# The Secretary of the Interior's Standards for the Treatment of Historic Properties and Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings



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Inside front cover:

The Secretary of the Interior is responsible for establishing professional standards and providing guidance on the preservation and protection of all cultural resources listed in or eligible for listing in the National Register of Historic Places. **The Secretary of the Interior's Standards for the Treatment of Historic Properties** apply to all proposed development grant-in-aid projects assisted through the National Historic Preservation fund, and are intended to be applied to a wide variety of resource types, including buildings, sites, structures, objects, and districts. They address four treatments: Preservation, Rehabilitation, Restoration, and Reconstruction. The treatment Standards, developed in 1992, were codified as 36 CFR Part 68 in the July 12, 1995 *Federal Register* (Vol. 60, No. 133). They replaced the 1978 and 1983 versions of 36 CFR Part 68 entitled "The Secretary of the Interior's Standards for Historic Preservation Projects." These revised Guidelines replace the Guidelines published in 1995 to accompany the treatment Standards.

The Secretary of the Interior's Standards for the Treatment of Historic Properties are regulatory only for projects receiving Federal grant-in-aid funds; otherwise, the Standards and Guidelines are intended to provide general guidance for work on any historic building.



*Another regulation, 36 CFR Part 67, focuses on "certified historic structures" as defined by the Internal Revenue Service Code of 1986.* ***The Standards for Rehabilitation*** *cited in 36 CFR Part 67 should always be used when property owners are seeking certification for Federal tax benefits.*

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**Acknowledgements**

**Preface**

## Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings

### Introduction to the Guidelines

**The Secretary of the Interior's Standards for the Treatment of Historic Properties** apply not only to historic buildings but also to a wide variety of historic resource types eligible to be listed in the National Register of Historic Places. This includes buildings, sites, structures, objects, and districts. Guidelines, however, are developed to help apply the Standards to a specific type of historic resource. Thus, for example, in addition to the **Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings**, there are also guidelines for cultural landscapes, historic lighthouses, historic vessels, historic furnished interiors, and historic covered bridges.



### Choosing an Appropriate Treatment for the Historic Building

The Standards and Guidelines are neither technical nor prescriptive, but are intended to promote responsible preservation practices that help protect the Nation's irreplaceable cultural resources. For example, they cannot, in and of themselves, be used to make essential decisions about which features of the historic building should be saved and which can be changed. But, once a treatment is selected, the Standards and Guidelines provide a consistent philosophical approach to the work.

Choosing the most appropriate treatment for a building requires careful decision making about a building's historical significance, as well as taking into account a number of other considerations:

**Level of Significance**. National Historic Landmarks, designated for their "exceptional significance in American history," and many other buildings individually listed in the National Register, are likely candidates for *Preservation* or *Restoration.* *Rehabilitation*, however, is the most commonly used treatment for the majority of buildings listed in the National Register that do not rise to the level of "exceptional significance" but which contribute to the significance of a National Register-listed historic district. *Reconstruction* has the most limited application because so few resources that are no-longer extant can be documented to the degree necessary to accurately recreate the property to convey its appearance at a particular point in history.

**Physical condition.** *Preservation* may be appropriate if distinctive materials, features, and spaces are essentially intact and convey the building's historical significance. If the building requires more extensive repair and replacement, or if alterations or an addition are necessary for a new use, then *Rehabilitation* is probably the most appropriate treatment.

**Proposed use.** Many historic buildings can be adapted for a new use or updated for a continuing use without seriously damaging their historic character. However, it may be extremely difficult or impossible to convert some special-use properties, such as cold-storage facilities, for a new use without major alterations that result in loss of historic character and even integrity.

**Mandated code requirements.** Regardless of the treatment, code requirements must be addressed. But, without a sensitive design approach, code-required work may damage a building's historic materials and negatively impact its character. Therefore, because the ultimate use of the building determines what codes will have to be met, some potential uses of a historic building may not be appropriate if the necessary modifications would not preserve the building's historic character.

**Using the Standards and Guidelines for a Preservation, Rehabilitation, Restoration, or Reconstruction Project**

***The Secretary of the Interior's Standards for the Treatment of Historic Properties and Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings*** are intended to provide guidance to historic building owners and building managers, preservation consultants, architects, contractors, and project reviewers prior to beginning work.



