Starting a Home Hardening Retrofit Project
Vent Retrofitting + Property Cleanup
Berkeley
July 13, 2022

Sheryl Drinkwater, Architect

Sheryl Drinkwater:

I am a registered architect, and have been practicing in the East Bay for over 25 years.

I am on the board of the Diablo Fire Safe Council which covers Alameda and Contra Costa Counties.

I am a CalOES certified Safety Assessor and have deployed to Sonoma County in 2017 and to Paradise, California in 2018.

Home Hardening

Concept

Is Your Home Hardened to Survive a Wildfire Ember Storm?

FIRE HARDENED means your home is prepared for wildfire and an ember storm. It does not mean fireproof. Home hardening addresses the most vulnerable components of your house with building materials and installation techniques that increase resistance to heat, flames, and embers that accompany most wildfires.

Learning to live with wildfire includes taking steps to reduce the risk to homes. Homes built to modern (2008 or later) building codes, with an adjacent and well-maintained defensible space, have a much better chance of surviving wildfire. Maintenance and upgrades to older homes can significantly improve the chance of your home surviving a fire.

Part of learning to live with wildfire is understanding that we have some control in how we prepare for and address this hazard, and how we manage fire in our individual communities.

This brochure can help you better understand options for hardening your home and where to find more information.

How Homes Catch Fire

THREE WAYS YOUR HOME CAN BE EXPOSED TO FIRE

EMBER STORM

Embers are small pieces of burning material that can travel more than a mile ahead of a wildfire. They can create spot fires when they land on combustible materials, such as leaves in your gutter or plants under your windows.

RADIANT HEAT

Radiant heat generated from burning structures or plants can be hot enough to ignite a house without direct flame contact. This is particularly challenging in densely populated areas, where the heat from one burning home can ignite the next.

DIRECT FLAME

Depending on time and exposure, direct flame contact can ignite your home. The flaming front of a wildfire is often not hot enough to ignite a house, but plants under windows ignited by embers or direct flame can break glass, allowing fire to enter the house.

Embers are responsible for most damage during wildfires. They can accumulate on your home, deck, or porch and ignite plants, mulch, leaves, fencing, or furniture. They can also be forced into gaps in the home (e.g. attic vents or an open or broken window) and burn the home from the inside out. When this happens, there can be little damage to the surrounding vegetation, leaving people puzzled as to what caused the home to burn.

Embers cause the majority of wildfire home ignitions.

PHOTO CREDITS: INSURANCE INSTITUTE FOR BUSINESS & HOME SAFETY (above left); TENNESSEE DIVISION OF FORESTRY (center)

California Fire Safe Council

Insurance Institute for Business & Home Safety (IBHS)

Home Hardening

Home Components

List:

Property + Roof Maintenance

Foundation + Eave vents

Wall to ground connection
Fences
Decks

Windows & Skylights
Roof Modifications
Roof Replacement
Siding

Note: This information is for you to use as you wish.
I am not responsible for any work you perform at your home. No home can be made fireproof. The conditions in an emergency can vary, so please evacuate early and get to safety.

Home Hardening Session 1:

1. Cleaning up your property
    a. Zone Zero - focus on the first 5 feet [soon to be a new law]
    b. Remove dead vegetation and overhanging branches
    c. Unwanted flammable items that could put your home at risk
    d. Clean your roof of small organic material (i.e. leaves)

