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# RIDING OUT THE STORM

ROOF MAINTENANCE requires attention before, during and after severe weather

This year alone, roofs have collapsed at a store in Georgia, a manufacturing plant in Ohio, a warehouse in Maryland, a firehouse in Virginia, an ice arena in Pennsylvania and a church in North Carolina. And with hurricane season in full swing, and winter snows looming, now is a good time for facility managers to think about ways to keep their buildings off that list.

Avoiding that fate isn't difficult, but it does require taking some time to set up an ongoing roof maintenance program, examining the roof when a storm is imminent, and inspecting again after the storm has passed.

Of course, before taking these steps, you want to know that the roof has been properly installed, says David Hawn, registered roof consultant (RRC) and president of Dedicated Roof and Hydro-Solutions, LLC. "You want a good installation and a good slope for draining." For most buildings, that means a fall of at least a quarter inch per foot of roof area, sloping toward the drain.

You also want to know that the contractor that installed the roof didn't cut corners in ways that may not be immediately apparent — say, by skimping on the use of the fasteners or the adhesive that attaches the roof to the structure, says Thomas Gernetzke, RRC and a project manager with Facility Engineering, Inc. If a storm in the area kicks up a great deal of wind, the roof may come loose easier

than it otherwise would. Similarly, the roof specifications may call for a roofing membrane of a specific thickness, but a slipshod contractor may switch in a thinner or lighter-weight product.

If the facility is located in a snowy area, it pays to work with a professional engineer to determine the approximate weight the roof can hold, says Doug Stieve, RRC and principal with Wiss Janney Elstner Associates. Then, you need to pay attention to the weather reports when snow is likely, and observe the accumulation of snow at the facility,

with the ANSI/SPRI ES1 standard, which applies to the design, specification and installation of edge materials used with low-slope roofs, says Sidney Hankins, RRC and president of Roof Design and Consulting Services. The standard focuses mainly on design for wind resistance, and any roofing or re-roofing project has to meet it, Hankins says.

## Inspection Checklist

Assuming the roof has been properly installed, it pays to complete a visual

## If ceiling tiles are falling or sprinklers start popping in a storm, evacuate the building; the roof may be caving in

keeping an eye on the actual accumulation including any large snow drifts. "If you're getting to the (maximum) range, get an engineer out there to evaluate," Stieve says. If the weight of the snow approaches the roof's structural capacity, it becomes necessary to have the snow removed from the roof and keep people out of the building until this can occur.

It also makes sense to become famil-

inspection at least once or twice each year, says Gernetzke. This provides a baseline of information, he adds. "Then you know what things are supposed to look like."

Moreover, routine inspections can help catch small problems before they become disasters, Hankins says. For instance, examine penetrations into the roofing system, as those areas are more prone to leaks during severe weather.

Another tip regarding regular inspections: If enough time is allowed, make repairs before severe weather is ready to hit. "If you only look at the roof the day of the storm, you don't have time to react," says Dale Purvis, RRC with Thompson Engineering.

Once a regular inspection program is in place, it makes sense to complement that with a once-over when a

storm is imminent. The goal here is to make sure that no debris or forgotten equipment is lying around that could become airborne and dangerous. Look for items that "might become a missile," if the winds pick up, Hankins says.

At the same time, keep an eye out for items that could clog the roof's drains or gutters, creating a backup of water, Hawn says. "When it does rain, you

want water to go where you want it to go," he says.

Both low- and steep-slope roofs can be vulnerable to water damage if the drains and gutters aren't kept clear, Hankins points out. That's particularly the case when the roof is surrounded by a parapet — a low wall — along its edge. If the water isn't able to move freely into the roof drain, it will pond. In cold weather, it's liable to freeze on the roof, leading to more serious problems.

Because roof failures usually start at the perimeter, examine the roof's edges closely. Say you notice a roof curb that's not secure. You'll need time to either secure it, or hire a contractor to do this. Otherwise, the unsecured portion "lets the wind have a point to grab. You get a zipper effect, where it tends to pull a larger area off," Purvis says.

Also part of preparing the roof for a severe storm is taking care of the rest of the structure, Hankins says. If the windows or doors break during the storm, air pressure inside the building can build, and contribute to roof failure. So, when you board up windows before severe weather, you're also helping to reduce the likelihood of roof failure.

"Studies have shown that the increased pressure inside, combined with uplift from outside, are a major cause of roof failure," Hankins says. Large warehouses are particularly susceptible to this, given the sizes of both the buildings themselves, and the openings, such as larger doors near loading docks.

### Storm Steps

Of course, you can't do much to repair or maintain a roof while the storm is underway; a roof isn't a safe place to be, especially if you're not familiar with it, Hawn says. So, if you sense problems during a storm like ceiling tiles falling or sprinklers popping, indications that the roof may be caving in, you'll want to evacuate the building.