The Guidelines are intended to assist in applying the Standards to all types of historic buildings. They are not meant to give case-specific advice or address exceptions or unusual conditions. They address both exterior *and* interior work on historic buildings. Those approaches to work treatments and techniques that are consistent with ***The Secretary of the Interior's Standards for the Treatment of Historic Properties*** are listed in the "Recommended" column on the left; those which are inconsistent with the Standards are listed in the "Not Recommended" column on the right.

There are four sections, each focusing on one of the four treatments: Preservation, Rehabilitation, Restoration, and Reconstruction.

Each section includes one set of Standards with accompanying Guidelines that are to be used throughout the course of a project. The Standards for the first treatment, *Preservation*, require retention of the greatest amount of historic fabric, along with the building's historic form, features, and detailing as they have evolved over time. The *Rehabilitation* Standards acknowledge the need to alter or add to a historic building to meet continuing or new uses while retaining the building's historic character. The *Restoration* Standards allow for the depiction of a building at a particular time in its history by preserving materials from the period of significance and removing materials from other periods. The *Reconstruction* Standards establish a limited framework for recreating a vanished or non-surviving building with new materials, primarily for interpretive purposes.

The Guidelines are introduced with a brief overview of the primary materials used in historic buildings and the exterior and interior architectural features and systems they comprise. The building's site and setting are also included, as well as code-compliance requirements regarding accessibility and life-safety. This overview establishes the format of the Guidelines that follow.

## Historical Overview

### Building Materials

### Masonry

*Stone* is one of the more lasting masonry building materials and has been used throughout the history of American building construction. The kinds of stone most commonly encountered on historic buildings in the U.S. include various types of sandstone, limestone, marble, granite, slate, and fieldstone. *Brick* varied considerably in size and permanence. Before 1870, brick clays were pressed into molds and were often unevenly fired. The quality of the brick depended on the type of clay available and the brick-making technique; by the 1870s—with the perfection of an extrusion process—bricks became more uniform and durable. *Architectural terra cotta* is also a kiln-dried clay product popular from the late-19th century until the 1930s. The development of steel-frame, high-rise office buildings in the early-20th century contributed to the wide-spread use of architectural terra cotta. *Adobe*, which consists of sun-dried earthen bricks, was one of the earliest building materials used in the U.S., primarily in the Southwest where it is still popular.

*Mortar* is used to bond together masonry units. Historic mortar was generally quite soft, consisting primarily of lime and sand with other additives. By the latter part of the 19th century, Portland cement was usually added resulting in a more rigid mortar. Like historic mortar, early *stucco* coatings were also heavily lime-based, increasing in hardness with the addition of Portland cement in the late-19th century.

*Concrete* has a long history having been composed of sand, crushed stone or gravel, lime, and natural hydraulic cements—later replaced with Portland cement in the 1870s. As a construction material concrete is used in a variety of forms, including blocks or units, poured or cast-in-place, precast, and reinforced concrete. In the 20th century *cast* and *reinforced concrete* were developed and have since become one of the most commonly used materials in modern building construction. *Cast stone* is a cementitious product manufactured in molds specifically to resemble blocks of stone.

While masonry is one of the most durable historic building materials, it is also very susceptible to damage by improper maintenance or repair techniques or abrasive cleaning methods.

**Wood**

*Wood* can be found in American buildings in every period and style, usually playing a central role. Its many and varied attributes have allowed it to serve in a broad range of uses, including structural members, siding, roofing, interior finishes, and decorative features. When used in its most basic form as logs, wood provided an expeditious building material in areas where it was readily available from the time of early settlements though the 19th century.

Water-powered sawmills cut logs into timbers and boards, but elements of any detail were generally crafted on site using hand tools until after the Civil War. With the arrival of mechanized production, the efficiency of cutting logs into timbers, boards, and more complex components increased, and the structural and decorative potential of wood's use in building construction expanded. With more efficient production came lower costs, but also standardization of ready-made moldings and assemblies for windows, doors, and decorative features. Initially wood was sourced locally, but improved transportation systems made the full range of wood species more accessible all over the country. With broader availability a particular wood could be selected for its suitability in a specific application, but regional production long remained a factor in what woods were used.

