KEY ROOFING STANDARDS FOR CONSULTANTS

INDUSTRY GROUPS AND CODE BODIES FOCUS ON ROOFING

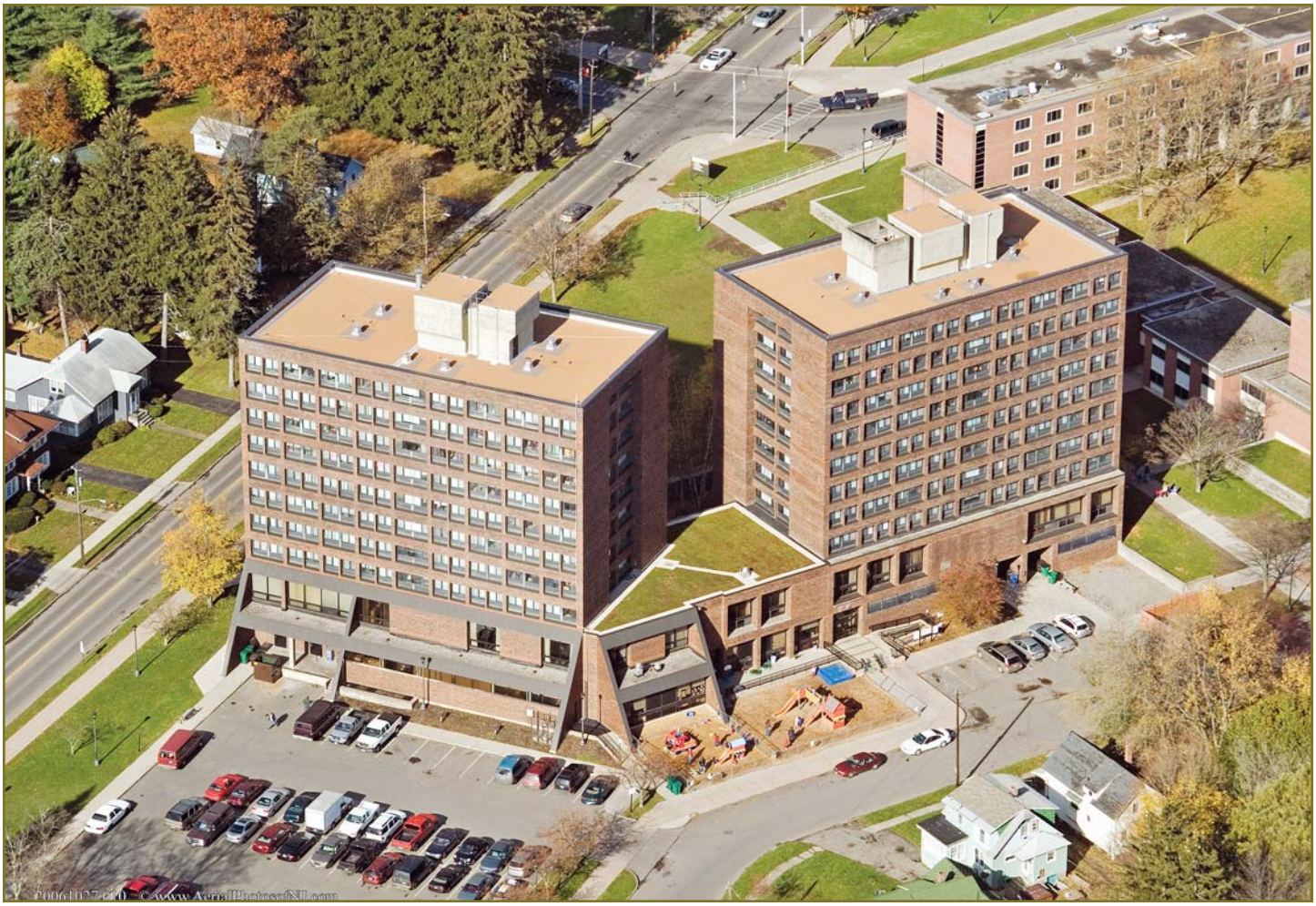
BY SPRI

Over the last several years, buildings and their key components are being scrutinized in terms of their long-term impact on the environment and their contribution to a sustainable society. Roofing systems, in particular, have received much of the attention. Besides their traditional waterproofing function, roofing systems are now tasked with saving energy, managing water supplies, reducing material impacts, and achieving extended life-cycle performance.

