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KEEPING TABS ON THE ROOF

Six steps guide facility executives in developing a roof asset management program

BY EDIS T. OLIVER

Roofs are no longer merely the skin on the top of a building. Today, the roof is an integrated component of a complex building envelope system that includes the foundation, walls, windows, masonry and structural components. All those components combine to provide an energy efficient, waterproof envelope. With energy efficiency becoming a crucial goal, the roof is expected to perform functions beyond merely providing a waterproof surface on the top of the building.

Since 1970, the number of roofing systems manufacturers has increased from approximately a dozen to nearly 500 today. The complexity has increased with single-ply roofs such as polyvinyl chloride (PVC), thermoplastic olefin (TPO), and ethylene propylene diene monomer (EPDM), all known in the trade as chemical roofs. Moreover, the advent of cool roofs, green roofs, modified bitumen roofs, and protected roof membrane assemblies have added complexity to the roof decision-making process.

All this means that it is more important for facility executives to consider roof life-cycle management to obtain the best value for a roof. It's a process that starts with due diligence with roofing selection. But really, it means a switch in philosophy — from seeing the roof as a set-it-and-forget-it building technology to managing the roof as an asset, just as other types of investments in the building or the organization in general are managed.

The facility executive plays a critical role in developing an overall roof management program. For example, facility executives with one million square feet of roof under their control

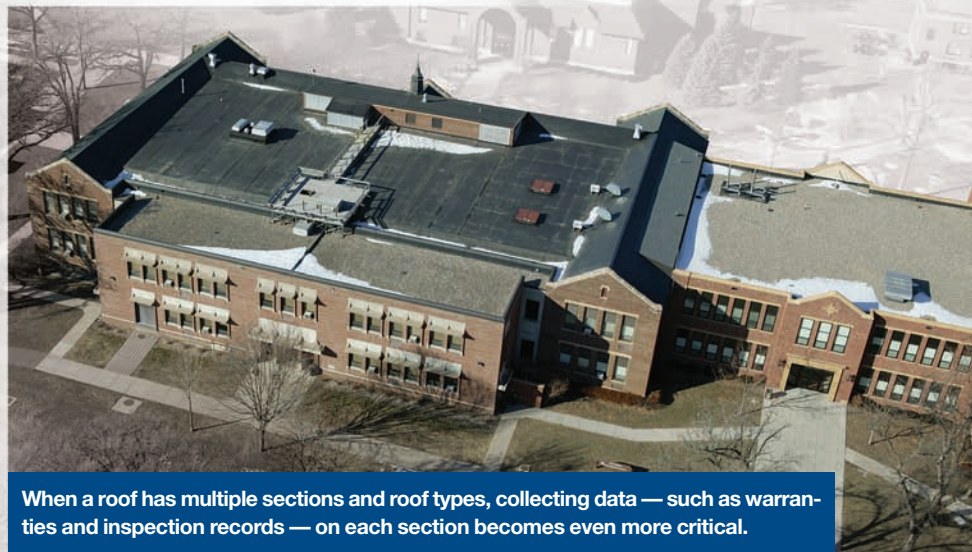
face an investment of about \$15 million in 2008 replacement cost dollars. The benchmark life for roofing systems in the U.S. is about 20 years. The average life of low-slope roofs in the U.S. ranges from 10 to 22 years depending on the type of building, use of the building and quality of the maintenance program. Failure to have a roof management program can result in millions of dollars in unplanned emergency roof

expenditures. Moreover, energy savings from new energy-efficient roofing systems during the replacement cycle of the roof management program will produce additional savings.

But a roof management program won't spring up on its own. Facility executives should consider the following six steps to optimize their roof asset management system.

1. Collect Written Documentation

Most facility executives do not have comprehensive records about their roofs. Warranties are usually lost or misfiled. Often there are no overall records of the types of roof assemblies, dates of installation, repair records, or names of contractors or manufacturers. The first step in establishing a roof management program is collecting and organizing as many of the following



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When a roof has multiple sections and roof types, collecting data — such as warranties and inspection records — on each section becomes even more critical.

DON'T DELAY ROOF REPLACEMENT UNTIL EMERGENCIES OCCUR

materials as possible:

1. Original building plans and specifications
2. Roofing and reroofing proposals and contracts
3. Warranties
4. Leak records and reports
5. Inspection records
6. Repair and maintenance records
7. Roof-related correspondence

In many cases, it's a good idea to have the roof surveyed by a professional consultant knowledgeable in all types of roof assemblies and having the tools, equipment, and instruments necessary to assess the condition of the roof. Assembling these documents will lower the survey cost because the consultant will not need to duplicate existing data acquisition.

There are several types of roof warranties, and virtually all roof installations require one or more of these warranties as part of the construction contract. Roofing contractors usually issue two-year warranties against defects in workmanship and materials of all components covered in the construction contract, including sheet metal flashings. Roofing material manufacturers issue warranties of up to 20 years covering the roof membrane and materials provided by the manufacturer. Paying for repairs to a roof that could have been covered under a warranty is a very common excessive cost to owners.

2. Maintain Data Electronically

Prior to performing field investigation work, facility executives should implement a data recording and filing system.

It does little good to invest in extensive data collection in the field unless that information can be readily recalled and expanded in subsequent years.