The extensive use of wood extensive use in buildings can be attributed to its many properties that include: strength in both tension and compression, ease with which it can be cut and shaped, capability to be connected with varied fasteners and adhesives, ability to be painted or varnished, and resistance to wear and weather. All of these characteristics, some more than others, vary according to the species of wood.

Wood selection and construction practices have capitalized on wood's attributes and compensated for it is weaknesses. Its resistance to decay made white oak and cedar common choices for roofing shingles, while oak and maple are frequently chosen for flooring because of their hardness. Pine and yellow poplar have often been used for siding and trim because of their straight grain and ease of milling, but they must be painted to protect them from decay.

*Plywood* is an engineered product formed by laminating thin sheets of wood together that was introduced to the U.S. building industry in the early-20$^{th}$ century. Because plywood has greater structural potential than wood, and as a sheet can be installed more efficiently, it soon replaced boards as sheathing, before being replaced itself by less expensive *particle board* in many applications. By applying surface veneers and adhesives, plywood can also be used as siding or for fine interior finishes on paneling or cabinetry.

**Metals**

*Metal* features—including steps, porches, and entire facades; cornices, siding, cladding, roofs, roof cresting, and storefronts, as well as doors, window sash, entablatures, and hardware—are often highly decorative, as well as practical, and are important in defining the overall character of historic American buildings.

Metals commonly used in historic buildings include *lead*, *tinplate*, *terneplate*, *zinc*, *copper*, *bronze*, *brass*, *iron*, *steel*, *aluminum*, and a variety of *alloys*, including *stainless steel*. Historic metal building components were often designed by highly-skilled artisans. By the late-19th century many of these components were prefabricated and readily available from catalogues in standardized sizes and designs.



*Cast iron* began to be manufactured in the Colonies as foundries were established around the time of the American Revolution. Structural cast-iron columns were first used in the 1820s, and cast-iron building fronts and decorative structural and ornamental features followed soon after. *Wrought iron* was introduced about the same time and wrought-iron features, such as fencing and ornamental balconies, were in use throughout the 19th century. Steel, which is an alloy of iron and usually carbon, increased in popularity as manufacturing processes and production improved in the mid-19th century.

*Lead* was first used in historic buildings as a roofing material. When combined with tin it was applied to sheet metal or steel to create *tinplate* or *terneplate* and became a common roofing material after it was first produced in the 1820s. (Pure tin was rarely used in architecture because it is so soft.) *Zinc*, too, was most frequently utilized for roofing to coat sheet metal to create "galvanized" iron. Entire galvanized-iron storefronts and individual decorative features were manufactured to simulate wood, stone, or cast iron from the latter part of the 19th century into the early years of the 20th century. *Copper* roofs—expensive but very durable—were installed on many important buildings from the 1790s through the first quarter of the 19th century and they are still favored in some high-end construction projects. *Bronze* and *brass* are both alloys of copper. Bronze, which weathers well, appears as entrance doors and storefronts. Brass, which is usually polished, is often used for decorative features on the interior, such as grilles and elevator doors. *Nickel* is most frequently found in building components in the form of an alloy, usually *nickel silver*, *Monel* or *stainless steel*. In comparison to some other metals used in construction, stainless steel is quite new, and it was not utilized much until the 1920s when it became a favorite material for Art Deco-style buildings.

*Aluminum*—prized for its light weight and corrosion-resistant qualities—was not used much in buildings because it was so expensive until the 1920s when expanded production reduced its cost. *Porcelain enamel*, or *vitreous enamel*, is a metal-based material, composed of a thin coating of glass fused to cast-iron or steel sheets, panels, tiles, or shingles. Although developed in the late-19th century, it too was popularized as a building material in the late 1920s and the 1930s for Art Deco and Art Moderne storefronts.

**Glass**

A wide variety of architectural glass has been used in American buildings: clear glass—flat or sometimes curved; as well as stained glass, tinted, patterned, textured, etched, frosted, leaded, painted, colored opaque glass and spandrel glass, prism glass, decorative Val de Verre glass (colored art glass), ceramic frit (pigmented glass enamel fused to a glass surface), and glass block. Many of these types of glass can be found in windows, transoms, doors and entrances, and storefront display windows, whereas some of them, especially opaque, pigmented structural glass with trade names such as Vitrolite, Carrara Glass, and Sani Onyx, are more likely to appear as exterior cladding on Art Deco -style storefronts, and spandrel glass first introduced on mid-century modern buildings. Glass was also used historically in skylights and monitors; on theater, hotel, and apartment building marquees and canopies; and as a component of lightning rods and weathervanes, address plates, and signage.