Because of the rapid growth of the green movement and cool roofing technologies, many of today's standards for roofing have become outdated and may not adequately reflect the internal and external changes affecting the building industry. Along with these new demands come new standards promulgated by code bodies and other organizations that may be unfamiliar with traditional roofing technologies and good roofing practice.

"Increasingly, outside influencers are creating and mandating standards that conflict with current roof design knowledge and best practices," says James Hoff, an RCIF Board member and chairman of *The 2009 Roofing Research Summit: Balancing the Future*. "The test methodologies for some ASTM standards governing roofing material performance are not in line with real-world performance criteria. Moreover, roofing is becoming an afterthought when standards-writing bodies and policy makers like ASHRAE and ASTM introduce new building

SPRI is currently working with the California Energy Commission to develop modeling data to support the inclusion of ballasted roofing systems as an approved alternative to cool roof systems. (Photo courtesy of Carlisle SynTec Incorporated, Carlisle, PA.)



The State University of New York at Cortland recently gave this green roof center stage. In reaction to a code change put into the International Code Council (ICC) stating all vegetative roof systems must undergo wind and fire testing, standards are in development to address these criteria. (Photo courtesy of Siplast Inc., Irving, TX.)

design standards."

Although interest in sustainable roof systems is increasing dramatically, there are currently no standards governing sustainability beyond singular characteristics such as roof reflectivity. This leads to exclusion of some high-performance roofing solutions and the specification of roofing systems that may actually be less sustainable over the long term.

"The addition of new energy and environmental practices into roofing may also have unexpected and adverse affects on the traditional role of roofs as one of the primary waterproofing systems for buildings. In addition, this creates confusion in the design, research, and roof consultant communities," according to Hoff, who is also president of TEGNOS Research Inc., Carmel, IN.

WRITING STANDARDS THAT MAKE SENSE

SPRI, the association representing sheet membrane and component suppliers to the commercial roofing industry, is working with a number of roofing industry organizations to develop meaningful standards that will benefit roof consultants and other design professionals over the long term.

As an accredited ANSI (American National Standards Institute) canvasser, SPRI has been extremely active in developing standards for acceptance into the building codes.

Since its inception in 1982, the association has widened its focus from single-ply roofing systems to a variety of other membranes and components, including vegetative roofs, gutters, cold adhesives, metal fasteners (corrosion-resistant), ballasted assemblies, fire- and wind-resistant roofing, and much more.

VEGETATIVE ROOFING

For many consultants, it's no longer a matter of considering a vegetative roof on the next project, but which type of design will work best. Thanks to the rapid growth of the green movement, vegetative roofs are one of the fastest growing systems in the low-slope market.

Among other things, SPRI is developing definitions for specifiers, roof consultants, and others that will help take the mystery out of vegetative roofs and the term's relationship to cool roofs, garden roofs, and energy-efficient roofing.

In 2006, requirements were included in the International Building Code (IBC) to evaluate the wind and fire performance of vegetative roof systems. At the time, none of the currently available standards for evaluating systems for these characteristics were adequate for evaluating vegetative roof systems.

In September 2007, SPRI and Green Roofs for Healthy Cities (GRHC) initiated the development of a wind standard for vegetative roofs under ANSI guidelines. A fire standard for vegetative roofs, which is a design guideline rather than a testing protocol, is also in development.

One example is the SPRI RP-14 wind standard. This document is being built off the RP-4 ballasted wind design standard, since both systems are technically ballasted roof assemblies. The standard also includes provisions to address the small stone found in the soil media used in vegetative roofs. Four ballots have been completed on this standard, although it has not yet achieved ANSI consensus.

In addition, the National Roofing Contractors Association (NRCA) has funded wind-tunnel testing to identify the maximum allowable growth-media exposure area before wind blow-off becomes an issue. A maximum area of 5 ft x 2 ft was found to provide acceptable performance; areas larger than this require enhancements such as tackifiers to prevent blow-off of growth media. This standard is being revised to include this information and will be sent out for reballot. A code change proposal has been submitted to the ICC to include this standard in the IBC.

The SPRI VF-1 standard is for fire-control designs to limit the spread of flame if a vegetative roof system were to catch on fire. This standard uses barriers of nonvegetative zones to contain a potential fire. Four ballots have been completed on this standard. Consensus has been obtained, and this standard will be sent to ANSI to be finalized. A code-change proposal has been submitted to the ICC to include this standard in the IBC.