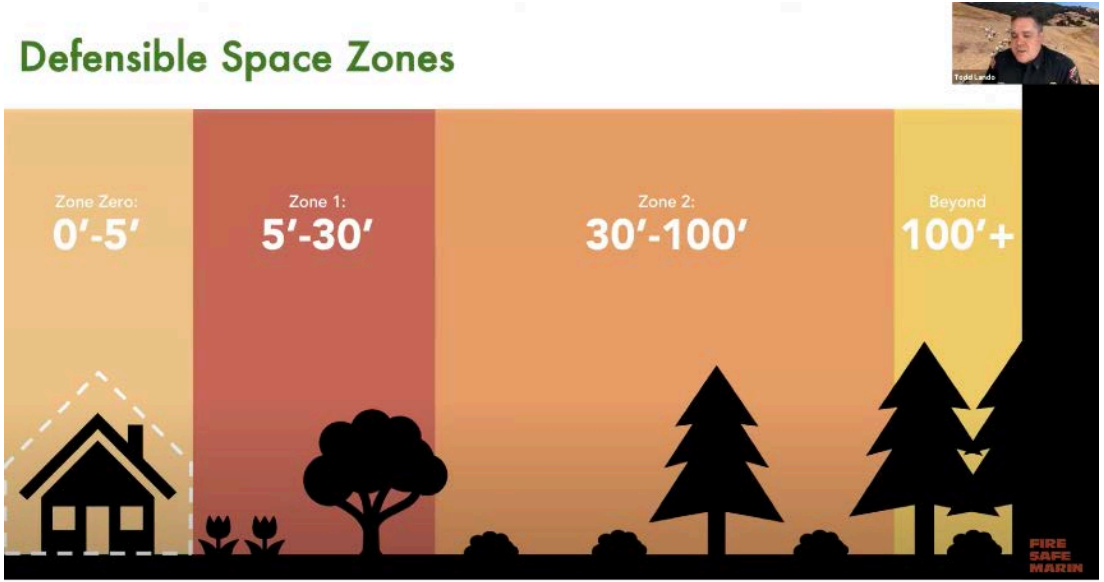
2. Retrofitting your Crawlspace and Attic vents
    a. How vents help your home
    b. How they put you at risk
    c. What you can do to reduce the risk

Home Hardening

Property Maintenance

The first 0-5 feet of your home should be a noncombustible zone.
Decks and patios should be cleared of any combustible materials.
-Remove wooden furniture, cushions, door mats, wood piles, etc.

Remove vegetation (weeds too) right near your home. Install gravel or pavers in the ember resistant zone.



Fire Safe Marin

Zone 0 will be added as the state law — taking a near-zero tolerance approach to anything combustible in the area closest to homes and structures. "The ember-resistant zone is currently not required by law, but science has proven it to be the most important of all the defensible space zones," says Cal Fire's website. -Kate Rauch, Berkeleyside

Home Hardening

Property Maintenance

Decks should be cleared of flammable materials, above and below.

Remove wooden furniture, cushions, door mats, wood piles, near your deck, especially on Red Flag days.

Do not store BBQ propane tanks on your deck during “fire weather.” Tanks should be shut off when not in use, check relief valve regularly, and, if possible, remove tanks at least 10’ from the home. 30’ feet is recommended.

Don’t forget to create defensible space around detached structures.

