NEW FIRE AND WIND

By Kelly Luckett, LEED AP, and Steven W. Peck

The long-awaited fire and wind design guides for vegetative green-roof systems are finally complete. In February, the American National Standards Institute (ANSI) accepted VF-1, *Fire Design Standard for Vegetative Roofs*, developed by Green Roofs for Healthy Cities (GRHC), the green-roof-and-wall trade association; and SPRI, Inc., the trade association representing the manufacturers of commercial roofing systems and component suppliers. A code-change proposal has also been submitted to the International Building Code to include this fire standard in the 2012 edition of the International Building Code. On the wind side, RP-14 was recently approved by ANSI.

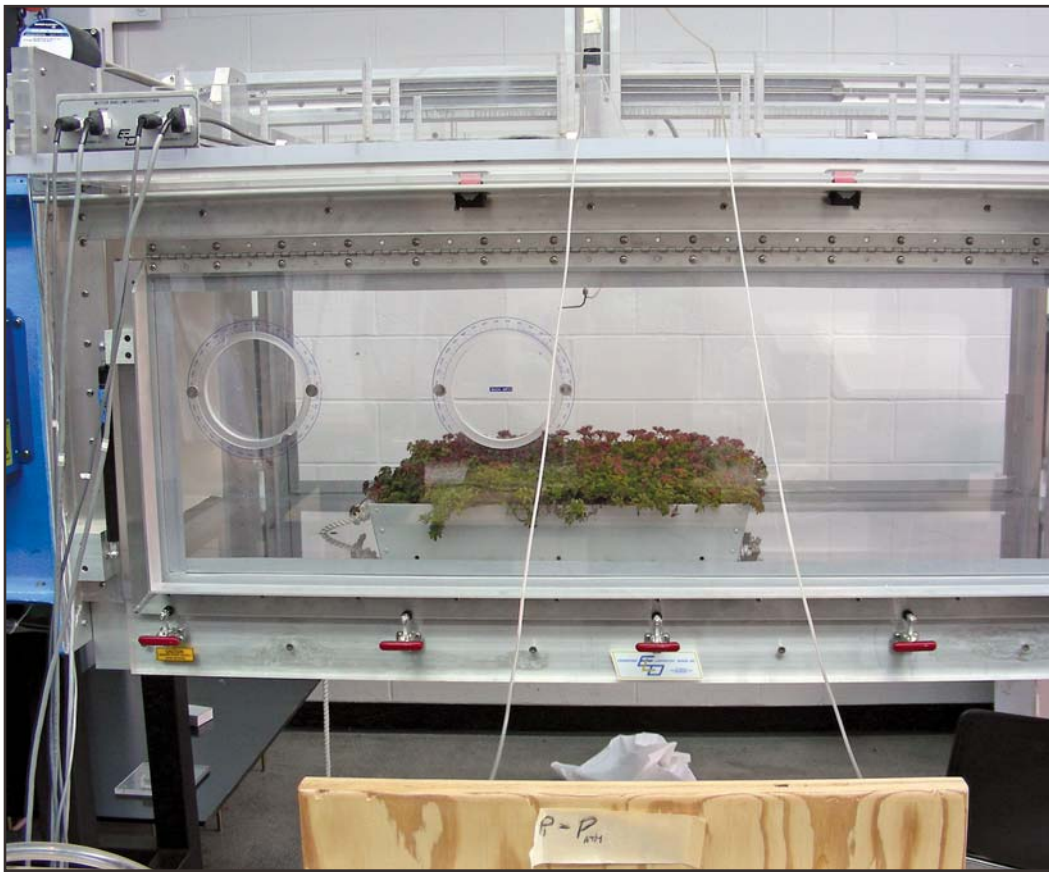
Both VF-1 and RP-14 (available under "Design Standards" at www.greenroofs.org) were the result of stakeholder consensus from the roofing, landscaping, and green-roof industries, including GRHC. While not everyone agrees with every provision, these standards set definitive design and construction requirements for green roofs that have been absent in the building codes that govern construction in North America. Acceptance by the International Code Council will make the RP-14 wind design guide and the VF-1 fire design guide the law of the land and change the way we design and construct green roofs.

VF-1 addresses three fundamental green-roof design considerations:

1. Location on a rooftop, where the green roof abuts vertical surfaces,
2. Dividers in the green roof called "firebreaks" that are intended to limit the spread of fire from one section of the rooftop to another, and
3. The maintenance of green roof systems to minimize their flammability.

Historically, no-vegetation zones at the perimeter of the roof and around roof penetrations have consisted of varying widths of gravel to limit the risk of fire spreading from the field of the green roof to the exterior walls and through openings in the roof surface to the interior of the building. However, the use of gravel aggregate on rooftops is prohibited in windborne debris zones near coastlines, and there has been a trend within the building engineering community to eliminate the use of gravel on rooftops altogether. Not all parapet and roof penetrations are constructed of flammable materials. Rather than arbitrarily mandating barriers at all vertical surfaces, VF-1 requires attention only to vertical surfaces that are constructed of flammable materials.