Moreover, SPRI and the Department of Energy jointly funded a program to quantify the energy savings associated with various types of vegetated roof systems. This research program investigated the effects of various depths of growth media, the use of tray systems and nontray systems, and the impact of plants on the thermal performance of these systems. This program has been completed and will be presented at the 2010 RCI International Convention and Trade Show.

GRHC-SPRI VR-1, Procedure for Investigating Resistance to Root Penetration on Vegetative Roofs, is also coming along. One ballot has been completed on this standard. A significant rewrite of the standard has also been completed. It was sent out for a second ballot in the fourth quarter of 2009.

IBC CHANGES WILL IMPACT CONSULTANTS

On the national level, SPRI is working to influence two areas of the IBC that should be of significant interest to roof consultants.

Stone-Ballasted Roofs

There is currently a table in the IBC that specifies where stone-ballasted roofs can be installed. In some instances, this table is more restrictive than the requirements of the national consensus standard, ANSI/SPRI RP-4; in other cases, it is less restrictive.

This table was included in the code due to a concern for gravel blowing off roofs in windstorms. However, no data are available to indicate that roofs designed in accordance with RP-4 have exhibited this type of problem. It is SPRI's position that ANSI/SPRI RP-4 already addresses this issue, and all that roofing specifiers and consultants need to do is to reference the document.

SPRI is currently working with an industry coalition consisting of the Federal Emergency Management Agency (FEMA), the Asphalt Roofing Manufacturers Association (ARMA), and the Spray Polyurethane

ROOFING STANDARDS UPDATE

VEGETATIVE ROOFING

SPRI RP-14, Wind Standard for Vegetative Roofing
Status: Proposed ANSI standard being revised and reballoted.

SPRI VF-1, External Fire Standard for Vegetative Roofing
Status: ANSI consensus obtained; standard to be finalized.

GRHC-SPRI VR-1, Root Penetration Resistance on Vegetative Roofing
Status: Revised and reballoted in November 2009.

WIND-UPLIFT RESISTANCE

Restrictive IBC table on stone-ballasted roofs
Status: Industry coalition is proposing code change at IBC code change hearings in November 2009.

BSR/SPRI WD-1 2008, Wind Design Standard Practice for Roofing Assemblies
Status: ANSI-approved standard submitted for inclusion in IBC, November 2009.

Florida Building Commission – Revisions on use of ballasted roofs
Status: Industry coalition succeeds in allowing continued use of ballasted and aggregate-surfaced roofs in state of Florida.

BSR/SPRI/FM4435-ES-1, Wind Design Standard for Edge Systems Used With Low-Slope Roofing Systems
Status: ES-1 standard rewritten and reformatted; fourth ballot completed as of November 2009.

COOL ROOFING

California Energy Commission (CEC), CA Energy Code
Status: SPRI and others have ensured that prescriptive cool roof requirements for cost effectiveness in Title 24, Part 6, remain unchanged.

Use of ballasted roofing systems as an approved alternative in Title 24
Status: SPRI is working with CEC to provide CA-accepted modeling data for ballasted roofs.

ROOF ACCESSORIES

BSR/SPRI GD-1, Structural Design Standard for Gutter Systems Used with Low-Slope Roofs
Status: GD-1 is currently being rewritten for consistency with SPRI document ES-1 and to address other comments.

RD-1, Performance Standard for Retrofit Drains
Status: Successfully reballoted and scheduled to be submitted to ANSI for approval by the end of 2009.

Foam Association (SPFA) to develop alternatives to the current code language. A code change containing the proposed language has been provided and was heard at the IBC Code Change Hearings in November 2009.

Wind Uplift

In addition, Wind Design Standard Practice for Roofing Assemblies, BSR/SPRI WD-1 2008, is now an approved ANSI standard. This standard provides a two-part methodology of designing for uplift resistance of nonballasted, built-up, modified-bitumen, and single-ply roofing system assemblies installed over any type of deck. It also provides recommendations for enhancing the perimeter and corner regions of the roof to resist the greater wind loads that occur in these areas.

SPRI has submitted a proposed code change to include this standard in the IBC. A code-change proposal was submitted for the 2009/2010 code-change cycle.

COOL ROOFING STANDARDS

SPRI is working on two issues with the California Energy Commission's (CEC's) energy code requirements.

1. In all but two of the climate zones in California, the energy code includes prescriptive requirements for the use of cool (highly reflective) roof systems. By law, the commission must ensure that the requirements of the energy code are cost-effective. However, the cost effectiveness of the prescriptive requirement for cool roofing systems is being challenged.

