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Journal

Myths and Misconceptions About Roofs

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A building's roof is its first line of protection against the elements of rain, sun, and wind but is usually the last thing a building owner thinks about until there is a problem. Roofs can often be a low priority until major issues affect the integrity of the structure and comfort of its occupants. Unfortunately, a host of common fallacies about roofs contribute to this tendency to do too little, too late.

Details for penetrations, flashings, ridges, valleys, drainage, and other key components should be entrusted to an architect or engineer experienced with the specified assembly.

Keeping up with the various types and configurations of roof materials and systems can be a challenge, but a little knowledge can go a long way toward clearing up misunderstandings about roof design, installation, maintenance, and replacement. Separating fact from fiction is important to prevent future headaches and erroneous, potentially costly, decisions.

Misunderstandings and misinformation about roof systems abound. Here are 12 roof myths that top the list of wrongheaded roofing lore.

Myth #1 – All Roof Systems Are Created Equal

Selecting a roof assembly for replacement isn't necessarily as simple as re-installing the same system, nor is it sufficient to select a promising product seen at a conference or used on the building next door. When selecting a roofing system, most owners and managers focus on cost, durability, construction schedule/logistics, and maintenance projections. Given the condition and composition of the existing roof, the climate and geographical location of the building, the configuration and style of the roof area, and the needs of the building occupants, some factors may weigh more heavily than others. A roofing design professional should provide building- and system-specific details and specifications that account for site and building conditions that may demand special treatment, such as unusual configurations, strong wind uplift, or numerous penetrations.

Myth #2 – New Roofing Systems Can Always Be Installed Over Existing Systems

The first decision to make in the reroofing process is whether to tear off the existing roof and start from scratch, or to leave the old system in place and lay the new one on top. The

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Too much insulation can trap moisture and overload the building structure.

Roof installation should be done only by manufacturer-certified contractors.

Recovering an old roof with a new one requires a sound roof deck.

best results are gained from complete replacement, as this not only eliminates the possibility of trapping moisture in the old system, but it also allows for a thorough inspection of the roof deck. Before the new system is installed, any deterioration in the substrate, such as rusted steel or spalled concrete, can be remedied.

Recovering can be a viable option in some special circumstances. A recover project offers a lower cost and shorter project schedule than does a tear-off and replacement. As there are fewer removed materials, disposal is simpler and therefore more economical. And in cases where the contents of the building are so critical that they cannot be exposed to possible water damage for even a short time while the existing roof is removed (as in a museum or rare book library), recovering makes it easier to maintain a water-tight structure during reroofing.

A qualified roofing design professional can determine whether recovering is feasible by examining both the existing structure and relevant building codes. In general, the basic conditions to be met are as follows:

- The structure must be able to safely support the added load of the new roof.
- There is no trapped moisture in the existing roof covering and insulation.
- There are no more than one or two (varies by local code) existing coverings on the structure.
- The roof deck is structurally sound.
- There is a means of positive attachment of the new roofing system to the building structure.
- Existing flashings are replaced when the new roof is installed.
- Fire resistance and wind uplift requirements are maintained.

Once an architect or engineer has given the go-ahead for a recover project, options for the new roofing system must be evaluated in terms of system compatibility. Manufacturers provide recover specifications which indicate how to prepare the existing system and how to attach the base of the new system to the structure.

Myth #3 – Any Contractor or Handyman Can Install or Repair a Roof

As part of the roof selection process, the architect or engineer should contact manufacturers to identify certified contractors and to determine the training requirements for contractors wishing to become certified installers. Specifying a product without hiring a contractor certified by the manufacturer may preclude issuance of a warranty. At best, an inexperienced contractor's efforts can incur additional expenses for time and materials; at worst, the roof system might be incorrectly installed, leading to premature failure.

The construction team also needs to be well versed in the basics of roof replacement procedures. Too often, "experienced" construction teams adopt practices they've used in the past in lieu of following design specifications, even when their methods are inappropriate for the situation or, even, unsafe. That's why a field representative, generally the roofing design professional, should be available to observe installation.

Myth #4 – "Flat" Roofs Are Prone to Leaks

Flat roofs are not actually flat. A more accurate description for this type of roof would be "low-slope." These roofs require pitch to be built into the system to allow it to shed water. The minimum recommended pitch to provide adequate drainage is a quarter of an inch of rise per one foot of run. In order for flat or low-slope roofs to shed water, drains, scuppers, and gutters of sufficient size and number – and in the proper locations – must be provided. A well-designed drainage system and properly pitched roof will

prevent the possibility of leaks into a building.

When designing a flat roof, an architect will often work with a structural engineer to design the roof in a manner to adequately support the weight of snow. Factors such as the building's location, exposure, and existing structure are considered when determining the capacity of a roof system to support the additional weight of collecting and drifting snow.