For centuries only blown glass was available in small pieces and it was expensive. Thus, the size of early windows in America was very limited, initially with only one small pane, increasing gradually over the years to multiple small panes of glass. With the invention of cast plate glass in 1848—large plates of glass could be manufactured, which were strong and inexpensive. Plate glass was first used in the early 1850s as the primary exterior material (with a cast-iron framework) for such structures as international exhibition buildings, worlds' fair pavilions, and greenhouses and conservatories. In the early-20th century, "modern" architects began using glass curtain walls in Bauhaus and Art Moderne buildings. In the late 1940s, several small private residences—"glass houses"—were first constructed with clear, all-glass exterior walls. By the middle of the 20th century, glass as a cladding system became synonymous with curtain-wall systems.

Glass features on the interior of historic buildings include: transoms, windows, privacy screens, office dividers, teller windows in banks, ticket windows in train stations and movies theaters, doorknobs, light fixtures, and mirrored wall inlay. Pigmented structural glass can be found in bathrooms in public buildings, and sometimes in kitchens, because of its sanitary qualities.

**Paint**

Paints and paint-like coatings have been used on historic buildings in America as a protective coating on building materials, as a decorative treatment and, sometimes, as a means of concealing inexpert repairs or repointing on a brick building. *Paint* is a liquid consisting of a pigment to make it opaque and to color it, a binder or base to hold it together, and a vehicle to carry the pigment. Traditional paints had an oil (linseed) base and the earliest paint colors were, for the most part, derived from natural pigments. Like today, both glossy and flat-finish paints were used historically on the exterior and the interior of a building. After 1875, factory-made paints were readily available

Other historic paint-like coatings, such as *whitewash*, are water based and always have a flat finish. In addition to water, whitewash is composed of hydrated (slaked) lime, salt and various other materials, and sometimes includes a natural pigment. Whitewash was used on interior plaster, and in cellars and on wood structural components, but not on wood doors, windows, or trim because its flat finish easily rubs off. Whitewash was used just as commonly on the exterior, particularly on farm out buildings and fences, and was often reapplied on an annual basis when it got dirty or wore off if exposed to the weather. *Calcimine* (or *kalsomine*) and *distemper* paints are also water based and included natural glues, gelatin, and gums, and whiting to which colored pigments could be added. They were used only on the interior, usually on plaster surfaces. *Casein* is a milk-based paint composed of hydrated lime, pigment, often oil, and a variety of additives to increase its durability. It was used on both the exterior and the interior of buildings.

A multitude of decorative painting treatments can be found on the interior of historic buildings. Some, such as graining and marbleizing, were applied to wood, stone, and plaster to give them the appearance of more exotic and costly materials. Others, such as murals and stencils, are purely decorative. *Tempera* and *gouache* are traditional water-based paints used almost exclusively for decorative painting.

Experimentation that began early in the 20th century resulted in the development of acrylic water-based paint, commonly known as latex paint. Traditional oil-based/alkyd paint continues to be used in the 21st century and it is still preferred for certain applications. Latex paint tends to be more popular, not only because it is water-based, making clean up easy during and after painting, but it also has no toxic vapors and it is very durable.

**Composite Materials: Fiber-Reinforced polymers (plastics, resins, vinyl), Fiber-Reinforced Cement Siding, and Fiberboard**

**Fiber-Reinforced Polymers**

The term *plastic* was first used by Leo Baekeland in 1907 to describe his invention, Bakelite, the first synthetic plastic. Plastic is a malleable material made of polyvinyl chloride which can be poured into molds or rolled in sheets. Improved plastic materials were introduced in America by World War I and began to be mass produced around 1940 during the Second World War. The industry continues to expand with the development of increasingly more sophisticated plastics.

