage/Buckwheat 20%]</b></p>	
<p><b>Rate of Spread - 247 ft/min</b></p>	
<p><b>Fireline Intensity - 11,87 BTU/ft/s</b></p>	
<p><b>Flame Length - 33.6 feet</b></p>	
<p><b>Expected Fire Behavior in Treated Fuels</b>  <b>Combined Fuel Model - [tl6 – Moderate Load Broadleaf Litter 50% and gr1 – Short Sparse Dry Climate Grass 50%]</b></p>	
<p><b>Rate of Spread - 62 ft/min</b></p>	
<p><b>Fireline Intensity - 216 BTU/ft/s</b></p>	
<p><b>Flame Length - 5.3 feet</b></p>	

**Table 3.1.4**  
***Fire Scenario #3 (West Boundary)***  
***Fire Approaching from the West or Northwest***  
***(Late Summer Season With 30 MPH Southwest or West Wind Conditions)***

<p align="center"><b>Fire Behavior Calculation Input Data</b></p> <ul style="list-style-type: none"> <li>• 10 percent slope</li> <li>• 30 mph 20-foot wind speed</li> <li>• 280° slope aspect from north</li> <li>• 270° wind direction from north</li> </ul>	<p align="center"><b>Anticipated Fuel Moistures</b></p> <ul style="list-style-type: none"> <li>* 1-Hour Fine Fuel Moisture of.....2%</li> <li>* 10-Hour Fuel Moisture of.....3%</li> <li>* 100-Hour Fuel Moisture of.....5%</li> <li>* Live Herbaceous Fuel Moisture of.....30%</li> <li>* Live Woody Fuel Moisture of.....60%</li> </ul>
<p><b>Expected Fire Behavior</b>  <b>Combined Fuel Model [gr2 – Low Load, Dry Climate Grass 80% and Fuel Model SCAL18 – Sage/Buckwheat 20%]</b></p>	
<p><b>Rate of Spread - 247 ft/min</b></p>	
<p><b>Fireline Intensity - 11, 846 BTU/ft/s</b></p>	
<p><b>Flame Length - 33.7 feet</b></p>	
<p><b>Expected Fire Behavior in Treated Fuels</b>  <b>Combined Fuel Model - [tl6 – Moderate Load Broadleaf Litter 50% and gr1 – Short Sparse Dry Climate Grass 50%]</b></p>	
<p><b>Rate of Spread - 62 ft/min</b></p>	
<p><b>Fireline Intensity - 216 BTU/ft/s</b></p>	
<p><b>Flame Length - 5.3 feet</b></p>	

## **4.0 Assessing Structure Ignitions in the Wildland/Urban Interface**

Structure ignitions from wildland wildfires come from three sources of heat: convective firebrands (flying embers), direct flame impingement, and radiant heat. The Behave Plus Fire Behavior Computer Modeling Program does not address wind blown embers or firebrands from a structure ignition perspective. However, even though ignition resistant exterior building materials will be used in the construction of the Keller Crossing development (see APPENDIX 'D' for the description of ignition resistive construction), wind driven embers and radiant heat issues are addressed in this FMP.

### **4.1 Firebrands/Embers**

Firebrands or embers are pieces of burning materials that detach from a burning fuel due to the strong convection drafts in the flaming zone. Embers can be carried a long distance (one mile or more) by fire drafts and strong winds. Severe wildland/urban interface fires can produce heavy showers of embers. The chance of these embers igniting a structure will depend on the number and size of the firebrand, how long it burns after contact, and the type of building materials, building design, and construction features of the structure. Embers landing on combustible roofing and decks are common sources for structure ignition. They can also enter a structure through unscreened vents, decks and chimneys, unprotected skylights, open windows, and overhangs.

Even with non-combustible roofing, embers landing on leaves, needles, and other combustibles located on a roof (due to lack of maintenance) can cause structure ignition. Any open windows, doors or other types of unscreened openings are sources for embers to enter a structure during a wildland fire. If these maintenance issues are addressed on a regular basis through homeowners' regular inspections, embers should not be a concern for the Keller Crossing residences, as the buildings will be constructed with Chapter 7A building materials.

### **4.2 Radiant Heat/Direct Flame Impingement**

Radiation and convection involve the transfer of heat directly from the flame. Unlike radiation heat transfer, convection requires that the flames or heat column contact the structure. An ignition from radiation (given an exposed flammable surface) heat transfer depends on two aspects of the flame: 1) the radiant heat flux to a combustible surface, and 2) the duration (length of time) of the radiant flux. The radiant heat flux depends on the flame zone size, flame-structure distance, and how much the combustible material of the structure is exposed to the flame. While the flame from a wildfire may approach 1,800 degrees Fahrenheit, it is the duration of heat that is more critical. For an example, a blow torch flame typically approaches 2,100 degrees Fahrenheit yet a person can easily pass their hand through the flame. Heat duration only becomes critical to a home with a wood exterior surface if the heat can remain for 30-90 seconds.

Research scientist Jack Cohen of the United States Forest Service has found that a home's characteristics--its exterior materials and design--in relation to the immediate area around a home within 100 feet principally determine the home ignition potential. He calls the home and its immediate surroundings the home ignition zone. In a study of ignition of wood wallboard, tests by a USDA Forest Service research team described in the Proceedings of the 1st International Fire and Materials Conference showed that flame impingement for sufficient length of time (approximately 1 min.) ignites a typical hardboard siding material. The likelihood of the homes' exteriors reaching ignition temperature is very unlikely due to either radiant or convective heat.

Fire agencies consider fuel treatment as a principal approach to wildland fire hazard reduction. Whenever the flame length, 1-2 minutes in duration or more, is equal to or more than the separation of combustible vegetation from a combustible structure, there is a high probability of structure ignition. Contact with a fire's convection heat column also may cause ignition but the temperature of the column's gases is generally not hot enough or long enough in duration to sustain the ignition of the structure.

Comparing the expected wildland fire behavior projections in each of the scenarios in Section 3.1 against the required fuel modification zones outlined in Section 6.0, demonstrate substantial reductions in the expected flame length and fireline intensity.

By requiring the structures exposed to the threat of wildfire to incorporate the following guidelines, those structures will be provided with the most effective treatment for minimizing losses from flame impingement and associated radiant heat intensities.

- Each structure is constructed of ignition resistant building materials as required by Chapter 7A of the California Building Code.
- The area surrounding each structure contains an irrigated Zone (defensible space) and a Thinning Zone (low fuel volume buffer strip) between the irrigated zone and the untreated fuels.
- Homeowners shall be required to maintain their properties to the fuel treatment standards outlined in Section 6.0 and shall keep the roof and any rain gutters free of leaves, needles and other combustible debris.
- All firewood and other combustible materials must be stored away from the structure so that burning embers falling on or near the structure have no suitable host.

#### **4.3 Fire Resistant Plant Palette**

Wildland fire research has shown that some types of plants, including many natives, are more fire resistant than others. These low fuel volume, non-oily, non-resinous plants are commonly referred to as "fire resistant". This term comes with the proviso that each year these plants are pruned, all dead wood is removed and all grasses or other plant material are removed from beneath the circumference of their canopies. Some native species are not considered "undesirable" from a wildfire risk management perspective provided they are properly maintained year round. Refer to APPENDIX 'A' for a list of prohibited plant species.