https://www.firesafemarin.org/home-hardening

Home Hardening

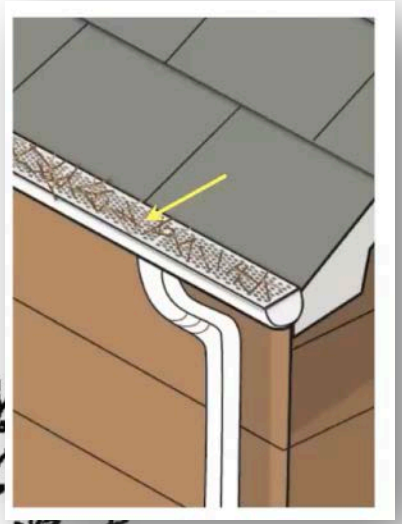
Roof Maintenance

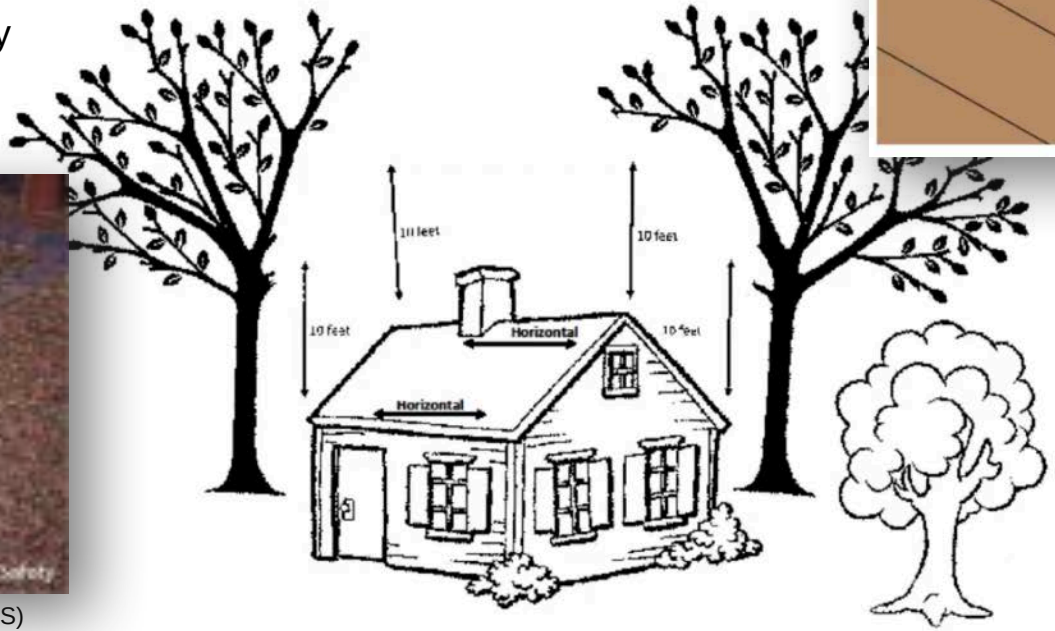
Remove debris from your roof.
Clean gutters and clear skylights.
Make repairs to roofing materials.
Cut back tree canopies.

This dry material can be ignited by window-blown embers.

Insurance Institute for Business & Home Safety (IBHS)

Gutter guards can allow embers to ignite fuels on the screen and get closer to roof openings. Clear frequently.





Home Hardening

Crawlspace (foundation) + Attic venting

Option #1 - add 1/8”- 1/16” screen material over existing crawlspace, attic, gable end or eave vents.

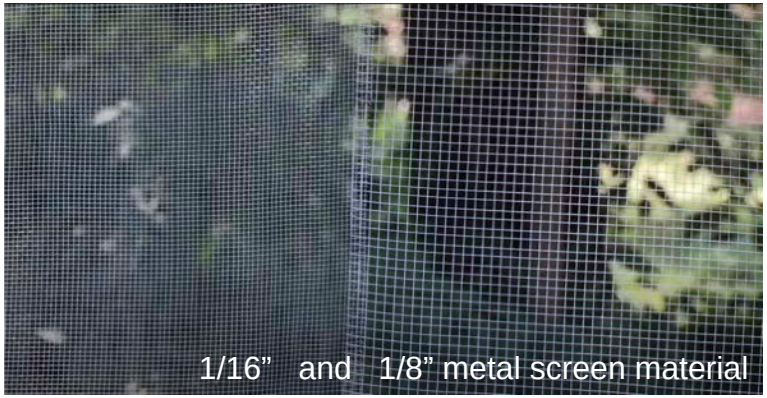
Option #2 - Replace crawlspace vents with wildfire-resistant vents.
Option #2a - Replace soffited eave or gable end vents with wildfire-resistant vents.

Option #3 - Retrofit an open eave to a closed eave (w/ or w/o venting).
Option #3a - Review total air flow calculations for crawlspace or attic ventilation to create a new, protected venting system.