Myth #5 – There Is No Such Thing as Too Much Insulation

One would assume that the more insulation on a roof, the better it will perform. In fact, insulation beyond what is required can work in concert with the building's moisture drive to trap moisture under the roof and result in significant damage. Trapped moisture may cause a roof to warp or rot and can also allow for mold growth. Added insulation also impacts flashing and curb heights, and the increased weight of materials may pose structural concerns. The roofing design professional can review applicable building and energy codes to provide the proper amount of insulation.

Pay attention to flashings, which can fail well before the roof needs replacement.

Myth #6 – Wet Insulation Can Be Reused

Wet insulation is failed insulation. Once it becomes damp or saturated it is no longer performing its single function of providing thermal protection. Wet insulation can also cause deterioration in the roofing materials above and below, resulting in a total failure of the roof system. Wet insulation must always be removed and discarded prior to repairing, re-covering, or replacing a roof.

Myth #7 – Gutters and Drains Are Separate from the Roofing System

Roofs must be designed to divert water from the structure. Drains prevent the ponding of water on the surface of the roof to avoid overloading the structure. Gutters and downspouts are similar, in that they transport water from the roof, away from the building's facades and foundations. A roof's drainage system must be properly designed and installed to prevent damage and deterioration of the roof system and structure. In addition, it is vitally important that drains, gutters, and downspouts be cleaned regularly to prevent the back-up of debris and sediment. Clogged drains and gutters can result in leaks below the roof and behind walls.

Myth #8 – Flashing Doesn't Require Attention Until a New Roof Is Installed

As the adage goes, a system is only as strong as its weakest part. This is especially true when it comes to roof flashings. It is often assumed that since most roof counter-flashings are made of metal, they are strong enough to last for a significant amount of time before requiring replacement or repair. Many times, the flashings are only addressed when an entirely new roof is installed. In fact, flashings can deteriorate quite quickly if not installed or maintained properly.

Loose, cracked or broken flashings can allow water to penetrate behind a wall surface or below a roof membrane. Periodic inspection of flashings allows for the identification of potential issues, before they become a larger problem and result in leaks.

Myth #9 – New Roofs Do Not Require Maintenance

The National Roofing Contractors Association (NRCA) recommends maintenance and repair be performed at least twice a year as well as before and after severe weather seasons and events. Typical maintenance includes the removal of debris from the roof, drains, and gutters, and repair of any damage to roof coverings and

Cleaning up debris, clearing drains and gutters, and repairing damage from severe weather events are important maintenance measures, even for new roofs.

ROOF INSPECTIONS: What to Look For

Until a problem is detected, it can't be fixed.

Regular roof inspections allow building owners and managers to correct minor problems before they become major ones, extending the roof lifespan and avoiding premature replacement. By tracking the progress of roof issues, periodic inspections can alert facility professionals to emerging conditions, allowing for prompt repairs that protect the building interior and prevent the expense and disruption of emergency roof replacement.

Keeping a record of roof conditions and maintenance provides advance notice that a roofing system is approaching the end of its service life. In general, it is easier to budget for planned reroofing than to deal with sudden roof failure.

Seasonal Inspection by Facility/Maintenance Staff

As part of a roof asset management strategy, seasonal inspections and maintenance are vital to maximizing roof lifespan and performance.

In the early spring, roof areas should be checked for snow and ice damage, and storm debris should be removed safely. Roof evaluation should note signs of wear, puncture, or failure, as well as problems with penetrations, drains, flashings, and accessories.

In early fall, the roof should be inspected to identify changes since the spring inspection, and to determine whether any developing problems need immediate attention. Signs of wear due to heat, moisture, and ultraviolet radiation should be noted, and any needed repairs or replacements should be planned ahead of the winter season.

When severe weather strikes, branches, litter, and debris should be removed from the roof as soon as possible. Where drains have clogged, dirt and rubble should be cleared promptly. Timely evaluation of the roof after a storm allows for repair work to quickly address damage.

Establishing and maintaining a regular roof inspection program requires an investment of time and resources, but the benefits of improved roof performance and longevity more than counterbalance the costs.

Moisture Testing

Non-destructive testing may be incorporated into roof condition surveys, especially if leaks have been reported. Infrared scans, nuclear isotopic testing, and electrical capacitance measurement are among the methods used to identify areas where moisture is present.

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Not every roof is right for every building, so finding the best suited system is critical.

flashings. Failure to regularly inspect and maintain a roof can result in leaks, which may, in turn, void a warranty. Many warranties require yearly inspection and the regular performance of repairs to remain in effect.