### **5.0 Fire Department Response Times**

The proposed project is within the Riverside County Fire Department's response area. RCFD Station #83 located at 37500 Sky Canyon Dr, Murrieta, CA is approximately 4.6 miles and nine (9) minutes driving time to the furthest point in the development. Riverside County Fire Station #34 located at 32655 Haddock St, Winchester, CA is approximately 5.8 miles and nine (9) minutes driving time to the furthest point in the development. The third closest Fire Station is Murrieta Fire Department Station #2 located at 28155 Baxter Road, Murrieta, CA is approximately 6.7 miles and 12 minutes away. Additional agencies such as nearby cities would also respond equipment under mutual aid agreements but would likely arrive after RCFD engines were on-scene. It should also be noted that the CALFIRE Ryan Air Attack Base is in nearby Hemet, approximately 8 air miles from the project. The Air Attack Base could respond with fire retardant tankers or helicopters if available.

Although RCFD Fire Station #83 and #34 engines may be 9 minutes away, there is no assurance that either engine company will be in their station on the day a wildfire threatens the Keller Crossing development. Engines may respond from other stations located further away or from other incidents. On days with extreme fire danger, there may be multiple fire starts and engine companies deployed on other incidents. This is why firewise planned projects use “*defensible space*”, ignition resistant building features, and key fuel treatment strategies that enable residents to substantially increase their ability to survive a wildfire on their own if necessary, without the loss of their structure. The goal of this FMP, therefore, is to make the Keller Crossing project and its occupants as safe as possible and able to survive on their own until firefighting equipment arrives and/or residents are safely evacuated.

## **6.0 Fuel Modification Zone Descriptions and Recommended Treatments**

Below are the descriptions and required treatments for the Fuel Treatment Zones. All distances in this report are measured horizontally. These distances are depicted on the enclosed Fuel Modification Map. With the exception of Lots 244, 264, 278, 305 and 339-346, Fuel Treatment Zones 1A, 1B, and 2 combine to provide 100 feet of treated area depending which is more than sufficient to mitigate the radiant heat effects and direct flame impingement of a wildland fire with expected flame lengths of between 8.5 and 5.3 feet within the treated areas.

Due to protected open space and habitat restrictions Lots 244, 264, 278, 305, and 339-346 have reduced fuel modification distances. Therefore additional construction requirements shall be required on these lots as outlined in Section 7.1 to mitigate for the reduction in fuel modification. Fuel modification together with the required ignition resistant construction and additional construction feature requirements should provide for sufficient protection from radiant heat and direct flame impingement on these lots.

The location of the buildings within Lot 354, for the high density residential area is not know

The homeowners shall be responsible for maintaining Fuel Modification Zones on their lots. Responsibility for maintaining Fuel Modification Zones outside homeowner lot boundaries are listed below. No HOA is planned for this development. In the event a home is repossessed, the unit/agency holding title to the lot will be responsible for the maintenance on the lot.

### **6.1 Fuel Treatment Zone 1A - Lot Owner Maintained (*Shown as No color on the Fuel Modification Map*)**

#### **Defined**

Fuel Treatment Zone is an irrigated zone, commonly called the defensible space zone, and shall be free of all combustible construction and materials. It is measured from the exterior walls of the structure or from the most distal point of a combustible projection, an attached accessory structure, or an accessory structure within 10 feet of a habitable structure to the lot boundary. It provides the best protection against the high radiant heat produced by a wildfire and is generally an open area in which fire suppression forces can operate during wildfire events. This zone includes a level or level-graded area around the structure.

It also contains a nearly non-vegetated zone five (5) feet in width that immediately surrounds each home.



### **Required Landscaping**

- Plants in this zone need to be fire resistant and shall not include any pyrophytes that are high in oils and resins such as pines, eucalyptus, cedar, cypress or juniper species. Plants used in fuel modification zones should exhibit the following qualities to be the most “fire resistant: thick, succulent or leathery leaf species with high moisture content; tendency to produce limited litter; the presence of high salt levels or similar compounds which may contribute to fire resistance; ability to withstand drought; and the ability to withstand severe pruning.
- Zone 1A will be cleared of all fire prone and undesirable plant species (see APPENDIX ‘A’ for the RCFD Prohibited Plant list).
- Landscape designs using hardscape features such as driveways, swimming pools, concrete, rock, and similar non-combustible features to break up fuel continuity within Zone 1A are encouraged.
- Landscaping shall be irrigated and primarily consist of fire-resistant, maintained native or ornamental plantings.
- Shrubs shall be low growing and approved by the RCFD. Mature height of plants shall not exceed 18 inches. They may be pruned to maintain the height requirement.
- Trees shall be single specimens or groupings of not more than three trees approved by the RCFD. Trees are to be planted such that the mature canopies will be at least 10 feet from the exterior walls of the structure or from the most distal point of a combustible projection, an attached accessory structure, or an accessory structure within 10 feet of a habitable building.
- Tree must have a minimum of six feet of vertical separation from low growing, irrigated vegetation beneath the canopy of each tree.
- The area within 5 feet of each home shall be absent of most plant including all the plants listed in Appendix A. A few scattered potted plants may be grown as long as they are not located beneath windows or vents or within 5 feet of a window.
- No combustible mulches shall be allowed within 5 feet of a structure.

### **Required Maintenance**

- Lots shall be maintained year round by the individual property owners within their property boundary (lot lines) and the Valley-Wide Recreation and Park District outside the lots as required by this FMP.
- Remove and replace any dead or dying plant material monthly.
- Remove any combustible material found within 5 feet of each structure.
- Native annual and perennial grasses will be allowed to grow and produce seed during the winter and spring. As grasses begin to cure (dry out), they will be cut to four inches or less in height.
- Trees must be maintained to have a minimum of six feet of vertical separation from low growing, irrigated vegetation beneath the canopy of each tree.
- Any disputes related to individual lot landscaping or fuel treatment, with respect to interpretation of the Fuel Modification Plan, shall be decided by the Riverside County Fire Department or its designated representative and whose decision shall be final and binding on the lot owner.
- All trees must be maintained to the current ANSI A300 standards [*Tree, Shrub, and Other Woody Plant Maintenance — Standard Practices (Pruning)*] (see [http://www.tcia.org/TCIA/TCIA/BUSINESS/A300\\_Standards/A300\\_Standards.aspx](http://www.tcia.org/TCIA/TCIA/BUSINESS/A300_Standards/A300_Standards.aspx)).

## **6.2 Fuel Treatment Zone 1B Valley-Wide Recreation and Park District Maintained (Shown as **Green** on the Fuel Modification Plan Map).**

### **Defined**

Common area planted and maintained to the criteria described in Section 6.1. The zone shall extend a minimum of 30 feet from the homeowner lot property line as shown on the Fuel Modification Plan Map (See Section 11.0). It also includes all manufactured slopes. Water will be paid for by the Valley-Wide Recreation and Park District.

### **Required Landscaping**

See Section 6.1

### **Required Maintenance**

See Section 6.1 and below:

The irrigation systems for Fuel Modification Zone 1B located in the common areas that are maintained by the Riverside County Valley-Wide Recreation and Park District shall always be kept in good condition and proper working order. The irrigation system shall not be turned off except for necessary repairs, maintenance or during extended periods of rainfall.

## **6.3 Fuel Treatment Zone 2 - Valley-Wide Recreation and Park District Maintained (Shown as **Orange** on the Fuel Modification Map)**

### **Defined**

Fuel Treatment Zone 2 is a transition area between the strict requirements of irrigated Zones 1A and 1B and undisturbed native vegetation. Zone 2 is a non-irrigated thinning zone that varies in width, depending on location and begins at the outer edge of Irrigated Zone 1A and 1B landscaping. Thinning zones are utilized to reduce the fuel load of a wildland area adjacent to urban projects thereby reducing the radiant and convective heat of wildland fires. The intent is to achieve and maintain an overall 50 percent reduction of the canopy cover spacing and a 50 percent reduction of the original fuel loading by reducing the fuel in each remaining shrub or tree without substantially decreasing the canopy cover or the removal of soil holding root systems.