While information compiled from records and surveys can be kept manually or electronically, electronic management makes it easier to recall, review and report data. Electronic record-keeping allows facility executives to maintain detailed records for each roof section, including warranty and repair information over a long period of years to provide for scheduled maintenance and repairs. There are excellent facility management software packages commercially available. One such program is the ROOFER program developed by the U.S. Army Corps of Engineers.

3. Survey All Roofs

There are several pieces to a well-documented roof survey. The process begins by making scale drawings of the roof. In a fully dimensioned survey drawing, roofs are segmented into sections. A roof section is a discrete area bounded by a roof edge, wall, expansion joint, and change in elevation to a higher wall. Roofs are segmented into sections because different areas of roofs may have different materials or construction, or have been built at different times.

The survey documentation should also include a precise system of coordinates and labels for rooftop equipment, drains, and other discontinuities. Field notes maintained electronically should include information such as size and number of roof drains and scuppers, height of parapet walls and adjacent

wall elevations, height of mechanical equipment curbs, conduits, and gas lines. The notes should also include information about window and wall construction, the types and number of layers of roofing systems, locations of standing water, and visually evident distresses.

Levels and other instruments should be used to measure and calculate actual roof slopes and drainage patterns. Photographs should show building elevations, panoramic roof views, and specific details and distresses.

Also important to the survey are core cuts of each section, as well as an infrared moisture survey. Core cuts of sufficient quantity and at locations representative of the roof section can reveal the type of roof membrane — asphalt or coal tar pitch built-up (BUR), or EPDM, for example. Cores will also reveal the type and thickness of the roof insulation and whether it is wet.

If the core cut is inconclusive, however, an infrared moisture survey should be conducted. An infrared camera can determine the exact location of wet insulation.

The most important information a surveyor must determine is how the water gets off the roof and where it goes after that. Does the water drain or evaporate from the roof within the industry recommended time of 48 hours? Does the roof have standing water locations? No single feature enhances roof performance more than good drainage.

4. Prepare Roof Condition Report and Priorities

The purpose of the roof condition report is to guide long-range planning.



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Survey documentation for a roof should include a system of coordinates and labels for equipment, drains and other discontinuities.

The roof condition report should explain the investigation methodology employed, the findings, the prioritized conceptual recommendations, and the probable cost of recommended repairs or replacements.

Most facility executives prefer to have predictable expenditures that can be budgeted in advance. To have a steady-state roof management program using 20 years as the average life of a roof, facility executives should plan on replacing 1/20, or 5 percent, of the roof each year and maintaining the other 95 percent. To ensure that capital is available, it's best to plan replacements no fewer than five years in advance.

A good way to classify roofs in terms of the priority for replacement is by triage, in other words, best to worst: Roofs that are under warranty and maintainable; roofs that are not under warranty, but maintainable; and finally, roofs that are near the end of their rated lives and not maintainable.

During the preparation of the roof condition reports, roofs should be classified into one of the three categories.

For the first group, during regular inspections, manufacturers should be notified of defects, warranty claims should be filed, and the repairs made at little or no cost to the owner. This much-neglected procedure can save owners thousands of dollars in unneeded expenses and demonstrate the importance of managing warranties over a long period of time.

For the second group, the roof condition reports should identify the nature of deficiencies and the repair and maintenance work that needs to be performed. Work orders should be issued, contractors hired, and the recommended repair, maintenance and cleaning should be performed at least annually.

The third group requires the longest-term perspective because the costs are the greatest. Once replacement has become necessary, facility executives should not wait until the work becomes an emergency. Repairs should be made to stop leaks, but major work or partial replacement should be postponed until the entire roof is replaced. Major roof replacement projects are expensive and disruptive and usually take many months to complete on large buildings. They should be planned several years in advance to allow time for budgeting, design, bidding, contractor selection, and actual construction.

5. Implement Scheduled Repairs

There are two types of maintenance programs: break-down maintenance and scheduled maintenance.

The term break-down maintenance is used in the mechanical equipment business to mean repairs made only when a unit breaks down rather than on a schedule. Break-down maintenance in roofing means merely fixing leaks when they occur rather than having an active preventive maintenance program. Roof leaks usually have secondary effects such as causing wet insulation, corrosion, interior damage and perhaps mold.

Scheduled maintenance and repairs can be planned for the owner's convenience. The owner's convenience may mean scheduling for optimum seasonal work, plant shutdowns, weekends or school holidays to avoid disruption. Having a regularly scheduled program for repair and maintenance work can also reduce costs because contractors are able to depend on a certain volume of work and staff accordingly.

6. Perform Semi-annual Inspection

The National Roofing Contractors Association recommends inspecting all roofs twice each year, once after the hottest weather and again after the coldest weather. It is these weather cycles that induce the most thermal stresses on roofs and manifest the greatest damage. Roofs should also be inspected after any major weather event, such as high winds or hail. The inspection report should classify distresses as follows:

1. Damage caused by storms
2. Warranty repairs
3. Housekeeping and cleaning
4. Repairs to be paid for by owner

Routine maintenance should be performed regularly, thereby correcting deficiencies disclosed by the inspections. All maintenance and repair work orders and payments should be entered into the client's database. **BOM**

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