Myth #10 – Roof Inspections Are Not Necessary Unless There Are Signs of Damage or Leaks

Although it's not unreasonable to inspect only in response to noticeable distress, most building owners and facility managers will find that being proactive and implementing a regular inspection program can actually save money and reduce downtime. By the time a leak is detected at the building interior, water has likely saturated insulation and damaged structural elements, framing, and drywall, to the point that repairing water damage can be more expensive than fixing the leak. Through early detection of developing or potential problems, routine roof inspections enable prompt response to deterioration and facilitate planning for maintenance and replacement.

The best way to keep roofing costs under control is to inspect the structure frequently over the life of the roof. By catching little problems early and repairing them, building owners

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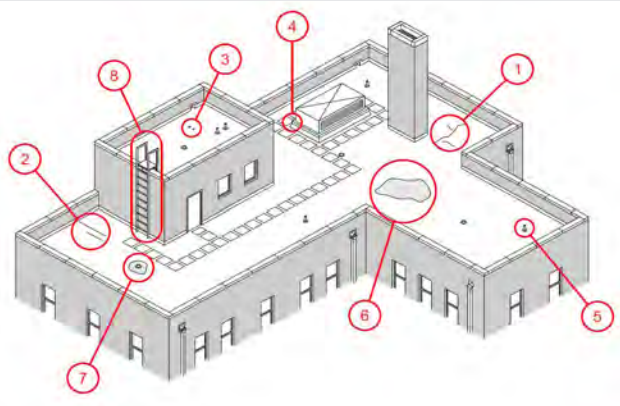
Condition Assessment by Roof Design Professional

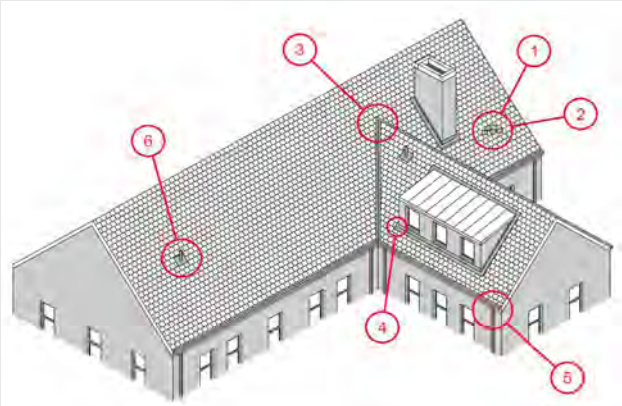
A detailed evaluation of roof conditions should be conducted at least once a year by an experienced architect or engineer. Developing a checklist for roof inspections can assist in collecting and organizing observations. It may be helpful to record the roof type, manufacturer, date of installation, and warranty information, to aid in roof lifespan projection and, when necessary, facilitate warranty claims. A history of dates, locations, and types of repairs should also be documented and updated as necessary.

Inspections should not be limited to the roof field alone. Water can migrate, so what may seem to be a roof leak might be due to exterior wall failure, condensation, plumbing leaks, or other problems. Parapets, copings, rooftop equipment, penthouses, and skylights should be included in roof condition surveys. By documenting signs of wear and damage, observed or reported leaks, and repairs and modifications, routine roof assessments provide up-to-date records that enable evaluation of maintenance practices and point to elements in need of replacement. ■



Low-Slope Roofs

1. Blisters, ridges, and wrinkles
2. Cracks and open seams
3. Punctures and pinholes
4. Split, cracked, or deformed flashings
5. Damage at penetrations
6. Ponded water
7. Clogged roof drains
8. Damaged accessories and railings



Steep-Slope Roofs

1. Misaligned or missing shingles
2. Missing fasteners
3. Wear at peaks and valleys
4. Damaged flashings
5. Loose or damaged gutters
6. Loose or damaged accessories

and managers can usually add many years of useful life to the structure.

Myth #11 – A Warranty Is the Best Protection

Warranties have an enticing allure, and they seem simple enough: you pay extra, and your roof is guaranteed not to leak. But what if it does? It might not be as easy as one would think to goad a manufacturer into sending an inspection team to look at the roof, much less fix it. And all too often, legal battles ensue while installation procedures are scrutinized to determine if all materials and methods fit the terms of the warranty agreement. Even if the manufacturer does perform warranty repairs, it's possible that the same roofing system defect could fail again—and this time, it could do so outside the warranty coverage period.

The best assurance of roofing durability is not an expensive warranty, but rather a roof system that is well designed, manufactured, and installed. Warranties are largely reactive, rather than proactive, and shouldn't distract from proper specifications and application. Looking into the requirements for a long-term warranty, however, can bring to light potential weaknesses in a product or technology. For example, if the warranty requires extra provisions in installation procedures or details for certain areas, it would be prudent to pay attention to those weak spots.