### **Required Landscaping**

- Thinning the native vegetation to a point where 50% open space is created.
- Removal of all dead woody debris and exotic or native flammable vegetation (see APPENDIX 'A').
- Allowances for the needs of protected species and habitats will be considered in this zone.
- No combustible construction or materials are allowed in Zone 2.

### **Required Maintenance**

- Annually maintain all tree crowns to keep a separation of six feet between the ground fuels (shrubs and ground covers) and the lower limbs.
- All trees must be maintained to the current ANSI A300 standards [*Tree, Shrub, and Other Woody Plant Maintenance — Standard Practices (Pruning)*] (see [http://www.tcia.org/TCIA/TCIA/BUSINESS/A300\\_Standards/A300\\_Standards.aspx](http://www.tcia.org/TCIA/TCIA/BUSINESS/A300_Standards/A300_Standards.aspx))
- Annually prune vegetation to maintain a 50% thinning from the original vegetation cover.
- Native and exotic annual and perennial grasses will be allowed to grow and produce seed during the winter and spring. As grasses begin to cure (dry out), they will be cut or mowed to 4 inches or less in height.

- Annually remove all dead and dying vegetation and highly flammable exotic species (see APPENDIX ‘A’)

#### **6.4 Roadside Fuel Treatment – Valley-Wide Recreation and Park District Maintained (*Shown as Purple on the Fuel Modification Plan Map*).**

All publicly accessible roads within the Keller Crossing Project shall be cleared of all combustible vegetation for a minimum of 20-feet on each side of the roadway and landscaped per the criteria outlined in Fuel Treatment Zone 1A. Sidewalks and related non-combustible improvements may be placed in this fuel treatment zone to further increase the level of protection. The purpose of this action is to minimize the cutting-off of workers, homeowners and guests from safely evacuating the area due to a wildland fire occurrence and for safe ingress by emergency responders.

#### **6.5 Temporary Roadside Fuel Treatment – Valley-Wide Recreation and Park District Maintained (*Shown as Blue on the Fuel Modification Plan Map*).**

All publicly accessible roads within the Keller Crossing Project that are temporarily maintained as described in Section 6.4 until such times as the adjoining property is developed. Irrigation systems may contain drip systems or similar water conserving irrigation methods.

#### **6.6 No Build Zone – (*Shown in Yellow on the Fuel Modification Plan Map*).**

An area where no combustible construction, homes nor apartments shall be built. This area is suitable for parking, recreational uses, roadways and similar features. The zone is needed to create a 30 foot wide space between the protected open space and structures.

#### **6.7 Zone Markers**

The exterior boundary of Fuel Treatment Zone 2 shall be marked on the ground for the purpose of guiding annual fuel treatment maintenance, inspection operations and protection of habitat along the northern project boundary. The most reliable markers are steel fence posts with a baked on painted finish. The upper half of the above ground portion of the fence post is then painted a bright “day glow” orange to improve visibility. These Fuel Treatment Zone markers must be spaced so that the markers on each side of an installed marker can be seen from the next marker. See Appendix ‘E’ for additional information.

## **7.0 Construction Requirements**

All structures within the Keller Crossing project shall meet all wildland/urban interface standards to the satisfaction of the RCFD and be designed and constructed with ignition resistant construction requirements. All construction and ignition resistant requirements shall meet the 2019 California Fire and Building Codes; 2019 Chapter 7A-California Building Code; and all current codes in force at the time of permit application. For a summary of the current construction requirements as of the date of this report, see APPENDIX ‘D’. The fire protection features described herein shall be maintained to be equivalent or greater ignition resistance.

All non-habitable accessory structures such as decks, balconies, patio, covers, gazebos and fences shall be built from non-combustible materials. The lot owners are not restricted from having concrete patios, concrete walkways or swimming pools within Fuel Treatment Zone 1A in compliance with other

codes. Refer to APPENDIX 'C' for photos and descriptions of non-combustible decks, patio covers, and railings for these non-habitable accessory structures.

Construction or building permits shall not be issued until the fire code official inspects and approves required fire apparatus access, setbacks and water supply for the construction site. Prior to the delivery of combustible building materials to the project site the following conditions shall be completed to the satisfaction of the RCFD:

- Water and power utilities shall be approved and installed by the appropriate inspecting department or agency.
- Approved Zone 2 fuel treatment shall be provided prior to combustible material arriving on the site and shall be maintained throughout the duration of construction. Fuel Treatment Zones 1A and 1B shall be cleared of all vegetation prior to construction and subsequently planted to the requirements stated in Sections 6.1 and 6.2 after construction is completed.

### **7.1 Additional Construction Requirements**

In the event of a wildfire in the adjacent wildlands the structures in the project will be showered with embers. To mitigate this hazard the following additional construction requirements shall be implemented on all lots within Keller Crossing.

1. All vents in the structures in the Tract shall be “Brandguard”, “O’Hagin Fire & Ice® Line – Flame and Ember Resistant” or equivalent ember resistant type vents.
2. All operable windows shall be provided with metal mesh bug screens over the operable opening to replace traditional vinyl bug screens to prevent embers from entering the structure during high wind conditions when windows may be inadvertently left open
3. All houses shall have automatic door closers on all vehicle garage doors (standard on most new automatic garage door openers as a security feature), that can be set to close after a certain period of time with no activity.

In addition to the requirements stated above, the following additional construction requirements shall be applied to the homes built on Lots 244, 264, 278, 305, and 339-346 to mitigate for reduced fuel modification zones.

1. Interior fire sprinklers shall be installed in the attics and garages. Listed domestic demand shutoff valves may be used to try to minimize upgrading meter sizes where possible. Copper piping is required in the attics; CPVC will only be permitted in the attic if listed heads are used in accordance with their listing.
2. All swinging exterior doors shall be self closing (e.g., pneumatic or spring loaded hinges) and self-latching.
3. Fire sprinklers shall be extended outside under the eaves facing wildland fuels according to NFPA 13D.

4. A six (6) foot solid non-combustible radiant heat wall shall be installed on the northern lot boundaries, as shown on the Fuel Modification Map to aid in radiant heat deflection and mitigate any reduced fuel treatment widths. The upper half of said wall may be a view wall where tempered fire-rated glass is utilized as long as the wall remains solid and noncombustible (See Appendix 'F' for an example). Post and glass frame assemblies shall be composed of metal such as steel, and 6063-T5 aluminum alloys or equivalent, respectively, which will not melt and allow the glass to fall out.

5. The homes on these lots shall be single story.

Any damaged or replacement window, siding, roof covering, or non-combustible wall will meet or exceed the original intent of the fire protection discussed in this plan.

## **8.0 Infrastructure**

The basic systems needed to develop a property and support its use by its residents and businesses. For fire protection planning, these typically consist of the water supply for fire hydrants and fire sprinkler systems and accessways to and from the property.

### **8.1 Water Supply**

The Eastern Municipal Water District (EMWD) will provide the Keller Crossing project with potable water. Hydrants, mains and water pressures shall be designed to comply with RCFD requirements. The developer shall provide an approved permanent water supply, including fire hydrants, capable of supplying the required fire flow for fire protection of both residential and commercial construction prior to any combustible material being placed on the site or the commencement of construction. The water supply system shall be a looped system served from two points.

Water supplies for fire protection and hydrants shall be in accordance with RCFD codes. The minimum size of water distribution mains on which fire hydrants are located shall be sufficient to provide the required fire flow but in no case less than eight-inch in diameter and designed to be a circulating (loop) for the mains.

Fire hydrants spacing shall not exceed 300 feet and are required on cul-de-sacs 300 feet or more in length. The size, type and location of fire hydrants shall meet the approval of the RCFD Fire Marshal. Water source shall have the capacity required to provide the minimum required fire flow with a residual pressure of 20psi in addition to maximum daily flow requirements for other consumer uses.