Additionally, the new standard requires the 6 ft of roof surfaces adjacent to the flammable vertical surfaces to be covered



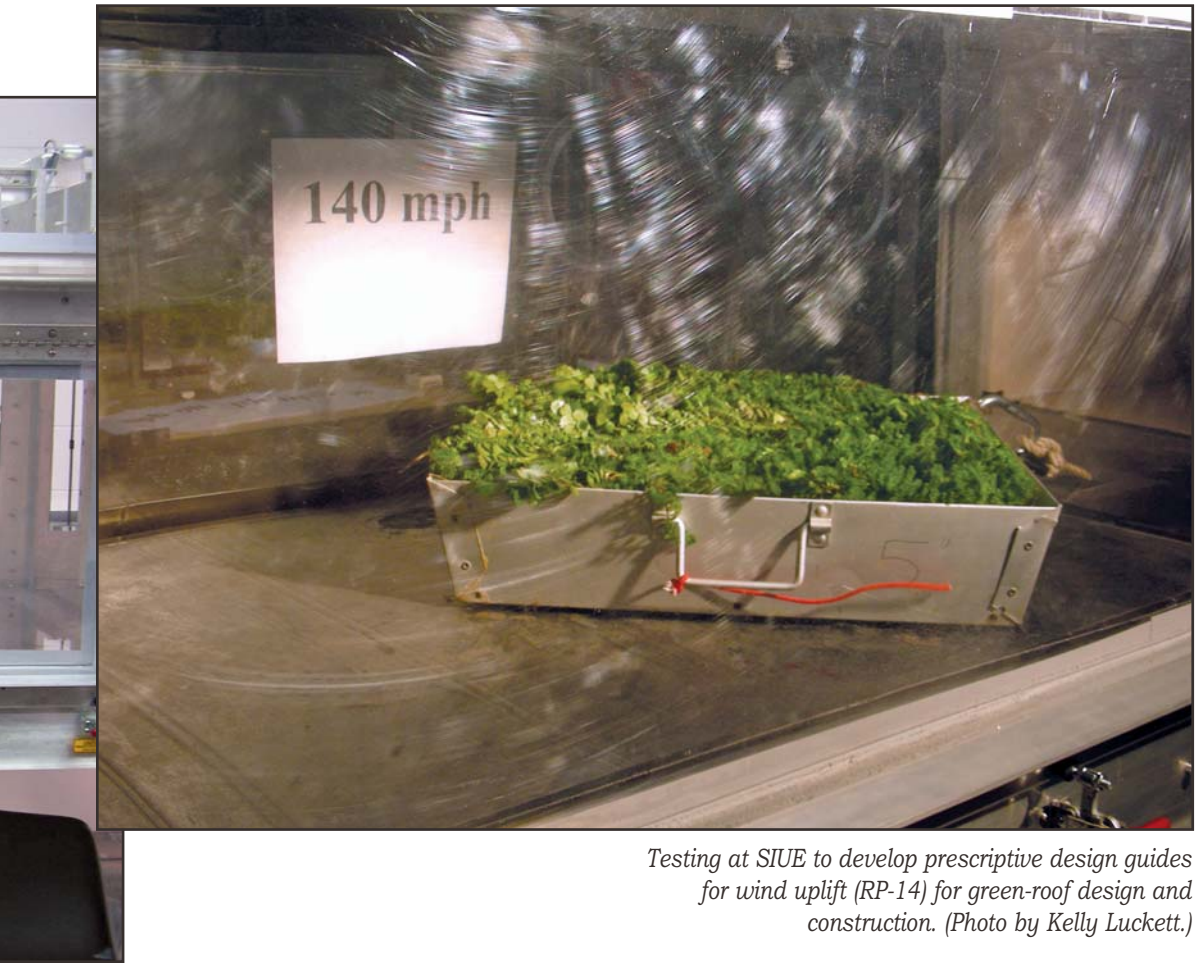
Southern Illinois University Edwardsville (SIUE) wind tunnel testing in June 2009. The tests revealed some issues regarding the minimum level of vegetative coverage necessary to keep the growth media from becoming airborne. (Photo by Kelly Luckett.)

STANDARDS FOR GREEN ROOFS ADOPTED BY ANSI

with a Class-A fire-rated material. Therefore, the use of a Class-A fire-rated roofing membrane at these locations eliminates the need for no-vegetation zones. Green roofs that do not employ Class-A fire-rated roofing membranes will be required to use 6-ft-wide, no-vegetation zones consisting of nonflammable materials such as concrete pavers.