Home Hardening

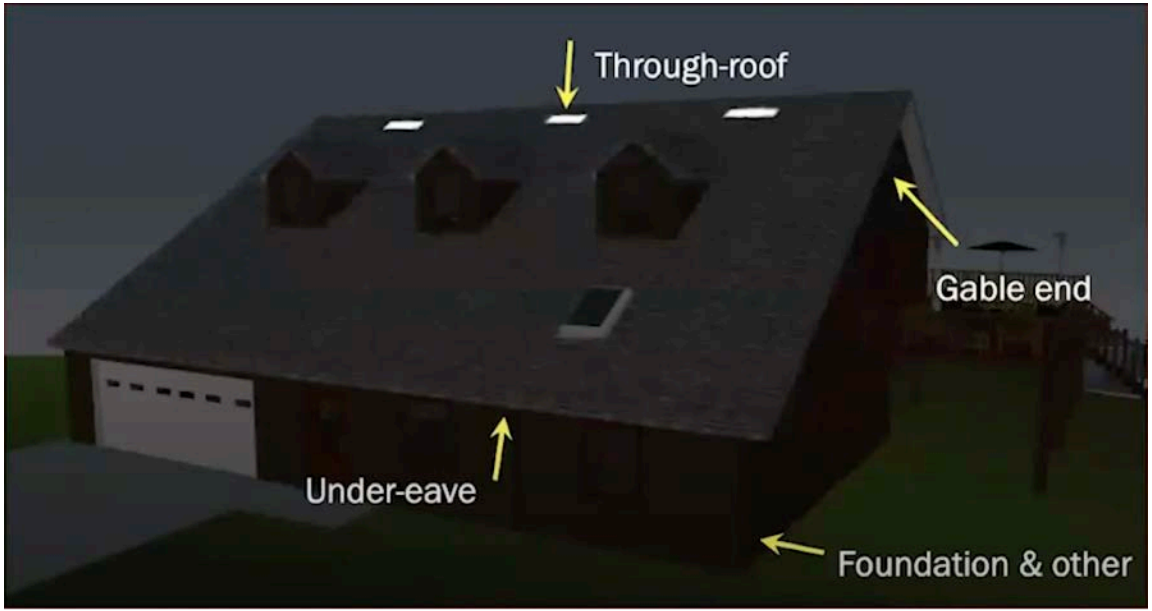
Vent Retrofitting

Vents are designed to create air flow and remove moisture above and below your living space, but they can draw embers inside and ignite combustible material in those spaces. Remove combustible materials stored in the attic and crawlspace.



Insurance Institute for Business & Home Safety (IBHS)

Fire Safe Marin

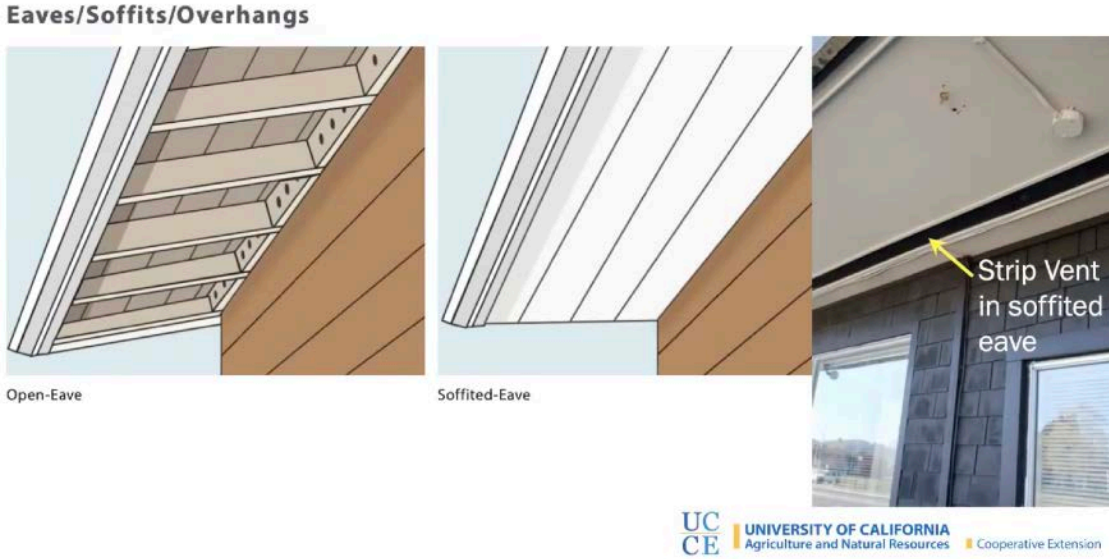


Insurance Institute for Business & Home Safety (IBHS)

Home Hardening

Attic vents

Screen open eave vents with wire mesh, or retrofit your eave with a closed soffit.



Unvented Roof using air displaced system.

Source: UCANR.edu

Insurance Institute for Business & Home Safety (IBHS)

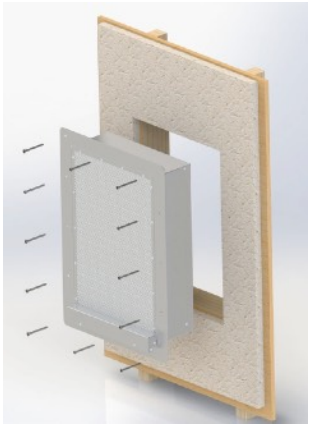
Home Hardening

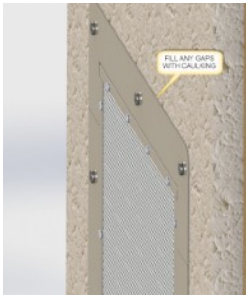
Attic vents

Swap-out an existing vent or creating a new vent opening.

