

Decks and Other Attached Structures



FEMA

Purpose

To provide guidance on the construction of decks and other attached structures on homes in wildfire zones. Other attached structures include balconies, porches, stairs, and ramps. All of these structures can be a source of fuel during a wildfire. Ignition by flames or firebrands can lead to ignition of the exterior of the building, resulting in substantial damage to or total loss of the building.

Key Issues

- Decks are often built at the top of a slope in the direct line of the most likely approach of a wildfire, putting these decks at a high risk of ignition. Building and deck orientation is therefore important in reducing the risk of exposure to a wildfire (see Fact Sheet #3, Selecting the Construction Site).
- Decks constructed of dimensioned lumber are combustible and subject to quick ignition.
- Embers, firebrands, and hot gases can become lodged or trapped under decks and other attached structures, where the structures attach to the building, and in the gaps between board decking. They can also settle against exterior walls and accumulate at railing edges. All of these things increase the risk of ignition of these structures and ignition of the home.

Guidance for New Decks and Other Attached Structures

Siting

Orient decks and other attached structures to avoid exposure to the path of a wildfire. Avoid constructing these structures near heavily vegetated areas and topographic features such as steep slopes, gullies, canyons, saddles, ridge tops, and narrow mountain passes (see Fact Sheet #3, Selecting the Construction Site).

Construction Materials

Use heavy timber or noncombustible materials (see Figure 1). The following materials are recommended:

- For columns, use a minimum 6-inch × 6-inch timber or concrete block or steel.

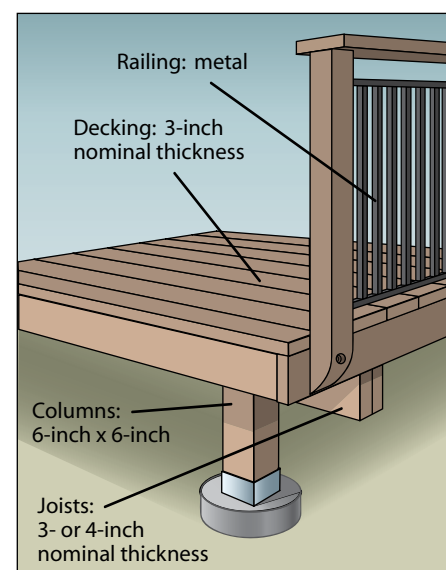


Figure 1. Deck constructed of heavy timber.

- For floor joists and beams, use heavy timber, 3-inch to 4-inch nominal thickness fire-retardant-treated wood, or concrete block or steel framing.
- For railings, use minimum 3-inch nominal thickness fire-retardant-treated wood or metal, cables, or tempered glass.
- For decking and stair treads, use exterior fire-retardant-treated wood, minimum 3-inch nominal thickness, or brick or concrete pavers and a suitable drainage mat over wood decking or metal grates. Light, poured concrete may also be a suitable deck covering.

Due to insufficient data comparing the performance of plastic and composite materials to heavy timber decking when exposed to flames and heat, FEMA does not recommend the use of plastic or composite decking in high Fire Severity Zones. However, the University of California's Center for Fire Research and Outreach (Berkeley) has conducted some testing on plastic and composite materials used in decks. Results are as follows:

- Plastic and composite products with channels on the underside of the decking degraded early when exposed to under-deck fires.
- Products with hollow construction exhibited board collapse when exposed to firebrands.
- Some products with a solid construction performed similarly to 2-inch thick nominal wood decking, but many did not perform as well as heavy timber decking.

More information on the testing is available at http://www.fire.ca.gov/fire_prevention/downloads/Part_12_CA_SFM_12-7A-4_Test_Standards.pdf.

Construction Techniques

- Isolate the attached structure by surrounding it with noncombustible material such as gravel, brick, or concrete pavers to prevent vegetative growth and reduce fuel in a wildfire (see Figure 2).
- Enclose the underside of the deck with fire-resistant skirting that acts as a shield against embers and reduces the probability that radiated and convected heat will ignite the deck (see Figure 2).
- To prevent ember intrusion in gaps between the decking and home (such as in offset ledger board construction), cover the gaps with 1/8-inch metal screening. Install flashing on ledger boards that are attached without gaps to create a barrier to embers and prevent water from penetrating (see Figure 3).
- Cover exposed floor framing at the underside of attached structures with a fire-resistant soffit such as fiber-cement panels. The soffit should have weep holes with a maximum diameter of 1/4 inch to allow water that leaks through the decking to drain out of the soffit space.

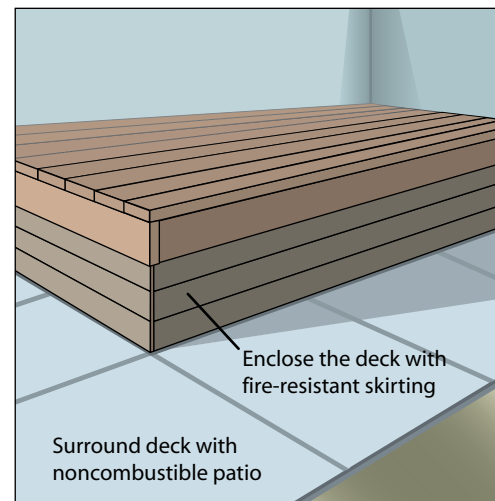


Figure 2. Deck isolated by a patio.

