

# **Protecting Homes and Communities from Wildfire: Preventative Cross-training Education for the Business Sector**

## **Curriculum Outline**

### **BUILDING MATERIALS AND DESIGN**

**Module Structure:** 1 hour cross-training

**Curriculum Objectives:**

Students will be able to

1. Identify the components of a house that determine its ignitability.
2. Determine alternative structural features to reduce ignitability
3. Identify what makes a roof Class-A
4. Identify hazards posed by attached structural components

**Summary:**

The ability of a structure to withstand ignition is essential to its survival in a wildfire event. Just as there are many factors involved in determining how much of a wildfire a house is exposed to, there are many features of a structure itself that determine its ability to survive a wildfire event. This section examines the different components of the structure as each plays a part in protecting a home or putting it at risk.

- a. A Systems Approach
  - i. No one factor should be singled out. Rather, a combination of factors contribute to these catastrophic structure losses, i.e., the common denominators
- b. Roof – Most vulnerable component of most homes
  - i. Should:
    1. Prevent ignition between roof deck and covering
    2. Limit Spread of fire beyond area of direct flame impingement
    3. Prevent fire from entering interior of structure from the roof assembly
    4. Prevent production of fire brands
    5. Prevent roof-edge ignition

- ii. Class-A
  1. Covering made from tile, slate, cement, asphalt or metal or
  2. Assembly must be rated for external fire exposure
- iii. Edge protection – keeps embers, bird-nests, etc, out.
- iv. Eaves - Can trap heat or provide access for embers
  1. Boxed
  2. Fire resistive materials
- v. Rain gutters – Non-flammable and free from debris
- c. Vents – Common path of entry for embers to enter home
  - i. Balance between moisture management and preventing ember infringement or direct flame infringement
  - ii. Examples: Gable, laundry, exterior wall roof, strip, soffit
  - iii. ¼ inch galvanized metal screen
  - iv. Spark Arresters with ½ inch screen required for chimneys
- d. Walls and siding
  - i. Prevent fire from gaining entry through wall assembly
  - ii. Prevent production of firebrands
  - iii. Limit spread of fire to other building components
  - iv. SFM Standard 12-7A-1
  - v. Fire resistive foam can be applied to existing materials to resist flame spread
- e. Door assembly
  - i. Limit radiant heat transfer through door to interior combustibles
  - ii. Prevent failure due to firebrand and debris impact
  - iii. Prevent fire from gaining entry through the door assembly
  - iv. Limit the spread of fire to other building components
- f. Windows
  - i. Dual Panes or tempered glass:
    1. Limits radiant heat transfer through window to interior combustibles
    2. Reduces chance of window failure from heat/flames
  - ii. Size of the window:
    1. Large windows, even if tempered/dual-pane can shatter under heat stress
    2. Smaller size and greater number of mullions within the window reduce chance of failure
    3. In high fire danger areas, metal shutters can be used to protect large picture windows
  - iii. Limit the spread of fire to other building components
  - iv. Prevent fire from gaining entry directly through the window assembly
  - v. Prevent failure due to firebrand and debris impact
- g. Decks, balconies, fences and other attached structures
  - i. County Building code does not allow any wood materials unless treated.

- ii. Decks should be constructed of Ignition-Resistant Materials and pass the performance requirements of SFM 12-7A-4, Parts A and B.
  - 1. Examples
    - a. Class A rated assemblies
    - b. Fire-X treated wood
    - c. Concrete
    - d. Metal
    - e. Heavy timber
  - iii. Screened/protected from accumulation of debris and combustibles
  - iv. First five feet of fences from structure constructed of non-combustible materials
  - v. Acceptable Materials:
    - 1. Fire X product.
    - 2. Enclosed deck system, concrete-base with waterproofing membrane
    - 3. Metal, concrete or other non-combustible.
- h. Fire sprinklers:
  - 1. Required both county and city building codes for new homes or remodel over a certain size
  - 2. For life safety primarily
  - 3. May help interior fires from spreading to surrounding areas, including neighboring homes and wildlands.
- i. Alternative Building Materials:
  - 1. Adobe
  - 2. Autoclaved Aerated Concrete (AAC).
  - 3. Others

### **Materials/References:**

State Fire Marshal - Public Resource Code and Health and Safety Code

<http://www.cdflmu.org/4291.pdf>

Structural components studies, Steve Quarles, University of California Cooperative Extension Advisor; Center for Fire and Research and Outreach

<http://firecenter.berkely.edu/quarles/squarles.htm>

The Homeowners Checklist, CDF and Fire Safe Council, Also available in Spanish

[http://www.fire.ca.gov/php/education\\_checklist.php](http://www.fire.ca.gov/php/education_checklist.php)

California Building Code, 2001

[http://www.bsc.ca.gov/title\\_24/t24\\_2001tried.html#part2](http://www.bsc.ca.gov/title_24/t24_2001tried.html#part2)

California Fire Code, 2001

[http://www.bsc.ca.gov/title\\_24/t24\\_2001tried.html#part9](http://www.bsc.ca.gov/title_24/t24_2001tried.html#part9)

International Urban Wildland Interface Code, International Code Council, 2003

<http://www.iccsafe.org/dyn/prod/3850S03.html>

**Other References:**

ICC Performance Code for Buildings and Facilities - Final Draft, International Code Council, August 2000  
California's I-Zone: Urban /Wildland Fire Prevention & Mitigation, 1996  
Development Strategies in the Wildland/Urban Interface, Western Fire Chief's Association, 1991  
I-Zone Series, California Department of Forestry and Fire Protection, UC Forest Products Laboratory, 2001  
Wildfire Mitigation-Southern California Wildfires of 2003, Mitigation Success Report, FEMA, 2004  
Ordinance 9111 San Diego County Appendix II-A, 1999  
Structure Survival on the 1990 Santa Barbara "Paint" Fire, Foote, 1994  
"Fire Safe Building Construction for Hazardous Fire Areas", Hunter, 2003  
"Structure Survivability", Hunter, 2004  
Emergency Express Terms By The California Department Of Forestry (Cdf) & Fire Protection Office Of The State Fire Marshal (Sfm) To The California Code Of Regulations, Title 24  
California Building Code (Cbc), Part 2 And The California Referenced Standards Code (Crsc), Part 12 Regarding Phase Ii - Wildland-urban Interface Fire Areas Building Standards