### **8.2 Access Roads/Driveways and Gates**

Main ingress and egress for the Keller Crossing development will be two means of access onto a realigned Keller Road then easterly to Winchester Road (Highway 79), a major 4 lane highway, or westerly toward Pourroy Road. All access roads within the property shall be termed "Fire Access Roads" within this document and be publicly maintained. All fire access roads shall meet the requirements of the RCFD, and shall be all weather surface capable of supporting loads of 75,000 lbs gross vehicle weight shall have an unobstructed width of not less than 24 feet (7315 mm), exclusive of shoulders. Access to all portions of the buildings must be within 150 feet of the available fire department access.

Clearance of brush or vegetative growth along new and existing on and off-site roadways will comply with RCFD requirements if not otherwise addressed in this plan. All roads, sidewalks and similar public improvements shall be built to Riverside County standards and become the responsibility of the County to maintain once the project is completed.

The Keller Crossing project will not be a gated community. However, any future gates to be installed shall meet RCFD Standards and shall be approved by the RCFD prior to fabrication and installation. A Knox override key switch, or similar device, must be installed outside the gate in an approved, readily visible, and unobstructed location at or near the gate to provide emergency access.

## **9.0 Homeowner Education and Requirements**

A copy of this report shall be available in the Keller Crossing Sales Office for review by any potential homebuyer. The Sales Office shall provide a copy of this Fuel Modification Plan to each buyer at the close of escrow of the initial sale. In all subsequent sales of the property, the new property owner(s) shall be provided with a copy of this FMP by the escrow company to insure continued compliance with all Fuel Modification maintenance and construction requirements.

Each homeowner shall be aware of the herein described fire protection measures, the types of non-combustible construction, and the plant materials that are allowed within their lot's boundaries. Of particular importance are APPENDICES 'A' and 'D' of this plan which provides guidance in the types of plants that are allowed to be established in landscaped areas and appropriate construction within Fuel Treatment Zones. Plant selection is critical as embers often travel over a mile during Santa Ana wind events. In addition, firewood and similar combustible materials shall not be stored within 30-feet of any structure.

Keller Crossing homeowners are responsible for maintaining their homes and for keeping all doors and windows tightly closed whenever a wildland fire is reported in the vicinity.

Ready, Set, Go is the evacuation strategy proposed for this project as described on the Cal Fire website. Should a wildfire exist that threatens the property or safety of people at the site, the following actions shall be implemented:

**1. Ready – Preparing for the Fire Threat:** *Take personal responsibility and prepare long before the threat of a wildfire so the home is ready in case of a fire. Maintain a defensible space by clearing brush away from all structures. Use fire-resistant landscaping and harden structures with fire-safe construction measures. Assemble emergency supplies and belongings in a safe spot. Make sure all individuals within the area are 'on the same page' in commitment to advance preparation. Plan escape routes.*

**2. Set – Situational Awareness When a Fire Starts:** *Pack vehicle(s) with emergency items. Stay aware of the latest news from local media and the local fire department for updated information on the fire and perform the following:*

- ✓ *Close all windows and doors that lead outside to prevent sparks from entering the house.*
- ✓ *Close all doors within the house in case the house does catch on fire; this will slow down the spread of the fire from room to room.*

- ✓ *Move all combustible materials in the home away from windows to prevent the possibility of heat from a fire radiating through windows and glass doors and catching flammable materials inside the home on fire. This includes drapes, curtains and furniture.*
  - ✓ *Close windows and all Venetian blinds or noncombustible window coverings.*
  - ✓ *Turn on the lights in each room, porch, and yard. This aids in visibility when the smoke gets thick and darkens the sky.*
  - ✓ *Fill all sinks, bathtubs and buckets with water in case the power goes out.*
  - ✓ *Shut off any gas valves within the house or outside.*
  - ✓ *Open the damper on fireplaces to stabilize inside/outside pressure, but close fireplace screens to keep sparks from igniting the house.*
- 3. Go – Leave early!** *Following an Action Plan makes one prepared and firefighters are now able to best maneuver the wildfire and ensuring everyone’s safety. Follow instructions given by the Fire Department official on site.*

## **10.0 Fuel Modification Map**

Attached to this FMP is the Keller Crossing Fuel Modification Map depicting the location of all proposed fuel treatments, as well as fire access roads, lot lines, additional construction features and development boundaries. This map also depicts the adjacent developed lots as a reference for interlinking fuel treatments.

# **APPENDIX 'A'**

## **Prohibited Plant List**



**APPENDIX ‘A’**  
**Prohibited (& Fire Prone) Plant Species List**  
**For Fuel Modification Zones in High & Very High Hazard Areas**

The following species are highly flammable and are more susceptible to burning, due to rough or peeling bark, production of large amounts of litter, vegetation that contains oils, resin, wax, or pitch, large amounts of dead material in the plant, or plantings with a high dead to live fuel ratio.

<b>Botanical Name</b>	<b>Common Name</b>	<b>Plant Form</b>
Acacia species	Acacia	Shrub/Tree
Adenostema fasciculatum	Chamise	Shrub
Adenostema sparsifolium	Red Shank	Shrub/Tree
Artemisia californica	California Sagebrush	Shrub
Anthemis cotula	Mayweed	Weed
Arundo donax	Giant reed	Grass/weed
<u>Bambusa species</u>	Bamboo	Shrub
Brassica nigra	Black Mustard	Weed
Brassica ropa	Yellow Mustard	Weed
Cedrus species	Cedar	Tree
Cirsim vugare	Wild Artichoke	Weed
Conyza canadensis	Horseweed	Weed
Cortaderia selloana	Pampas Grass	Tall Grass
Cupressus species	Cypress	Tree
Cytisus species	Broom	Shrub
Eriogonum fasciculatum	Common Buckwheat	Shrub
Eucalyptus species	Eucalyptus	Shrub/Tree
Gensita species	Broom	Shrub
Heterotheca grandiflora	Telegraph plant	Weed/shrub
Juniperus species	Junipers	Shrub
Lactuca serriola	Prickly lettuce	Weed
Nicotiana bigelevel	Indian tobacco	Shrub
Nicotiana glauca	Tree tobacco	Shrub
Palmae species	Palms	Tree
Pennisetum species	Fountain Grass	Ground cover
Picea species	Spruce	Tree
Pinus species	Pines	Tree
Rosmarinus species	Rosemary	Shrub
Retama monosperma	Broom	Shrub
Salvia species *	Sage	Shrub
Silybum marianum	Milk thistle	Weed
Spartium junceum	Spanish Broom	Shrub
Urtica urens	Burning nettle	Weed
Washingtonia species	Palms	Tree
* Except -Salvia columbariae (chia), Salvia sonomensis (Creeping Sage)		