Source: Vulcan Vents

Source: UCANR.edu





Source: Embers Out

Source: UCANR.edu_fireguardvent

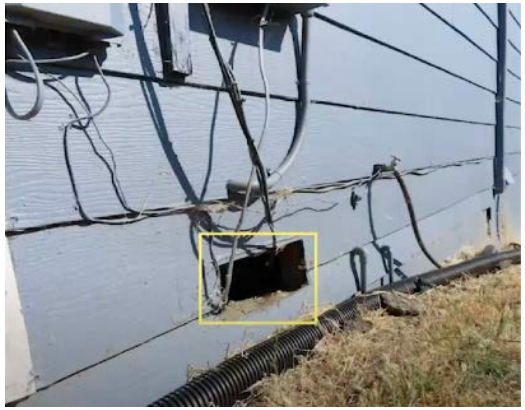
Source: familyhandyman

Home Hardening

Foundation vents

Screen existing foundation vents or install approved ember-resistant vent products.

Vulcan products use a honeycomb matrix with an intumescent coating (expands when exposed to heat) to further prevent embers from entering.



Brandguard fire safety vent utilizes a baffle design.

Home Hardening

Foundation vents

Swap-out of existing vents with new vent product.

Don’t forget the pet door.

Vulcan Vent®
Foundation Exterior Retrofit – Wood Siding
(VF414FF, VF614FF, VF814FF)
Installation Instructions.

After removing the old vent, you will need the following tools & supplies:
Screw gun w/ tip for your screw type or hammer (if using nails)
4) 1" to 1.5" Wood Grip Screws, or Nails

1) **Remove old vent.** Depending on how old vent was installed you may need a hammer and cat's-paw or crowbar OR a drill gun with the appropriate tip.

2) Install new vent: Fit the new vent into the opening and secure it with nails or screws.

Optional: Depending on weather conditions, overhangs and building codes in your area, it may be necessary to use a clear silicone caulk along the edge of the vent, once it is securely fastened in place.

This entire process should only take a few minutes to complete depending on existing conditions. If any questions arise regarding the installation process, please call Gunter Mfg. at 916-652-7424.

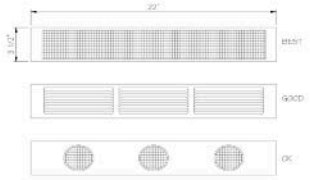
Home Hardening

Vent Calculations

ATTIC VENTILATION CHART					
TOTAL AFFECTED SQ. FT.	367				
VENTILATION RATIO	1/150				
VENTILATION AREA REQUIRED	2.45 SQ. FT. = 352.8 SQ. IN.				
MODEL	SIZE	LOCATION	QUANTITY	APPROX. FREE AREA	TOTAL FREE AREA
VE3514	3.5"x14"	(N) ROOF AREA	15	24 SQ. IN.	360 SQ. IN.

Net Free Area (NFA)

The net free-area of a vent cover is equal to the total vent opening less the interference to air flow caused by a screen or louver used for ventilation. Screened or louvered vent opening covers are typically marked by the manufacturer with the "net free-area." For example, a 22.5 in. by 3.5 in. eave vent screen with a total area of 78.75 square inches may have a net free-area of only 45 square inches.



The Importance of Attic Ventilation

A great deal of research has gone into the benefits of preventing heat buildup in attics in the summer, especially given that ducts are often located in the attic. The energy code encourages radiant barrier, insulation at the roof deck of a vented attic, and some means of mechanically ventilating an attic, such as whole house fans.

One of the most effective tools for removing heat from an attic is passive attic vents. Poor attic ventilation alone has been known to cause air conditioners to run at night even when it is cool outside, due to the trapped heat in the attic. There are a variety of types of vents: gable end, eyebrow, dormer, cloaked dormer and eave vents, and the latter being the most common, but also the most likely to be affected by improper installation of ceiling insulation and poor framing practices. It's not uncommon to look into a screened eave vent (top example above) and see nothing but insulation. While insulation is very poor at stopping airflow into or out of a house, it can be quite effective at reducing attic air movement.