Firebreaks are similar to setbacks at the perimeter and roof penetrations but are required on the interior of very large rooftops. VF-1 requires a 6-ft-wide strip of Class-A fire-rated material every 125 ft or 15,625 sq ft. The use of a Class-A fire-rated roofing membrane also eliminates the need for no-vegetation zones at firebreaks, perimeters, and roof penetrations.

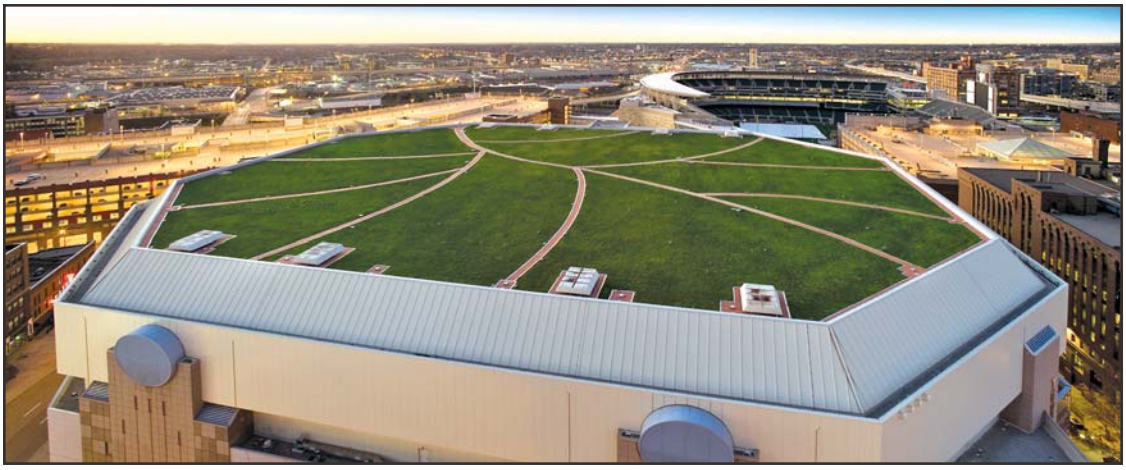
Finally, prudent design can go only so far to reduce the risk of flame spread across a green roof. The primary factor in reducing the flammability of green-roof plants lies in the maintenance of the green roof. VF-1 stops short of mandating irrigation systems on all green roofs, instead requiring property owners to perform necessary maintenance to keep the plants healthy, including irrigation, fertilization, and weeding. Additionally, owners of green roofs with plants that produce dead foliage (such as prairie grasses) must remove this flammable material no less than twice per year.



Testing at SIUE to develop prescriptive design guides for wind uplift (RP-14) for green-roof design and construction. (Photo by Kelly Luckett.)

FIRE MARSHAL MAY REQUIRE MAINTENANCE PLAN

In an interesting development, the core action items in VF-1 were proposed and adopted into the International Fire Code last fall. The approved measure included language that entitled the local fire marshal to require a maintenance plan for vegetative green roof systems. This effectively moves green roof maintenance requirements from postconstruction to preconstruction, as the fire marshal's review of the construction documents occurs prior to the issuance of building permits. This new measure also transfers the policing of the green roof maintenance requirements from the building inspector to the fire marshal, significant because the building inspector enters the building only at the conclusion of construction and at subsequent occupancy changes. The fire marshal, however, conducts routine inspections and will now have the authority to identify violations of the green-roof maintenance requirements and issue citations to the



Minnesota's Target Center has a 2.5-acre extensive green roof, capturing nearly 1 million gallons of storm-water annually. The red and white "vein" pathways, which give the green roof a leaf-like appearance, act in part as firebreaks that would limit the spread of flames in the event of a fire. (Photo by John Wiese.)

property owner.

The green-roof industry has long been fighting early misconceptions spread by various media outlets espousing green roofs to be "maintenance-free." The actions taken by the International Code Council will make huge strides in correcting the resulting unrealistic expectations regarding the necessary maintenance onus that falls to the owner of a green roof. Educating prospective green-roof owners about the maintenance requirements of their green-roof investments is critical to the success of the green-roof concept. Unpleasant as it may be to discuss the future expenses of a roofing option that is already much more expensive than traditional roofing processes, it pales in comparison to that of the conversation with an unhappy green-roof owner who was allowed to enter into a green-roof endeavor expecting zero maintenance.

GRHC is launching a new advance maintenance practices program at its Eighth Annual Conference in Vancouver this fall. More information on the new fire and wind standards will be presented at CitiesAlive: Eighth Annual Green-Roof-and-Wall Conference in Vancouver, BC, November 30 to December 3, 2010 (visit www.citiesalive.org).

The new fire and wind standards may be downloaded free of charge from www.greenroofs.org.

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