# **APPENDIX 'B'**

## **Literature References**

## Literature References

1. *Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model*, General Technical Report RMRS-GTR-153. June 2005. Joe H. Scott, Robert E. Burgan, United States Department of Agriculture - Forest Service, Rocky Mountain Research Station, Missoula, Montana.
2. *BehavePlus: Fire Modeling System, version 5.0: Variables*. General Technical Report RMRS-GTR-213WWW Revised. September 2009. Patricia L. Andrews, United States Department of Agriculture - Forest Service, Rocky Mountain Research Station, Missoula, Montana.
3. *Behave Plus Fire Modeling System, Version 5.0.4*, General Technical Report RMRS-GTR-106WWW Revised. July 2008. Patricia L. Andrews, Collin D. Bevins, Robert Seli. United States Department of Agriculture - Forest Service, Rocky Mountain Research Station, Missoula, Montana.
4. California Code of Regulations Title 14 section 1280 and Title 24 Part 9
5. California Public Resources Code Sections 4201 through 4204
6. California Government Code, sections 51175 through 51189
7. 2019 California Fire Code portion of the CBSC, including appendices to Chapters 1 & 4 and Appendices B, F & H
8. 2018 International Fire Code, published by the International Code Council.
9. National Fire Protection Association - NFPA 13 Standard for the Installation of Sprinkler Systems in One and Two-Family Dwellings and Manufactured Homes, 13-R & 13-D, 2019 Editions
10. National Fire Protection Association - NFPA 1142 *Standard on Water Supplies for Suburban and Rural Fire Fighting*, 2017 Edition.
11. National Fire Protection Association - NFPA 1144 *Standard for Reducing Structure Ignition Hazards from Wildfire*, 2018 edition.
12. 2019 California Fire Code and Local Amendments
13. 2019 California Building Code- Chapter 7A- *Materials and Construction Methods for Exterior Fire Exposure*.
14. 2019 California Residential Code (CRC) R337
15. *The California State and Local Responsibility Area Fire Hazard Severity Zone Map – Fire and Resource Assessment Program of CAL FIRE*
16. Western Region Climate Center. *Historic Climate Data from Remote Automated Weather Stations*. RAWS USA Climate Archive. Reno, NV. Data for all Remote Automated Weather Stations is available at: <http://www.raws.dri.edu/index.html>

# **APPENDIX 'C'**

## **Non-combustible & Fire Resistant Building Materials**

# APPENDIX 'C'

## Non-Combustible & Fire-Resistant Building Materials For Balconies, Carports, Decks, Patio Covers and Floors

Note: The Office of the State Fire Marshal (SFM) Fire Engineering Division administers licensing programs and performs engineering functions affecting consumer services and product evaluation, approval and listing. The following link is to the State Fire Marshal's office for more information on the Building Material List for non-combustible and fire resistant building materials: <https://osfm.fire.ca.gov/divisions/fire-engineering-and-investigations/building-materials-listing/bml-search-building-materials-listing>.

Examples of non-combustible & fire-resistant building materials for balconies, carports, decks, patio covers, and floors are as follows (these are only examples and materials listed here must meet local fire and building codes:

### I. NON-COMBUSTIBLE HEAVY GAGE ALUMINUM MATERIALS - *Metals* *USA Building Products Group - Ultra-Lattice*



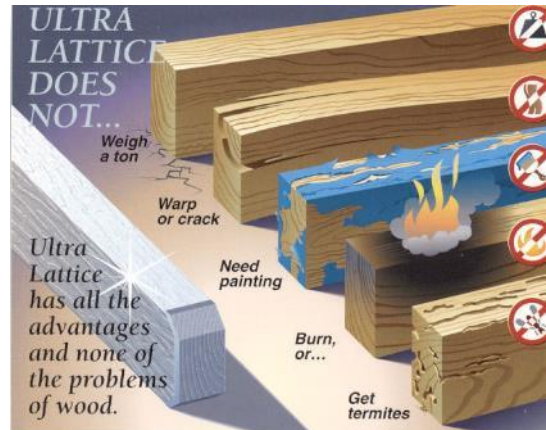
Ultra-Lattice Stand Alone Patio Cover



Ultra-Lattice Attached Patio Cover



Ultra-Lattice Solid Patio Cover



Ultra-Lattice Vs. Wood

## II. FRX Exterior Fire-Retardant Treated Wood

### Exterior Fire Retardant Treated (FRT) Wood

FRX® fire retardant treated wood may be used in exterior applications permitted by the codes where: public safety is critical, other materials would transfer heat or allow fires to spread, sprinkler systems cannot easily be installed, corrosive atmospheres necessitate excessive maintenance of other materials, or fire protection is inadequate or not readily available. The International Building, Residential and Urban-Wildland Interface Codes and regulations, permit the use of fire-retardant treated wood in specific instances. See below for typical exterior uses and typical residential uses.

#### Typical Exterior Uses

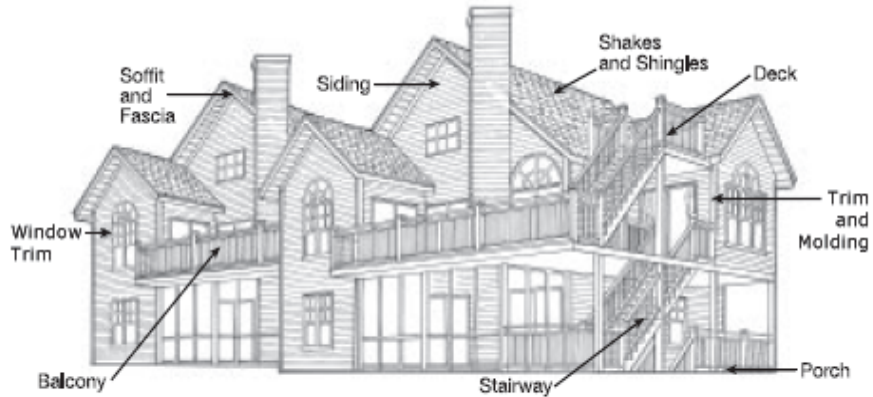
- Wall coverings
- Balconies
- Decks
- Stairways
- Fences
- Sheds
- Gazebos
- Roof coverings
- Open-air roof systems
- Canopies and awnings
- Storefronts and facades
- Eaves, soffits and fascia
- Agricultural buildings and horse stalls
- Scaffolding and scaffold planks
- Construction staging
- Various other residential and commercial uses



Property owners and Architects: See this [2-minute video](#) and the illustration below.



### Typical Residential Uses

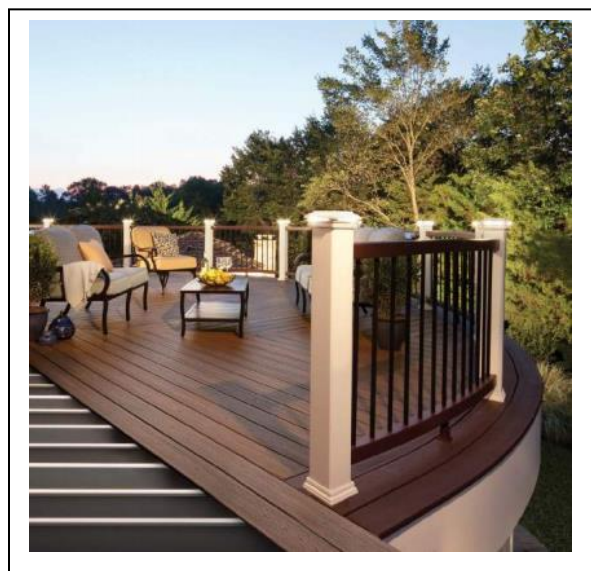


Rising concerns over fire damage and the adoption of urban-wildland interface codes have increased the use of FRT wood in residential structures.

For information on fire retardant treated wood for exterior uses, visit [www.frxwood.com](http://www.frxwood.com).

**III. TREX COMPANY, INC.** – “Trex Transcend®, Trex Select® and Trex Enhance® wood and polyethylene composite deck board, nominal ranging in size from 1” x 5-1/2” to 1-3/8” x 5-1/2” installed per manufacturer maximum edge-to-edge gap of 3/16”. All Trex decking products meet or exceed the SFM 12-7A-4A testing protocol.