What about shoveling during a snow storm? Here, caution is in order, particularly once the snow has started to accumulate. In the process of moving it from one place to another, you'll be placing even more stress on certain areas of the roof, Hawn notes.

Once you've taken all the steps you can to ensure the roof will weather the



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storm, what happens when it's over? Of course, if there's been some damage to the structure, you first need to secure the area to limit the risk of injury to people who might otherwise enter the building, Hawn says.

**Evaluate the Damage**

As soon as it's safe to examine the roof, you'll want to do so, says Chip Ward, president of AP Ward Consulting. This should help you get to a local contractor first, if one is needed, before other facility managers do. "You have a better shot of being at the front of the line."

As you review any damage, establish priorities, Ward adds. Anything that's causing leaks is top priority and needs attention as soon as possible. On the other hand, small scrapes to the membrane that aren't causing leaks or other non-moisture problems typically can wait. You'll also want to check the roof drains and gutters to see if they became clogged.

Similarly, you'll need to see whether any metal flashings have come loose, creating a risk of water getting into the building, Purvis says. If the roof has multiple levels, pay particular attention to the intersections of the walls and roof levels to make sure nothing has been dislodged, he adds.

Also on the checklist: listening for a crunching sound as you walk the roof. That may indicate that the roof actually was lifted by the storm and is settling back into place as you walk over it, Purvis says. If that happens, check it further. Or you may see that the fasteners have backed up and penetrated the roof membrane, so that they may cause leaks when the next storm hits.

For instance, Ward says he recalls one client who was finding leaks after a tornado came through, but couldn't find the source. While walking across the roof, Ward says he noticed piles of gravel; typically, it would be evenly distributed. That was an indication that the fasteners had become loose and the tornado had lifted up the membrane, causing leaks in some spots.

Several areas warrant checking that might not be apparent at first glance, Hawn says. For instance, confirm that all penetrations and penetration flashings remain firmly attached to the roof. The

same goes for any equipment screens, which should be "storm-worthy for the next event," he adds.

If the storm was severe and you want to determine whether the roof failed, allowing water into the substrate, you can complete a "non-destructive moisture survey," says Hawn. Water in the substrate can lead to mold and other problems. If that occurs, fix the

leak and replace the damaged insulation as well.

Hail also can damage roofs in ways that aren't apparent, Ward says. For instance, it can weaken the felt so that it no longer resists water, even as it remains intact.

Two options for checking for the presence of moisture within the roof, where it can't be easily seen, are a

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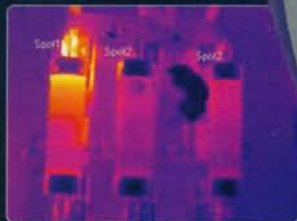
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RCI, Inc. is an international association of more than 2,500 professionals who specialize in roofing, waterproofing and exterior wall specification. Its members reside primarily in the United States and Canada.

Formerly Roof Consultants Institute, the name was changed to more accurately reflect the breadth of expertise within RCI, and to recognize the interconnectedness of different building systems. RCI members can provide information on the design, repair, planning, and quality of the roofing, waterproofing and exterior wall systems. They also can prepare building documentation, conduct forensic inspections, monitor construction progress and serve as expert witnesses.

Because RCI members are not affiliated with any manufacturer or product, and because they pledge to adhere to a code of ethics, their recommendations are independent and unbiased.

Among other services, RCI presents educational programs, a monthly journal and an online newsletter focused on roofing and waterproofing. The organization offers several professional designations, including RRC (Registered Roof Consultant), RRO (Registered Roof Observer) and RWC (Registered Waterproofing Consultant). These designations distinguish professionals who meet or exceed the organization's proven standards of education, experience and ethics.

For more information, visit [www.rci-online.org](http://www.rci-online.org).

nuclear moisture scan or an infrared examination, Hankins says.

Often, it makes sense to bring in a roofing consultant. He or she can properly assess the damage, and offer independent recommendations for repairing it. "If you notice anything suspicious, get an expert involved," says John Wells, registered roof observer (RRO) and president of Wells Klein Consulting Group. The consultant will be able to tell when forensic testing is in order to rule out any damage that isn't visible.

Finally, if the damage is extensive, you'll want to talk with your insurer to determine if it makes sense to replace the roof, Gernetzke says. This may be a reasonable course of action if you need to repair more than 25 or 30 percent of the roof area, or when the roof is older.

While roof maintenance often takes a back seat to other priorities on a facility manager's To-Do list, it is an important part of managing and looking after the asset, says Wells. An ongoing maintenance program can prevent more serious and costly problems down the road. ■

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