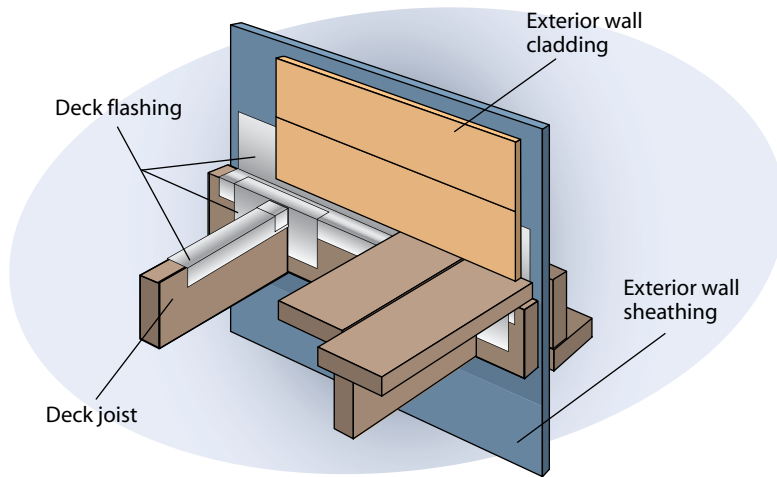


Figure 3. Deck flashing.

Guidance for Existing Decks and Other Attached Structures

To enhance the performance of existing decks and other attached structures, the following are recommended:

- Replace combustible materials with noncombustible or fire-resistant materials.
- Replace dimensional timber railings with railings constructed of fire-resistant materials such as metal, tempered glass, cables, or 3-inch nominal thickness fire-retardant-treated wood (see Figure 4).
- When the deck, balcony, stairs, or ramp can accommodate or be reinforced to accommodate additional load, install brick or concrete pavers and a suitable drainage mat over the existing decking (see Figure 4).

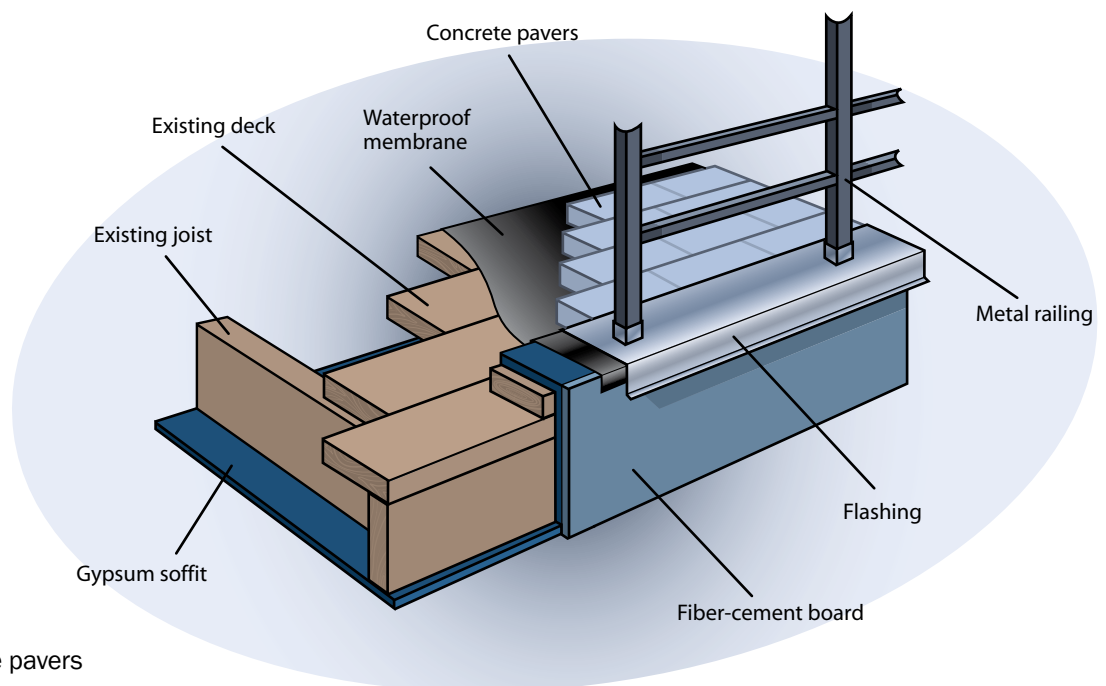


Figure 4. Concrete pavers over existing deck.

- Construct deck skirting around the deck using fire-resistant or noncombustible material such as fiber-cement boards and/or construct a patio on the ground around the deck, stairs, or ramp.
- Install a soffit at the underside of balconies, decks, stair landings, or ramps when skirting is not installed (see Figure 4).

Considerations

- Maintenance and removal of combustible debris and vegetation around and under decks and other attached structures is a key factor in reducing vulnerability to ignition during a wildfire (see Figure 5). For more information on defensible space, see Fact Sheet #4, Defensible Space.
- Decks and other attached structures should be maintained by replacing deteriorated components before they lose their fire-resistance.
- Decks enclosed with fire-resistant skirting must be vented for moisture control (see Fact Sheet #8, Vents).



Figure 5. Combustible debris under this deck ignited and led to the destruction of the deck. Although the siding is noncombustible, the fire spread from the deck through a window to the interior (firecenter.berkeley.edu).

Effectiveness

All mitigation measures listed in this Fact Sheet are effective in all Fire Severity Zones.

Resources

Decking: SFM Standard 12-7A-4. 2001 California Referenced Standard Codes (Part 12, Title 24, C.C.R.). http://www.fire.ca.gov/fire_prevention/downloads/Part_12_CA_SFM_12-7A-4_Test_Standards.pdf.

University of California Agriculture and Natural Resources. Fire Performance Testing: Decks. http://firecenter.berkeley.edu/quarles/deck_kit-SQ.pdf.