Trex combines both beauty and fire defense. A few examples of installations are shown below:





#### **IV. SOLID “WOOD” DECKING**

Company Name: Various Manufacturers

Product Description: Solid “Wood” decking, when installed over minimum 2” x 6” solid “Douglas Fire” or better joists, space 24” or less on center, and decking and joints comply with American Softwood Lumber Standard PS2o as follows:

Minimum nominal 5/4”thick and nominal 6” wide decking boards with a maximum 3/8” radius edges made of solid wood species “Redwood”, “Western Red Cedar”, “Incense Cedar”, “Port Orford Cedar”, or “Alaska Yellow Cedar” having a Class B Flame Spread rating when tested in accordance with ASTM E84. Lumber grades; construction common, commercial or better grade for Redwood; 3 common, commercial or better grades for Cedars.



## V. Vents

Examples of Ember Resistant Approved Vents

### Brandguard



### O'Hagin Fire & Ice® Line – Flame and Ember Resistant

An available option for all O'Hagin attic ventilation products, this attic vent not only features all the same design, construction elements and color choices as the O'Hagin Standard Line, but also features an interior stainless-steel matrix that resists the intrusion of flames and embers. This patent-pending attic vent is accepted for use by many local fire officials for installation in Wildland Urban Interface (WUI) zones.





## **Vulcan Vents**

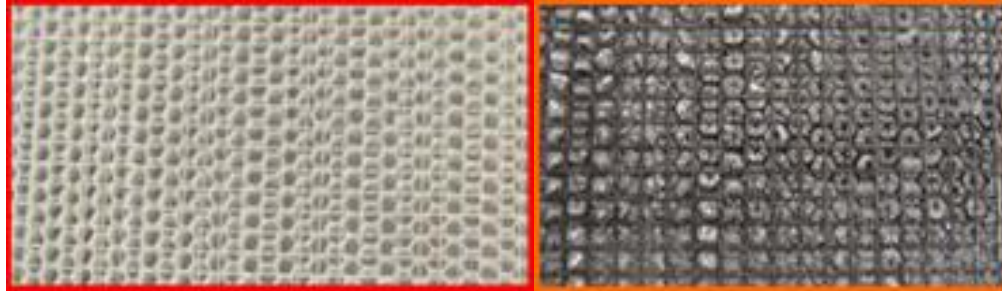
The founders of Gunter Manufacturing have been working closely over the last two years, with the scientists and inventors of Vulcan Technologies to bring to market this incredible product.

Combining our quality vent products with the fire-stopping honeycomb matrix core designed by Vulcan has produced unique and remarkable results.

At Gunter manufacturing has over 50 years of combined sheet metal manufacturing experience. Special orders are not a problem. Their vent frames are industry standard frames so there is little or no learning curve for installers and contractors. Their stated goal is to provide people with the vents they need to secure their homes with additional safety against wildfires and give them piece of mind from knowing that their home or structure is protected by a product that works!

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The core of their fire and ember safe vents are manufactured out of hi-grade aluminum honeycomb and coated with an intumescent coating made by [FireFree Coatings](#). The intumescent coating is designed to quickly swell up and close off when exposed to high heat. The expanded material acts as an insulator to heat, fire, and embers

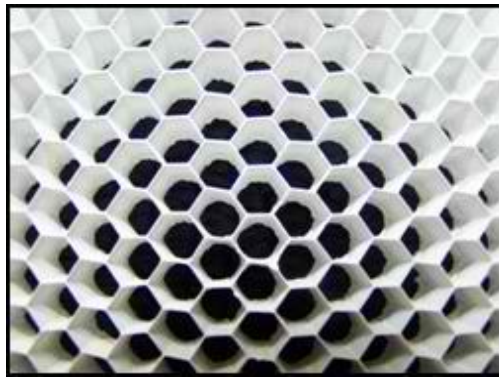


**Before**

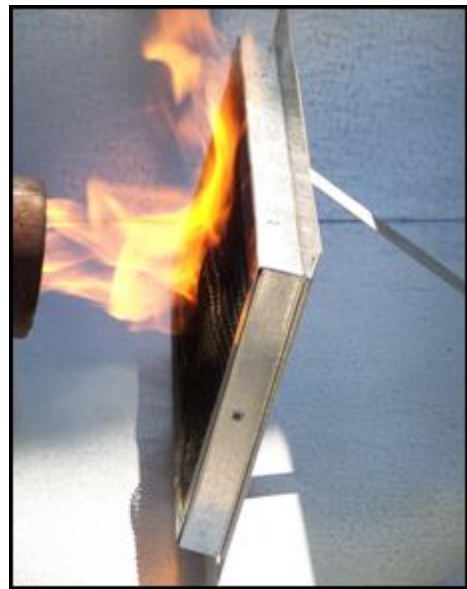
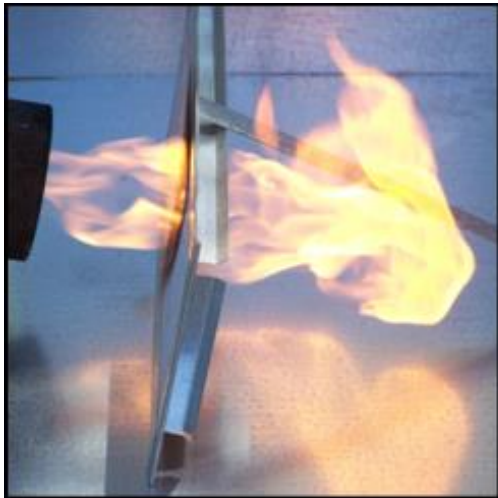
**After**

After the cells close off, they are extremely well insulated, and fire or embers cannot penetrate.

Even before the cells close off, the vent is designed to protect against flying embers. In many cases embers will attack a structure before fire ever comes near, so this feature is very important.



**Close-up of the coated honeycomb matrix.**



Fire easily passes through a standard vent, on the left, but stops cold when it comes up against a Vulcan Vent shown on right.

## **APPENDIX 'D'**

### **Ignition Resistant Construction**

# APPENDIX 'D'

## Ignition Resistant Construction Requirements

The following is a summary of the current requirements for ignition resistant construction for high fire hazard areas under Chapter 7A of the California Building Code (CBC) 2019 edition. However the requirements listed below are not all inclusive and all exterior building construction including roofs, eaves, exterior walls, doors, windows, decks, and other attachments must meet the current CBC Chapter 7A ignition resistance requirements, the California Fire Code, and any additional County and/or City codes in effect at the time of building permit application. See the current applicable codes for a detailed description of these requirements and any exceptions.

1. All structures will be built with a Class A Roof Assembly and shall comply with the requirements of Chapter 7A and Chapter 15 of the California Fire Code. Roofs shall have a roofing assembly installed in accordance with its listing and the manufacturer's installation instructions.
2. Roof valley flashings shall be not less than 0.019-inch (0.48 mm) No. 26 gage galvanized sheet corrosion-resistant metal installed over not less than one layer of minimum 72-pound (32.4 kg) mineral-surfaced nonperforated cap sheet complying with ASTM D3909, at least 36-inch-wide (914 mm) running the full length of the valley.
3. Attic or foundation ventilation louvers or ventilation openings in vertical walls shall be covered with a minimum of 1/16-inch and shall not exceed 1/8-inch mesh corrosion-resistant metal screening or other approved material that offers equivalent protection.
4. Where the roof profile allows a space between the roof covering and roof decking, the spaces shall be constructed to resist the intrusion of flames and embers, be fire stopped with approved materials or have one layer of a minimum 72 pound (32.4 kg) mineral-surfaced nonperforated cap sheet complying with ASTM D3909 installed over the combustible decking.
5. Enclosed roof eaves and roof eave soffits with a horizontal underside, sloping rafter tails with an exterior covering applied to the under-side of the rafter tails, shall be protected by one of the following:
  - noncombustible material
  - Ignition-resistant material
  - One layer of <sup>5</sup>/<sub>8</sub>-inch Type X gypsum sheathing applied behind an exterior covering on the underside of the rafter tails or soffit
  - The exterior portion of a 1-hour fire resistive exterior wall assembly applied to the underside of the rafter tails or soffit including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association Fire Resistance Design Manual
  - Boxed-in roof eave soffit assemblies with a horizontal underside that meet the performance criteria in Section 707A.10 when tested in accordance with the test procedures set forth in ASTM E2957.