   SPRI worked hard to determine the most effective manner in which to obtain installed cost information for cool single-ply systems to provide to the CEC. Based on information from many sources, including the SPRI information, cool roof requirements in Title 24, Part 6 (the CA Energy Code) remain unchanged as of this writing.

2. SPRI is also working with the CEC to allow ballasted systems to be considered an approved alternative to cool roof systems where they are currently included as a prescriptive requirement. The basis for this request is a study completed by SPRI after three years of aging studies at Oak Ridge National Laboratory. This study concluded that, due to the

SPRI and the Dept. of Energy have jointly funded a program to quantify the energy savings associated with various types of vegetated roof systems. (Photo courtesy of GAF Materials Corporation, Wayne, NJ.)

thermal mass of ballasted systems, they provide energy performance equivalent to highly reflective roof systems after two years of aging. The study report is available at no charge on SPRI's Web site, **www.spri.org**.

SPRI and the CEC staff are working to provide CA-accepted modeling of ballasted systems for inclusion in Title 24.

At the same time, industry organizations worked with the Florida Building Commission to continue to allow the use of ballasted roofing systems, which have been proven effective in the state of Florida, both from an installed-cost standpoint and a performance standpoint.

ARMA led this successful effort with support from SPRI and the SPFA. As a result of these combined efforts, the use of ballasted and aggregate-surfaced roofs is still allowed in the state of Florida. Thanks to these efforts, consultants can continue to specify a proven, cost-effective, ballasted roofing option.

METAL FASTENERS IN TREATED WOOD

SPRI is also undertaking a study to evaluate the effect of various types of wood preservative treatments on metal fasteners and components used in commercial roofing applications. SPRI, NRCA, and the RCI Foundation provided significant funding for this project. Much concern has been expressed that some of the new wood treatments will cause certain types of metal that come in contact with them to corrode, leading to failure of the metal component.

Since treated wood is commonly used as a nailer in commercial roofing applications, this study will determine the temperature/humidity conditions that exist at the nailer location in four different climate zones: the Northeast, the Northwest, the Southeast, and the Southwest. This information will help determine the corrosion potential of various types of wood treatments, since temperature and humidity trigger corrosion.

Results of this study will also be presented at the 2010 RCI conference.

Other SPRI standards in progress include:

- **BSR/SPRI/FM4435-ES-1, Wind Design Standard for Edge Systems Used with Low-Slope Roofing Systems.** This standard provides

the basic requirements for wind-load resistance testing and design for roof-edge securement, flashing systems, and nailers. It also provides minimum fascia thicknesses that lead to satisfactory flatness, as well as designs to minimize corrosion. It is intended for use with the specifications and requirements of the manufacturers of the specific roofing materials and the edge systems used in the roofing assembly, excluding gutters.

The latest revision to ES-1 combines the performance requirements included in the current version of ES-1, and it has been expanded to include requirements addressed in FM4435. This standard has completed four ballots. The standard has been rewritten and reformatted based on comments received, and it went out for a fourth ballot in November of 2009.

- **BSR/SPRI GD-1, Design Standard for Gutter Systems Used with Low-Slope Roofs.** The proposed standard specifies structural design for gutters used with low-slope roofing. The standard does not address water removal or the water-carrying capability of the gutter, as other building codes already address this issue. GD1 is being rewritten to accommodate comments received and to make it consistent with the revised ES-1.
- In addition, **SPRI RD-1, Performance Standard for Retrofit Drains**, was successfully reballoted and has been sent to ANSI to be finalized. It was scheduled to be reapproved in 2009, as of this writing.

SPRI also conducted a wind-design seminar on October 13, 2009, in Oklahoma City, OK, as well as a presentation on ES-1 at the Westcon Show on November 10, 2009.

SPRI is also planning to conduct three presentations at the RCI convention in March 2010. The papers being presented include:

- "Evaluation of Metal Fasteners Corroded from Contact with Preservative Treated Wood," by SPRI Technical Director Mike Ennis, RRC.
- "Thermal Performance of Vegetated Roof Systems," by André Desjarlais of Oak Ridge National Laboratory, and nonpresenting coauthor Mike Ennis.
- "Fire and Wind Resistance Standards for Vegetative Roofs," also by Mike Ennis.

For more information about SPRI and its activities, visit SPRI's Web site at **www.spri.org,** or contact the association at info@spri.org.