HERS Raters will check to make sure that the required vent area is unobstructed all the way to the main volume of the attic. Obstructions by framing or improperly baffled insulation will result in a failed inspection. Designers are encouraged to install more ventilation than is allowed by code. The code minimum is actually not intended for the heat removal that we desire. More is generally better.

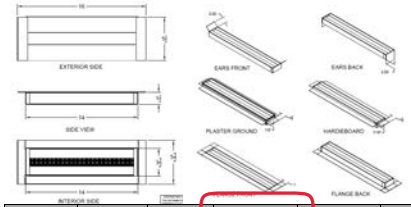
CalCERTS, Inc.

BRANDGUARD Vents TENMAT

KEY SPECIFICATION

Product Spec Sheet

3.5" x 14" EXTREME Soffit/Eave Vent Model # UE3021



Soffit/Eave Vents	Model	Size W x L	NFVA Provided (sq in)	Flanges Available	Flange Definition	Weight
	UE3021-FF	3.5" x 14"	13	Flange Front	Flange Front	3lbs
	UE3021-PG	3.5" x 14"	13	Plaster Ground	7/8" J Channel	3lbs
	UE3021-H	3.5" x 14"	13	Hardie/Cement	7/16" setback	3lbs
	UE3021-EF	3.5" x 14"	13	Ears Front	2" side flanges	3lbs
	UE3021-EB	3.5" x 14"	13	Ears Back	2" side flanges	3lbs
	UE3021-FB	3.5" x 14"	13	Flange Back	Flange Back	3lbs
	UE3021-RE	3.5" x 14"	13	Retrofit Eave	For rafters	3lbs
	UE3021-RS	3.5" x 14"	13	Retrofit Soffit	Flange Front	3lbs
Continuous Soffit and Custom sizes/materials AVAILABLE						

BENEFITS:

- Safety vents that resist intrusion of flames, embers, EXTREME radiant heat, driving rain, snow, and rodents.
- **TRIPLE PROTECTION** (Patent Pending):
  - Anti -Clogging Overlapping Baffles
  - 1-2 Hour Fire Rated Intumescent strips inside baffles
  - 1/8" mesh on back side of vent
- Air flows through normally
- Approved and used throughout California and beyond. California BML Listing # 8165-2232:0500
- Prevents Rodent Entry
- 20 Year Warranty
- Easy to Install and Paint

STANDARD MATERIALS
1/8" mesh standard unless otherwise requested
ASTM A653/A653M- G90 hot dipped galvanized steel, 26 GA
Intumescent adhesive strips(1-2 hr fire rated) installed on internal baffles to provide extreme radiant heat protection
ASTM D9092- mill phosphatized coating for painting.- If bonderized
ASTM b370- Sheet Copper, 16oz and 20oz- if copper
Installation: Install like any other similar Ventilator Product on the market.

BRANDGUARD VENTS Inc. 6 Rancho Circle, Lake Forest, CA 92630 T: 949-481-5300 E: info@brandguardvents.com www.BRANDGUARDVENTS.com

Typ. building code requires 1 sq. ft. of venting (technically, "net free vent area, " or NFVA) for each 150 sq. ft. of attic. (1:150 ratio). A house with a 1,500-SF attic will need 10 SF of venting, ideally about half placed high on the roof and half in the eave/soffit. View the vent specification or look for the stamp on the vent for the NFVA.

Neighbors working together

You may be able to group some of these smaller retrofit projects together to create a larger project that is more attractive to a contractor or handyman.

LevelSet

Home Hardening

Matteo Garbelotto, Adjunct professor, Forest Pathology, UCB

Home Hardening
Resource Guide

Wildland Urban Interface - Home Hardening Self Inspection Checklist

Take a walk around the outside of your home and answer all of the questions below that apply. Determine what needs work and prioritize projects around preparing your home to be more fire-resistant. **"Remember the Ember" – top priorities should be near-home vegetation, roof, vents and gutters.**

NEAR-HOME VEGETATION and combustible mulch immediately around your home and under windows, eaves, and vents can ignite and provide a way for fire to enter the home

