

Better Budgeting: Roof Management Plans Help Estimate Costs

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Depending upon the complexity of a hospital roof, the average cost for a replacement roof can range from \$15 to \$40 per square foot—making it critical for facility managers to maintain this important building asset to avoid premature replacement. Maintaining hospital roofs can be a challenge. Hospitals are often comprised of multiple buildings of all types, configurations, and ages. With so many buildings to oversee and limited personnel, facility managers benefit from using a method for tracking past, current, and future roof replacements and repairs. Organization of this magnitude requires the facilities manager to keep careful track of detailed repair histories and recommended repairs, all while managing current and projected costs. A formal roof management plan (RMP) can assist in this task and help both day-to-day operations and long-term planning.

Facility managers are often expected to develop multi-year budgets for maintenance requirements. However, due to the lack of in-depth information on their roofs, funds for roof repairs or replacements are often provided as unanticipated emergency costs. Facility managers seldom have the resources necessary to evaluate their roofs on a yearly basis, so they typically make an educated guess about the types of repairs or replacements needed based on the history and age of their roofs. The ultimate purpose of a well-defined RMP is to establish current and long-term budgeting for roof repairs and replacements. An initial RMP can be developed by an independent consultant specializing in roofing and associated building envelope components. These firms will develop an initial baseline study, which can then be used and maintained by facility managers.

Trying to project roof repairs and replacements based on warranties or anticipated service life estimates can be ineffective since roofs fail for a variety of reasons, including issues related to the care given during installation, excessive rooftop traffic, damages from other trades, lack of maintenance or service, and weather conditions. Industry standards note that the service life of an unmaintained roof is half that of a facility that uses periodic maintenance as part of their overall roof asset protection plan. Furthermore, lack of a maintenance plan can void most roof system manufacturers' warranties, which stipulate that the owner must maintain the roof assembly. The development and use of an RMP helps hospitals achieve the anticipated service life of a roof with associated cost savings and asset protection. In the development of an RMP, a systematic analysis of the roof assemblies will typically consist of the following components:

- **Building histories:** The building history is used as a background for the report and typically includes the name and use of the building, age of the building, type of roof system, and repair history. Most, if not all, of this information is obtained from the facility manager. Knowing the history of the roof is invaluable in understanding its current condition and in anticipating potential repairs and replacement needs. If the roof is 25 years old, one can anticipate that it will require replacement in the near future. If a roof just received repairs, it can be assumed that the service life has been extended. Both of these assumptions should be confirmed with a visual inspection.

- **Roof warranty information:** Roof warranty information is critical for making claims on roof failures and, in some instances, scheduling maintenance checks by the manufacturer's representatives. This information must be provided by the facility manager and can be included as an appendix within the report for easy reference. As stated previously, the age of the roof should not be used as a stand-alone tool for predicting repair or replacement needs since many factors contribute to a roof system's life span. It should not be assumed that if a roof has 10 years remaining on the warranty then the roof will not require repairs or replacement until the end of the warranty.
- **On-site visual evaluations:** The condition of roofs cannot be determined without a visual observation of the roof membrane, seams, flashings, transitions, and associated components. Copies of the existing roof area plans should be used if available. If not, a detailed plan that notes all penetrations, parapets, drains, etc. should be developed. Critical defects should be noted on these plans and included within the report. It is helpful to develop a simple number key for noting common defects that can be referenced when reviewing the report.
- **Non-destructive testing (infrared thermography):** Infrared thermography can be used to note areas of moisture saturated insulation. The amount of moisture in the roof system can determine whether the roof can be repaired or whether it should be replaced. Measuring the roof drain leaders can help estimate the existing capacity of the leader lines. This will inform facility managers whether any of the roofs are under capacity based on drain size and quantity. Undersized drains can lead to flooding of the roofs and backup of the drain lines, creating leaks or damaging the roof.
- **Destructive testing (roof cuts):** Roof cuts can be combined with roof area plans that note the type, quantity, and locations of deficiencies. They can be helpful in verifying energy code requirements based on insulation type and thickness.
- **Adjacent constructions:** Often, instances of moisture intrusion into building interiors are not roof-related; interior leak audits combined with evaluations of constructions adjacent to the roof, such as walls and windows, are required. Facility managers do not want to replace a leaking roof only to find out the walls were the source of water entry. Visual inspections will typically provide the owner with a general understanding of overall roof conditions with approximate budgets for roof repairs or replacements. However, it is recommended that in-depth analysis, including test cuts, leak audits, material testing or sampling, and leak testing (to confirm the source of leaks) be considered if sensitive budgeting is required. The level of evaluation depends on the particular needs of the facility manager.

Determining priorities

With the completion of the initial roof evaluation, compilation of historical documents, and a clearer understanding of the conditions of various roof areas, a prioritized list of recommendations is developed. With the input of the facility manager, priorities will be developed after considering a number of issues, including condition, use of underlying occupied space, anticipated interior renovations, and other factors. For example, if a hospital has two roofs that are in equally poor condition, the roof that is above a patient recovery area would be a priority over a roof above a storage area for maintenance supplies.

Developing the report

The findings of the plan can be incorporated into a computer-based program that can be updated and maintained by facilities personnel. Components of the program can include the following:

- Conditions of each roof area
- Roof area plans with type, location, and quantities of observed defects
- Repair guidelines to address specific defective conditions
- Warranty coverage information

- Existing system types, configurations, roof access, and deck types
- Campus plans
- Photographic documentation

- Budget matrix that notes roof repair replacement: immediate (zero to three years), near term (one to five years), and long-term (five to 10 years)

An RMP can provide multi-year budget guidelines for roofing that allows facility managers to quickly modify priorities to address changes in building use, maintain the comfort of building occupants, and maintain the valuable roofing asset.