*Plastic* signs on the exterior of commercial buildings changed and radically expanded the role of signage as advertising, as well as being important design features themselves. Coating canvas awnings with *vinyl* helped to extend their lifespan; resulting, eventually, in awnings manufactured solely of vinyl. Plastic was also sometimes used as decorative trim on storefronts. *Fiber-reinforced plastic (FRP)* is made of a polymer matrix mixed with fiber, usually fiberglass, to add strength. Its ability to be molded in thin shells resulted in new and creative designs such as the geodesic dome, invented by Buckminster Fuller, and first exhibited in 1954. Although geodesic domes can be constructed of a variety of materials, they are most often associated with plastics.

On the interior, vinyl wallpaper was used as early as the 1920s, and is still selected for restaurants, commercial spaces and hospitals, because it is durable and washable. Plastic materials became popular in the 1950s in the form of plastic-laminate sheeting and wall tiles, vinyl flooring, and plastic-laminated countertops. Plastic/vinyl first was used to replace asphalt as a binder in floor tiles in the late 20s in part because plastic, unlike asphalt, could be made in lighter colors and, thus, a greater variety of colors. By 1931, a semi-flexible, vinyl floor covering had been developed. As resins improved and became more affordable after the war, vinyl flooring, manufactured in the form of tiles or rolled sheets, became common in both residential and commercial interiors.

**Fiber-Reinforced Cement Siding**

*Fiber-Reinforced Cement Siding* is a composite material made of sand, cement, and cellulose fibers. It was developed as a replacement for asbestos cement siding which preceded it and became popular in the latter part of the 20th century. It is frequently installed in the form of horizontal boards or vertical panels as exterior siding. Fiber-reinforced cement is used on both residential and commercial buildings.

**Fiberboard**

*Fiberboard* is a composite hardboard material made from pressure-molded wood. It had early precedents in the late-18th century, but was first manufactured in large quantities in the 1920s, and became increasingly popular in the 1930s and 40s. Fiberboard, or wallboard as it is commonly known, is marketed by various companies, such as Masonite. It was used as sheathing for roofing and siding on the exterior, for insulation, and for interior walls.

**Substitute Materials**

Substitute building materials are materials that are common and readily available which are used to simulate a more expensive material. They have a long history in American building. Wood, cut and planed, sometimes coated with a sand paint, has been used since the 18th century in this country to replicate cut blocks of stone and quoins on the exterior of a building. Another material, stucco, applied over any kind of construction from log to rubble masonry, when scored to resemble stone could make even a humble log house look elegant. Cast iron and pressed metal, whether as a complete façade or a storefront, or as an individual feature, such as a window hood, cornice or decorative pilaster, were also used on the exterior of buildings to replicate stone. Not only architectural terra cotta, but cast stone—of course, was also used as a substitute for stone. Metal and concrete roofing tiles were used as cheaper alternatives instead of clay roofing tiles.



In the 20th century the use of exterior substitute materials expanded as new products were developed. Asphalt roll siding that resembled brick could be applied to a wood building and asbestos composite shingles were produced to replicate, not only wood shingle siding, but also slate roofing shingles. Aluminum siding has been used as a replacement for wood siding, which evolved into vinyl siding, pressed wood siding and, eventually, composite or fiber-cement siding. Manufactured faux slate roofing, in particular, is increasingly popular, not only because it is cheaper, but it is lighter weight. Over the years substitute materials have increased in variety as synthetic materials continue to be introduced on the market, even including a substitute material for a substitute material—stucco.

On the interior substitute materials, such as scored plaster, were applied to walls to give the appearance of stone. Painted or marbleized finishes on plaster or wood, could further simulate stone, and decorative graining could transform the surface of a cheaper wood into a more exotic species. Scagliola, which is often applied to brick columns, is a very old technique that uses a plaster-like composite material to create the rich look of marble. Vinyl and other manufactured flooring materials come in many patterns and colors that are intended to copy brick, stone, clay tile, and wood.

**Building Features and Systems**

**Roofs**

The roof—with its shape; features such as cresting, dormers, cupolas, and chimneys; and the size, color, and patterning of the roofing material—is an important design element of many historic buildings. In addition, a weathertight roof is essential to the long-term preservation of the entire structure. Historic roofing reflects availability of materials, levels of construction technology, weather, and cost.

