Enhanced Sprinkler Protection for Hotels in the Wildland-Urban Interface

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In the early '80s a series of well publicized fatal high-rise hotel and office building fires in the the United States resulted in the code development community instituting requirements for enhanced fire detection and suppression equipment and systems in high-rise buildings, hotels included, in the nation's building and fire codes. While that effort largely affected only new construction, many states[1], cities[2] and counties[3] passed statutes and/or ordinances imposing those enhanced requirements for existing hotels as well. Many hotel owners and operators[4] also voluntarily retrofitted thousands of hotels with such equipment and systems in the '80s and '90s.

The result? By the mid-90s fire deaths, injuries and significant property damage in hotel fires had plummeted to the point of statistical insignificance in the overall picture of fire losses in the United States[5].

Fast-forward four decades. For existing and newly constructed hotels, within or at the wildland-urban interface (WUI), the threat from catastrophic fires is now largely from the outside, the result of structure exposure to massive wind-driven wildfires. That is especially true if such hotels are located within designated 'extreme/very high' or 'high' wildfire hazard zones[6].

Since 2010, hundreds[7] of people have been killed and injured, more than 50,000 structures have been destroyed and millions of acres of timber and animal habitat have been lost to wildfires. The period of 2015-2018 represents, to date, the pinnacle of historical losses of all types in western states wildfires in the United States. The largest loss-by-dollars fires since 2015 have all been wildfires[8]. The 2018 Camp Fire in Butte County, CA alone resulted in at least 86 fire deaths[9] and destroyed more than 18,800 structures, historically California's largest wildfire ever.

[1]Louisiana, Nevada and Florida were among states that did so.
[2]For example, New York City Local Law 16 (1984)
[3]The County of Maui, HI did so in the mid-90s.
[4]Hilton Hotels Corporation, the Sheraton Corporation, Westin Hotels & Resorts and the Marriott Corporation were among hotel industry members who mandated sprinkler systems, fire alarm systems and smoke alarms in all of their hotels, new and existing, regardless of height, in the mid-80s.
[5]See https://www.washingtonpost.com/news/post-nation/wp/2017/06/15/risk-of-high-rise-fire-deaths-in-u-s-has-dropped/?noredirect=on&utm_term=.cec92fc21218
[6]See, for example, the California wildfire hazard zone maps and update http://fire.ca.gov/fire_prevention/fire_prevention_wildland_zones_maps
[7]See https://phys.org/news/2018-11-deadliest-wildfires-states-1990s.html
[8]See the NFPA report https://www.nfpa.org/News-and-Research/Data-research-and-tools/US-Fire-Problem/Large-loss-fires-in-the-United-States/Largest-fire-losses-in-the-United-States
[9]For a brief description of this fire's carnage see https://en.wikipedia.org/wiki/Camp_Fire_(2018)

The Caughlin Ranch Fire, November 18, 2011 Reno, NV.

We saw internally sprinklered hotels (among other types of occupancies)[10] of Type IV construction burn to the ground in the Tubbs wildfire in Santa Rosa, CA in October 2016, the result of external exposure to that wildfire.

Traditional sprinkler systems inside buildings are no defense to this continuing wildfire threat. Earlier the fully sprinklered (internal) Two Elk Lodge on the top of Vail Mountain burned to the ground in October 1998, the victim of domestic terrorists, who torched the outside of the Type III heavy timber constructed facility. When rebuilt the following year external exposure sprinklers were added around the entire perimeter of the larger facility under the eaves.

So, what about external sprinklers?

The Standard for the Installation of Sprinkler Systems, NFPA 13, allows for, but does not require, external 'exposure' sprinklers. Some guidance is provided as to design requirements[11], but the expectation is that the building is otherwise sprinklered and the exposure sprinklers are in addition to standard sprinkler protection. External sprinklers are typically horizontal sidewall, extended coverage, corrosion resistant types, often closely spaced.

Nonetheless, external sprinklers alone have a proven record of success in wildfires. The 2007 Ham Lake and Gunflint Trail fires in northwest Minnesota proved the effectiveness of external sprinklers. In those fires dozens of homes equipped with external sprinkler systems generally survived those wildfires where adjacent homes without external sprinklers were lost[12].

In the more recent 2018 Camp Fire in Paradise, CA., one forward thinking homeowner who deployed external sprinklers and maintained defensible space saw their home survive while those around them burned to the ground[13].

Western States routinely classify areas in their wildland-urban interface by their wildfire risk, producing maps[14] to be used by local building and fire officials to evaluate the risk vis-à-vis applicable code requirements for structures.

Of the western and mountain states all but Oregon and Idaho adopt the International Wildland-Urban Interface Code (IWUIC), in addition to their state building and fire codes, to further address requirements for structures built in wildlands.

[10] On October 8, 2016 the fully sprinklered Hilton Sonoma Wine Country hotel and the adjacent Fountaingrove Inn and Equus Restaurant in Santa Rosa, CA were destroyed by the Tubbs fire, see https://www.youtube.com/watch?v=Ab0_X4b-KAA

[11] See NFPA 13-2016 Secs. 7.7 and 11.3.2.

[12] For details of those successes, see 'External Sprinkler Systems and Defensible Space: Lessons Learned from the Ham Lake & the Gunflint Trail', J. Johnson, T. Downing and K. Nelson, Department of Forest Resources University of Minnesota, April 15, 2008.

[13] See this account of the success of external sprinklers in combatting wildfires, http://www.philly.com/news/nation-world/paradise-california-camp-fire-homeowners-prevention-20181201.html

[14] See the California state-wide map here http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_statewide;

However, that code has only been in existence since 2003, so millions of existing structures were built without regard to the wildfire risk.

A recent code change proposal for the 2021 International Wildland-Urban Interface Code to require external sprinklers for new Type III, IV and V[15] (non-fire resistive) buildings, otherwise requiring sprinkler protection throughout and located within 'extreme' and 'high' wildfire hazard zones, went down to defeat.

NFPA's *Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural and Suburban Areas* (NFPA 1141-2017) requires sprinkler protection for residential buildings[16], but not external sprinklers.

The Camp Fire in Butte County, CA., from space November 8, 2018, courtesy of NASA

At a minimum hotel owners, investors and operators considering building a lodging accommodation within or at the wildland-urban interface should consider the small marginal cost of adding exposure sprinklers when the hotel otherwise requires an internal sprinkler system.

For existing sprinklered hotels in the WUI, adding external sprinklers to an existing sprinkler system is generally possible at a modest cost and may improve their insurability.

How many more lodging accommodations must burn to the ground?

[15]See NFPA 220 (2018) Standard on Types of Building Construction, Chapter 4 for the definition of each type of construction.

[16] See NFPA 1141 (2017), Sec. 8.1.2.

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