Myth #12 – There Is No Need to Consider Replacing a Roof Before It Fails

Replacing an aging roof assembly before problems arise might seem an extravagance, but it can be fiscally responsible. Advance planning allows the prudent building owner or manager time to reflect on the available options, in order to make the best choice for the available budget and for the building's needs. Emergency reroofing rarely affords that luxury.

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Comparing Roof Systems

When it's time to replace the roof, it can be hard to know whether to replace in kind or opt for another type of assembly that may be less expensive, easier to maintain, more durable, or all of the above. Although each building and situation demands nuanced, customized consideration, a general understanding of the pros and cons of different systems can help with the decision process.

Low-Slope Roofs		
Single-Ply Systems		
Types: • Thermoplastics: Polyvinyl Chloride (PVC), Thermoplastic Olefin (TPO) • Elastomerics: Ethylene Propylene Diene Terpolymer (EPDM), Rubberized Asphalts	Configuration: • Sections of membrane are joined together with seam tapes (EPDM), mechanical fasteners or heat welding (TPO and PVC), and adhesive (rubberized asphalt).	Characteristics: • Lack redundancy and self-healing properties but recover well from thermal change and building movement. • Seams are typically the weak point. • EPDM is relatively low-cost; others can be more expensive than multiple layer assemblies. • Can last 10-25 years, depending on type.
Multiple Layer Systems		
Types: • Modified Bitumen Roofing (MBR) • Built-Up Roofing (BUR)	Configuration: • Two or more layers of modified asphalt (base and cap sheets), plus reinforcing material. • Attached to the deck by hot mopping, torching, mechanical fasteners, or adhesive ("peel-and-stick").	Characteristics: • Redundancy, puncture resistance, and self-healing properties. • Can stand up to foot traffic, UV radiation, and building movement. • Lower life-cycle cost than other systems; typically last 20 to 30 years.
Fluid-Applied Systems		
Types: • Polymethyl Methacrylate (PMMA) • Polyurethane Methacrylate (PUMA) • Spray Polyurethane Foam (SPF)	Configuration: • Seamless; use a fluid binder as a monolithic waterproofing system. • May be squeegeed or sprayed on. • Reinforced with embedded fabric. • Can be used for re-cover applications.	Characteristics: • High-performance products that can be used for challenging configurations and high-traffic areas. • Tend to have a higher cost than other systems. • Typical service life is 25 years.
Steep-Slope Roofs		
Metal Panel Systems		
Types/Materials: • Flat seam, standing seam or batten seam. • Copper, zinc, aluminum, or steel, alloys and composites.	Configuration: • Formed from metal sheets joined on site.	Characteristics: • Vary in cost, depending on materials. • Recyclable, long-lasting (copper roofs can last 100+ years), sustainable. • Generally low maintenance, although ferrous metals are susceptible to corrosion.
Shingle Systems		
Types/Materials: • Slate, terra cotta and asphaltic.	Configuration: • Overlapping shingles cover the roof area.	Characteristics: • Lifespan ranges from 20 years (asphalt) to 100+ years (slate); cost varies widely. • Synthetic slate and terra cotta cost less but compromise performance and longevity. • Fasteners and peak/valley details are weak spots.

representative projects

Roofs

Accurate diagnosis and appropriate design are critical to success in resolving roof leaks. The key to longevity in roofing is to specify, detail, and oversee correct installation of a quality roof system that is the right fit for the building. Having a maintenance plan, including comprehensive annual inspection, and sticking to it is essential to maximizing roof lifespan.

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Roof Replacement

The Morgan Library & Museum
New York, New York
Roof Replacement

Deerfield Academy
Deerfield, Massachusetts
Gymnasium Roof Replacement

Church of the Heavenly Rest
New York, New York
Roof Investigation

Hopkins School
New Haven, Connecticut
Hopkins House Slate Roof Replacement

Federal Reserve Bank of New York, New York, New York, *Roof Replacement.*

1001 Pennsylvania Avenue, Washington, District of Columbia, *Roof Replacement.*

Wellesley College, Houghton Chapel, Wellesley, Massachusetts, *Slate Roof Survey.*

The Metropolitan Opera House
New York, New York
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A design professional should evaluate existing conditions and determine whether a proposed new roof assembly is compatible with the building construction, climate, and wind zone.

Debunking Roof Myths

With so much misinformation circulated about roofs, it can be a challenge to tell good advice from bad. Knowing when the time and effort spent on routine inspections, roof system evaluation, flashing and drainage maintenance, and other roof management tasks is worthwhile, or whether resources are better spent on other, more visible parts of the building, can be tough to assess.

By taking a few minutes to consider roofing assumptions, building owners and managers will likely save resources in the long run, as many closely held notions about roofing are as wrong as they are damaging. The straight talk on roofs is that there are no easy answers: the best way to prolong roof lifespan is to design appropriately, install correctly, and maintain diligently. And that's no myth. ■

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