

Tracking the elusive leak

One of the toughest challenges that a roofing contractor has to face is being able to find a roof leak. But because the potential savings to an owner can be so great, it is a challenge that deserves our best shot. It is an unfortunate fact that each year many good roofs are torn off and replaced because a reported leak is not found and repaired.

The ideal person to look for a reported roof leak is a seasoned roofing superintendent who knows the proper application procedures for all kinds of roofing systems over a variety of substrates. This employee will know that the place to start an investigation is with a person who is familiar with the problem such as the owner or his representative. By discussing the situation with this person, the investigator can discover clues that will lead him or her to the leak's source. Such clues might include the location of the leak and the conditions present when the leak occurred.

An inside job

The next step might be an examination of the building's interior. Some clues may be discovered by simply noting the activities conducted inside the structure. Roof membranes can be adversely affected by operations that generate excessive humidity or vibration, or produce some chemical contaminant.

While poking around inside the building, the investigator will also want to note the deck's construction and whether mechanical fasteners have been used to secure the membrane or insulation. It will help the investigator locate the leak's source if the actual deck opening where the water enters the building can be found. This might be a weld burn or a section of the deck that has been cut for a pipe or curb. Sometimes the water may leak into the building at various points even though it is entering the roof system at only one location.



To see the underside of the deck, the investigator may have to move ceiling tiles or wriggle into crawl spaces. Other details about the deck's construction may only be revealed in the specifications or roof maintenance records.

During the interior examination, the investigator should study the condition of other building components for evidence of the nature and severity of the roof problem. If efflorescence is visible on a wall's interior surface, it may indicate that moisture has found its way inside the wall. Signs of changes to the interior may also point to the source of roof problems. If the investigator sees that a dropped ceiling or batt insulation above a dropped ceiling has been installed recently, he or she should look into the possibility that the roof system's dew point has been changed. If so, it may mean that water vapor within the building is condensing before reaching the vapor retarder.

This initial investigation should indicate if the roof is the true source of the problem. Just because there's a puddle on the carpet,



J.D. Miles III is an NRCA vice president and president of J.D. Miles & Sons, Inc., a roof contracting firm in Chesapeake, Va. 65529.

Roof leaks won't always be found directly above the point where water is dripping from the ceiling.

it doesn't automatically mean the roof leaks. The water may be entering the building through a roof drain or piping, a window, a wall, an air conditioning unit, an exhaust fan, a penthouse, a skylight, the coping or the counter flashing. It might even be the result of condensation on the bottom of the roof or on the air handling equipment, or a fault in the automatic sprinkler system or the plumbing. Each of these sources must be considered and eliminated before the investigator begins to concentrate on the roof itself as the culprit.

Once the leak's location inside the building has been determined, the job of hunting down the water's point of entry on the roof's surface begins. This will require the investigator to get up on the roof and examine the surface and its flashings. A rooftop examination should take place even if the investigator believes the water is coming from a non-membrane source just to make sure the roof isn't contributing to the problem.

Roof leaks won't always be found directly above the point where water is dripping from the ceiling. The water may be traveling some distance within the roof system or along the deck flutes or other components before it finds an opening into the building. It is possible, however, to backtrack from the inside leak to the point of entry on the roof's surface by following the route the water is most likely to take. If the leak's source can't be found close to the leak on the inside, the investigator should begin examining roof surfaces that are higher than the area directly above the leak.

Locating the leak's source

Several rooftop conditions can be the source of the roof leak. Sometimes the source is as obvious as an open window or a roof hatch. Other possible sources include curbs, walls, drains, gravel stops, scuppers or air handling units near the interior leak.

New base flashings on retrofit roofs should be examined to see that they have not been carried up beyond the old counter flashing and secured to the wall with a termination bar. If the original through-wall flashing is placed correctly above the counter flashing, the investigator should make certain that the weep holes have not been plugged or caulked. The horizontal legs of counter flashings or expansion joints that extend out away from the vertical plane of the wall should also be checked.

Metal copings, especially flat copings, deserve special attention. Rusting may be a problem if the joints are exposed to wind-driven water. The investigator should also check any field-fabricated miters and transitions at the metal coping.

Sagging, open flashings are frequently found to be the leak's point of entry. Base flashings are also common sources of problems such as punctures, especially where there is heavy foot traffic. Opened or separated laps in the base flashing or diagonal wrinkles that have cracked may also allow water to enter. Some of these problems may be discovered if the investigator walks along the base flashing and presses on bulging areas.

Vertical penetrations such as soil vents should also be suspect. Occasionally, an investigator will find a lead boot that was never extended to the top of a pipe. It might also be discovered that a membrane boot was improperly caulked or inadequately clamped to a pipe.

Expansion joints, particularly those that intersect each other or a vertical surface, should also be checked. The joints in metal gravel stops on bituminous roofs, another area of possible concern, should be individually inspected for splits in the bituminous stripping at the joints.

While the investigator is on the roof, he or she should also assess the condition of the roof's surface, although this exam may be complicated by the system's surfacing. The smooth surface of a built-up roof can be examined easily for fishmouths, wrinkle cracks, open blisters, severe alligatoring or splits. But if the existing BUR has ballast



surfacing, the aggregate must be chipped or scraped off in the vicinity of the leak point so that the membrane itself can be examined.

If the system is a ballasted elastoplastic membrane, the ballast should be swept or pushed carefully away from the entry point. During a surface examination of a single-ply or modified bitumen, all lap joints should be carefully probed, and the lap sealant or caulking should be checked for complete adhesion to the membrane.

Other surface problems that might be discovered during this surface examination include nails or mechanical fasteners backed up through the membrane. Sometimes the wood deck itself will warp enough to tear a membrane.

If this rooftop investigation still doesn't reveal the leak's exact point of entry, flood-

ing the area with a hose may be helpful. Roof drains and piping systems should be flooded first to expose any problems in this area. If the hosing doesn't expose a roof membrane leak, it can be turned onto skylights, curbs, expansion joints, walls, windows, counter flashing and coping to expose problems in these areas.

It is sometimes helpful for the investigator to use some sort of non-destructive evaluator such as a hand-held capacitance meter to find a particularly elusive leak source. However, even the most sophisticated new equipment can't replace an exhaustive investigation by a seasoned specialist.

Sagging, open flashings are frequently found to be the leak's point of entry.

