

ROOFING FOR HISTORIC BUILDINGS

Roofing Today

The manufacturing of roofing materials and installation practices today draw upon the experience of the past 300 years. While this is particularly true with restoration work on historic buildings, it is also evident with new construction work. The strong market today for "substitute" materials that convey some of the same visual qualities of traditional roofing reflects our society's appreciation of historic architecture.

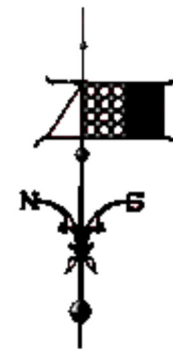
Building code changes, performance requirements, code constraints, new technologies, and modern building practices are just a few of the factors that have contributed to an ever evolving roofing industry. For historic buildings, the greatest opportunity to take advantage of these changes is with low slope roofing. Because of the low slope design, these areas are often not visible from grade and thus there is less concern with matching the appearance of the original roofing than with more visible steep sloped roofing. Some of the materials and systems originally used on historic low slope roofs (such as canvas) are not necessarily watertight or durable, and therefore are not appropriate choices for reroofing. The four main types of low slope roofing systems today are fully adhered, mechanically fastened, loose laid and ballasted, and protected membrane. Each of these systems has certain advantages and disadvantages with respect to wind, fire, resistance to mechanical damage, ease of installation, thermal value, resistance to ponded water, and compatibility with existing roof deck and structural components. Some systems strongly reflect traditional roofing practices while others are very contemporary approaches.



The first ply of hot applied, built-up roofing is installed over perlite insulation board. The system is carefully installed to accommodate locations of roof penetrations and rooftop mechanical equipment. (Photograph courtesy of Wiss, Janney Elstner and Associates)

Built-Up Roofs

Today's built-up roofing systems incorporate traditional as well as contemporary materials, and contemporary improvements for installation techniques. Modern built-up roofs are fully adhered assemblies of multiple reinforcing plies (organic, fiberglass, or nonwoven polyester mats) that are directly embedded in layers of hot asphalt or coal tar. The finished assemblies are often covered with gravel. Asphalt roofs can be left smooth surfaced but must be coated to protect them from direct sunlight and also to provide a fire rating. Coal tar bitumen, used on many historic buildings, offers superior resistance to ponded water.



Tools and Equipment for Investigation and Installation

Many traditional tools are still used in roofing, but equipment for investigation and installation has changed. Modern techniques for investigation include nuclear moisture meters, infrared thermal imaging, capacitance meters, moisture monitoring systems, and special measuring devices.

New tools and equipment for installation include electrical lifting equipment such as cranes and small mechanized hoists, as well as special safety equipment such as special ladders and fall protection, and mechanical fasteners such as nail guns. These new tools have significantly facilitated roofing work.

The first ply of hot applied, built-up roofing is installed over perlite insulation board. The system is carefully installed to accommodate locations of roof penetrations and rooftop mechanical equipment. This single ply membrane with an isolation felt material (visible at left) is covered by concrete masonry unit pavers, in this example of a ballasted system. The pavers are interlocked with plastic tabs. Along the wall at the right is a PVC clad metal base flashing.



This investigator is using a nuclear moisture meter to identify areas of moisture in the roof system. The nuclear moisture meter is most appropriate for use with gravel.

This single ply membrane with an isolation felt material (visible above) is covered by concrete masonry unit pavers, in this example of a ballasted system. The pavers are interlocked with plastic tabs. Along the wall at the right is a PVC clad metal base flashing. (Photograph courtesy of Wiss, Janney Elstner and Associates)

Single Plies

Single ply roofs today involve contemporary materials and installation techniques. Single ply roofs consist of a single layer of synthetic materials, 30 to 80 mils (.030 to .080 inches) thick, that can incorporate a reinforcement layer

of polyester or fiberglass. Single ply roofs can be ethylene propylene diene monomer (EPDM), polyvinyl chloride (PVC), thermoplastic polyolefin (TPO), or hypalon, which begins as a weldable thermoplastic and becomes rubber-like as it cures. Single ply roofs are categorized as thermosets, thermoplastics, and plasticizers. They can be fully adhered, mechanically fastened, loose laid and ballasted, or placed under an extruded polystyrene insulation board as a protected membrane roof.

Modified Bitumen

Modified bitumen roofs involve some traditional materials, but use modern fabrication methods, and traditional or more contemporary installation techniques. Modified bitumen roofs are made from prefabricated rolls of modified asphalt (or coal tar) reinforced with a fiberglass or polyester reinforced mat. Rubber-modified asphalts, such as styrene-butadiene-styrene (SBS) materials, are granular surfaced and are normally installed in two or more plies using mopping asphalt, cold adhesives, or torch welding. Plastic-modified asphalts such as atactic polypropylene (APP) systems are smooth or granular surfaced and can be heat welded or laid in cold adhesive.

Metal Roofs

Metal roofs have a long history of use, although improvements have occurred in shop fabrication methods and new sealant materials. Metal roofs are available in a wide variety of rib configurations, colors, and slope configurations. Architectural systems use an underlying deck to provide structural support, while structural standing seam metal roofs provides an integral supporting frame. Structural systems can be used to retrofit an existing flat roof deck to provide improved drainage. Sealant is required at valleys, gutters, and drains, to ensure watertightness.

Sprayed Polyurethane Foam

Sprayed polyurethane foam is a contemporary system that is sometimes appropriate for use on historic structures. Sprayed polyurethane foam (SPF) accepts a variety of substrates and is readily adapted to recovering existing flat or low sloped roofs. This roofing can be designed to incorporate increased slope for better drainage. The foam also serves as insulation. A smooth or granular coating is usually applied to provide protection from sunlight.

surfaced built-up, EPDM, and modified bitumen roofing systems. The system is most accurate when the rigid insulation beneath these systems is uniform in thickness. (Photograph courtesy of Wiss, Janney Elstner and Associates)