- Is the 5-foot zone around your home and deck free of flammable vegetation and all combustibles such as mulch, jute/natural fiber door mats, dry leaves/pine needles, firewood, etc? ☐ good ☐ needs work
- In order to break up fuel, is there recommended space between plants and between the ground and the lower branches of trees? ☐ good ☐ needs work
- Are grasses kept to a height of 3 inches or less? ☐ good ☐ needs work

THE ROOF has the greatest exposure to embers and is the most vulnerable part of a home

- Is the roof covering composed of approved fire-rated material, such as metal, tile or asphalt composition shingles? ☐ good ☐ needs work
- Are there any damaged areas needing repair/replacement? ☐ good ☐ needs work
- Is the rooftop, especially crevices around chimneys, sky-lights and architectural elements, clear of flammable debris? ☐ good ☐ needs work
- Are there any gaps at the edges of the roofing that can be filled? ☐ good ☐ needs work
- Are end tiles blocked (with metal mesh or steel wool, for example) to prevent bird nesting? ☐ good ☐ needs work

VENTS can allow embers to enter a crawlspace or the attic

- Are all vents covered with 1/8-inch metal mesh, or are special vents designed to resist embers and flames installed? ☐ good ☐ needs work

RAIN GUTTERS should be cleared of leaves and needles that embers can easily ignite

- Are the gutters clear of all flammable debris? ☐ good ☐ needs work
- Do the gutters have metal screens/covers in good condition? ☐ good ☐ needs work

EAVES & SOFFITS with open-eave construction should be inspected

- Wherever possible, are open eaves enclosed? ☐ good ☐ needs work
- Have gaps around exposed rafters and blocking been caulked and plugged? ☐ good ☐ needs work

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CHIMNEY

- Are all chimney and stovepipe outlets covered with non-combustible mesh screen/spark arresters in good condition? ☐ good ☐ needs work

WINDOWS can break from heat, even before a home ignites, allowing embers or flames to enter

- Are all windows multi-pane, tempered glass? ☐ good ☐ needs work
- Is outside flammable vegetation or other combustible materials cleared from within 5 feet of windows and glass doors? ☐ good ☐ needs work

SIDING is vulnerable if exposed to flames or radiant heat for periods of time

- Have all gaps and joints been caulked and plugged? ☐ good ☐ needs work
- Is there 6 inches or more of vertical noncombustible material maintained between the ground and the start of the siding? ☐ good ☐ needs work
- Has wood shingle or shake siding been replaced with ignition-resistant materials such as fiber cement or stucco? ☐ good ☐ needs work
- Is the dryer vent cover noncombustible and either louvered or self-closing? ☐ good ☐ needs work

DECKS are vulnerable to fires from embers igniting nearby vegetation or materials above/below

- Are all combustible items removed from underneath, on top of and next to all decks and porches? ☐ good ☐ needs work
- Is all combustible material removed from the small gaps between the deck boards? ☐ good ☐ needs work
- Is there a noncombustible layer between wood decks and siding? ☐ good ☐needs work
- Are under-deck and porch areas screened-in with wire mesh? ☐ good ☐ needs work

GARAGES are especially vulnerable to embers as they can enter through large gaps around the door, and attached garages can potentially ignite a house from the inside

- Is there weather stripping or gaskets around and under the garage door to limit ember entry? ☐ good ☐ needs work
- Are all combustible and flammable liquids stored in approved containers and away from ignition sources? ☐ good ☐ needs work
- Can you easily open the garage door when there's no power? ☐ good ☐ needs work

FENCES can burn right up to a structure and quickly ignite it

- Do fences or gates that connect to structures have noncombustible materials such as brick or metal within 5 feet of the building? ☐ good ☐ needs work
- Are fences cleared of any kind of combustible vegetation? ☐ good ☐ needs work

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Home Hardening

Resource Links

Insurance Business & Home Safety-
www.iafc.org/topics-and-tools/resources/resource/ibhs-wildfire-checklist

CalFire Prepare for Wildfire-
www.readyforwildfire.org/prepare-for-wildfire/get-ready/

University of CA Cooperative Extension-
www.ucanr.edu/sites/fire/Prepare/Building/

USDA Forest Service-
www.wildfirerisk.org/reduce-risk/home-hardening/

Sustainable Defensible Space (Eco)-
www.defensiblespace.org/house/

Questions or a home visit?
Please email me

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