- Boxed-in roof eave soffit assemblies with a horizontal underside that meet the performance criteria in accordance with the test procedures set forth in SFM Standard 12-7A-3.

**Exceptions:** The following materials do not require protection:

1. Gable end overhangs and roof assembly projections beyond an exterior wall other than at the lower end of the rafter tails.
2. Fascia and other architectural trim boards.

6. The exposed roof deck on the underside of unenclosed roof eaves shall consist of one of the following:

- Noncombustible material, or
- Ignition-resistant material, or
- One layer of 5/8-inch Type X gypsum sheathing applied behind an exterior covering on the underside exterior of the roof deck, or
- The exterior portion of a 1-hour fire resistive exterior wall assembly applied to the underside of the roof deck designed for exterior fire exposure including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association fire Resistance Design Manual.

**Exceptions:** The following materials do not require protection:

1. Solid wood rafter tails on the exposed underside of open roof eaves having a minimum nominal dimension of 2 inch (50.8 mm).
2. Solid wood blocking installed between rafter tails on the exposed underside of open roof eaves having a minimum nominal dimension of 2 inch (50.8 mm).
3. Gable end overhangs and roof assembly projections beyond an exterior wall other than at the lower end of the rafter tails.
4. Fascia and other architectural trim boards.

7. Vents - ventilation openings for enclosed attics, enclosed eave soffit spaces, enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters, and underfloor ventilation openings shall be fully covered with metal wire mesh, vents, other materials or other devices that meet one of the following requirements:

A. Vents listed to ASTM E2886 and complying with all the following:

- i. There shall be no flaming ignition of the cotton material during the Ember Intrusion Test.
- ii. There shall be no flaming ignition during the Integrity Test portion of the Flame Intrusion Test.
- iii. The maximum temperature of the unexposed side of the vent shall not exceed 662°F (350°C).

B. Vents shall comply with all the following:

- i. The dimensions of the openings therein shall be a minimum of 1/16-inch (1.6 mm) and shall not exceed 1/8-inch (3.2 mm).
- ii. The materials used shall be noncombustible.

**Exception:** Vents located under the roof covering, along the ridge of roofs, with the exposed surface of the vent covered by noncombustible wire mesh, may be of combustible materials.

- iii. The materials used shall be corrosion resistant.

8. Vents shall not be installed on the underside of eaves and cornices.

**Exceptions:**

1. Vents listed to ASTM E2886 and complying with all the following:
  - There shall be no flaming ignition of the cotton material during the Ember Intrusion Test.
  - There shall be no flaming ignition during the Integrity Test portion of the Flame Intrusion Test.
  - The maximum temperature of the unexposed side of the vent shall not exceed 662°F (350°C).
2. The enforcing agency shall be permitted to accept or approve special eave and cornice vents that resist the intrusion of flame and burning embers.
3. Vents complying with the requirements of Section 706A.2 shall be permitted to be installed on the underside of eaves and cornices in accordance with either one of the following conditions:
  - 3.1. The attic space being ventilated is fully protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or,
  - 3.2. The exterior wall covering, and exposed underside of the eave are of noncombustible materials, or ignition-resistant materials, as determined in accordance with SFM Standard 12-7A-5 Ignition-Resistant Material and the requirements
9. All chimney, flue or stovepipe openings that will burn solid wood will have an approved spark arrester. An approved spark arrester is defined as a device constructed of nonflammable materials, having a heat and corrosion resistance equivalent to 12-gauge wire, 19-gauge galvanized steel or 24-gauge stainless steel. or other material found satisfactory by the Fire Protection District, having 1/2-inch perforations for arresting burning carbon or sparks nor block spheres having a diameter less than 3/8 inch (9.55 mm). It shall be installed to be visible for the purposes of inspection and maintenance and removeable to allow for cleaning of the chimney flue.
10. All residential structures will have automatic interior fire sprinklers installed according to the National Fire Protection Association (NFPA) 13R 2019 edition - *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*.
11. The exterior wall covering or wall assembly shall comply with one of the following requirements:
  - Noncombustible material, or
  - Ignition resistant material, or
  - Heavy timber exterior wall assembly, or
  - Log wall construction assembly, or
  - Wall assemblies that have been tested in accordance with the test procedures for a 10-minute direct flame contact expose test set forth in ASTM E2707 with the conditions of acceptance shown in Section 707A.3.1 of the California Building Code, or
  - Wall assemblies that meet the performance criteria in accordance with the test procedures for a 10-minute direct flame contact exposure test set forth in SFM Standard 12-7A-1.

**Exception:** Any of the following shall be deemed to meet the assembly performance criteria and intent of this section including;

- One layer of 5/8-inch Type X gypsum sheathing applied behind the exterior covering or cladding on the exterior side of the framing, or
- The exterior portion of a 1-hour fire resistive exterior wall assembly designed for exterior fire exposure including assemblies using the gypsum panel and sheathing products listed in the Gypsum Associate Fire Resistance Design Manual.

12. Exterior walls shall extend from the top of the foundation to the roof and terminate at 2-inch nominal solid blocking between rafters at all roof overhangs, or in the case of enclosed eaves, terminate at the enclosure.
13. Gutters shall be provided with the means to prevent the accumulation of leaf litter and debris within the gutter that contribute to roof edge ignition.
14. No attic ventilation openings or ventilation louvers shall be permitted in soffits, in eave overhangs, between rafters at eaves, or in other overhanging areas.
15. All projections (exterior balconies, decks, patio covers, unenclosed roofs and floors, and similar architectural appendages and projections) or structures less than five feet from a building shall be of non-combustible material, one-hour fire resistive construction on the underside, heavy timber construction or pressure-treated exterior fire-retardant wood. When such appendages and projections are attached to exterior fire-resistive walls, they shall be constructed to maintain same fire-resistant standards as the exterior walls of the structure.
16. Deck Surfaces shall be constructed with one of the following materials:
  - Material that complies with the performance requirements of Section 709A.4 when tested in accordance with both ASTM E2632 and ASTM E2726, or
  - Ignition-resistant material that complies with the performance requirements of 704A.3 when tested in accordance with ASTM E84 or UL 723, or
  - Material that complies with the performance requirements of both SFM Standard 12-7A-4 and SFM Standard 12-7A-5, or
  - Exterior fire retardant treated wood, or
  - Noncombustible material, or
  - Any material that complies with the performance requirements of SFM Standard 12-7A-4A when the attached exterior wall covering is also composed of noncombustible or ignition-resistant material.
17. Accessory structures attached to buildings with habitable spaces and projections shall be in accordance with the Building Code. When the attached structure is located and constructed so that the structure or any portion thereof projects over a descending slope surface greater than 10 percent, the area below the structure shall have all underfloor areas and exterior wall construction in accordance with Chapter 7A of the Building Code.
18. Exterior windows, skylights and exterior glazed door assemblies shall comply with one of the following requirements:



- Be constructed of multiplane glazing with a minimum of one tempered pane meeting the requirements of Section 2406 Safety Glazing, or
  - Be constructed of glass block units, or
  - Have a fire-resistance rating of not less than 20 minutes when tested according to NFPA 257, or
  - Be tested to meet the performance requirements of SFM Standard 12-7A-2.
19. All eaves, fascia and soffits will be enclosed (boxed) with non-combustible materials. This shall apply to the entire perimeter of each structure. Eaves of heavy timber construction are not required to be enclosed as long as attic venting is not installed in the eaves. For the purposes of this section, heavy timber construction shall consist of a minimum of 4x6 rafter ties and 2x decking.
20. Detached accessory buildings that are less than 120 square feet in floor area and are located more than 30 feet but less than 50 feet from an applicable building shall be constructed of noncombustible materials or of ignition-resistant materials as described in Section 704A.2 of the California Building Code.  
**Exception:** Accessory structures less than 120 square feet in floor area located at least 30 feet from a building containing a habitable space.
21. All rain gutters, down spouts and gutter hardware shall be constructed from metal or other noncombustible material to prevent wildfire ignition along eave assemblies.
22. All side yard fence and gate assemblies (fences, gate and gate posts) when attached to the home shall be of non-combustible material. The first five feet of fences and other items attached to a structure shall be of non-combustible material.
23. Exterior garage doors shall resist the intrusion of embers from entering by preventing gaps between doors and door openings, at the bottom, sides and tops of doors, from exceeding 1/8 inch. Gaps between doors and door openings shall be controlled by one of the methods listed in this section.
- Weather-stripping products made of materials that:
    - (a) have been tested for tensile strength in accordance with ASTM D638 (Standard Test Method for Tensile Properties of Plastics) after exposure to ASTM G155 (Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials) for a period of 2,000 hours, where the maximum allowable difference in tensile strength values between exposed and non-exposed samples does not exceed 10%; and (b) exhibit a V-2 or better flammability rating when tested to UL 94, Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.
  - Door overlaps onto jambs and headers.
  - Garage door jambs and headers covered with metal flashing.
24. Exterior doors shall comply with one of the following:
1. The exterior surface or cladding shall be of noncombustible material or,
  2. The exterior surface or cladding shall be of ignition-resistant material or,
  3. The exterior door shall be constructed of solid core wood that complies with the following requirements:

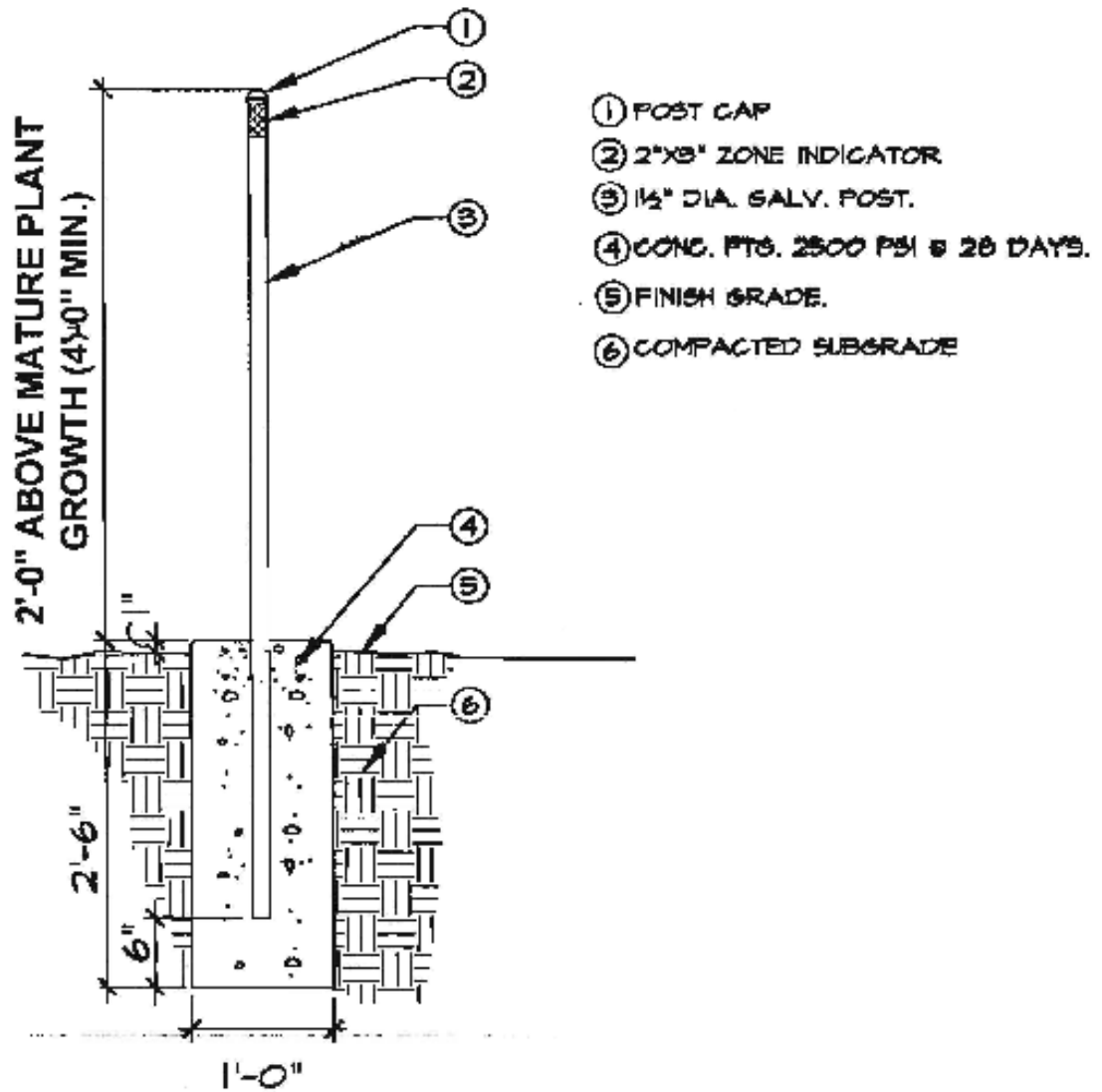
- 3.1. Stiles and rails shall not be less than 1-3/8 inches thick.
  - 3.2. Panels shall not be less than 1-1/4 inches thick, except for the exterior perimeter of the panel that shall be permitted to taper to a tongue not less than 3/8 inch thick.
  4. The exterior door assembly shall have a fire-resistance rating of not less than 20 minutes when tested according to NFPA 252 or,
  5. The exterior surface or cladding shall be tested to meet the performance requirements of Section 707A.3.1 when tested in accordance with ASTM E2707 or,
  6. The exterior surface or cladding shall be tested to meet the performance requirements of SFM Standard 12-7A-1.
25. Fire access tunnels shall have two hour rated walls consisting of two layers of 5/8" Type 'X' gypsum wallboard panels on each side of the studs. The EZ Taping Systems "Fire Tape" product or equivalent should be used as an alternative to convention joint tape when:
1. Two or more layers of listed Type 'X' gypsum wallboard are applied vertically with joints staggered and joints of the face board are":
    - a. Tightly butted and taped with EZ Taping Systems "Fire Tape" or equivalent product or
    - b. Finished with joint compound of EZ Taping Systems "Fire Tape" or equivalent product if the gap between gypsum wallboard panels are visible at the joint.
  2. Two or more layers of USG "Sheetrock" Fire code C gypsum wallboard are applied (horizontally or vertically).
  3. Gypsum panels shall be attached with Type S drywall screws, placed 8" oc to vertical edges and 12" oc to top and bottom runners and intermediate studs.
  4. Fire Tape shall be nominal 2" wide and applied on the vertical joints at studs.

\*\* FAHJ – Fire Authority Having Jurisdiction  
SFM – State Fire Marshal  
NFPA – National Fire Protection Association

# APPENDIX 'E'

## Zone Marker Detail

ZONE MARKER DETAILS



# APPENDIX 'F'

## Non-Combustible Wall Example