Throughout all periods of American history, with only minor exception, *wood* has been used for roofing, and despite the early use of many other materials, wood shingles remained the most common roofing material throughout much of the 19th century. Initially the species of wood used would have been specific to a region, but the quality and design of a building were usually the prime determinants in the way wood was used, ranging from wide, lapped boards to small, uniform, geometrically-shaped shingles.

*Clay tile* was used at least in a limited way in the earliest settlements on both coasts, but the earliest roofing tile, like the earliest slate shingles, were imported. Tile was manufactured in America by the mid-17th century, whereas the earliest *slate* quarry did not open until the end of the 18th century. Both slate and tile provided fire protection, especially important in urban areas. The use of slate expanded quickly in the second half of the 19th century with the development of the railroads and remained a commonly used material until the middle of the 20th century.

*Lead* and *copper* were the first metals used for roofing, later joined by *zinc* and *iron* in the beginning of the 19th century. Neither zinc nor lead achieved particularly widespread use. Copper has continued in use to the present though, typically, only on the best buildings due to its cost. Painted iron was initially used in large sheets but it was less successful than smaller sheets of iron plated with *tin* or *terne*, a lead-tin mix which came to replace it. As plated iron and later *steel* became widely available, their light weight, inflammability, and low cost made them the ideal alternative to wood. The ductility of metal allowed sheets to be bent to cover varied shapes and to be folded into seams that were sealed with solder. *Galvanizing*, which gained widespread popularity in the 20th century, is a process that involves coating base steel with an alloy of zinc. Galvanizing imparted additional strength to metal and it became the preferred coating for corrugated sheet metal roofing because it reduced the need for sheathing. Galvanized steel metal was also stamped into strips simulating shingles and clay tiles.

Shortly after the start of the 20th century *asbestos* (fiber cement) or *asphalt* shingles came into use as a less expensive alternative to slate. The last decades of the 19th century saw the development of *composition* roofing (built-up or roll roofing), a layered assembly of felt sheets and coal tar or asphalt, suitable for waterproofing flat and low-sloped roofs. Later in the 20th century sheets of *modified bitumen* and *synthetic rubber* provided more options for a flat roof. By the end of the 20th century *liquid* and *vinyl membranes* were also common on flat roofs; and *synthetic* and *recycled material*s were used increasingly for both new and replacement roofs.

**Windows**

Technology and prevailing architectural styles have shaped the history of windows in America. The earliest windows were essentially medieval in their form. Small panes of glass, usually diamond-shaped and held together with lead, were set in a hinged sash of wood or iron. By the beginning of the 18th century the glass had increased in size and had become rectangular with putty holding it in place. Wood muntins replaced lead cames between the panes, and two sashes were placed in a frame where the lower one could slide vertically. Such simple windows remained common in utilitarian buildings well into the 20th century. With the introduction of iron pulleys the sash could be hung from cords connected to counterweights which resulted in single-hung windows, or double hung when both sashes were counterbalanced.

Sash increased in depth as its evolved providing additional strength that allowed narrower muntins. As the production of glass (blown initially as a disk and later as a cylinder) improved, larger pieces of glass became more affordable resulting in fewer panes of glass in a window. A sash that would have had twelve panes of glass in the 18th century often had only two by the mid-19th century. The mass production of millwork after about 1850 established standard profiles and sizes of windows. It also made a wide variety of designs and light patterns readily available that could be selected from a catalogue according to the desired architectural style.

Steel was employed beginning at the end of the 19th century to build windows that would resist the spread of fire in tight urban environments. These hollow-core windows were frequently galvanized. Windows with solid, rolled steel sections were first produced in the first decade of the 20th century in many forms ranging from casements, popular in domestic construction, to large, multi-pane units that provided whole walls of natural light in industrial and warehouse buildings. Operable vents in these large windows pivoted on simple pins. Their relatively small panes and the fact that they were puttied in from the interior made the inevitable breakage easy and inexpensive to repair. Rolled steel also took the traditional form of a double-hung window, becoming common in high-rise buildings in the 1920's and beyond.

Aluminum windows were developed in the 1930s and, by the 1970s, rivaled wood in popularity, particularly in commercial and institutional buildings. They were more likely to have hopper or awning vents than to be hung sash.

Metal-clad (initially copper) wood windows, appeared early in the 20th century but were not common until the later part of the century when the cladding became enameled aluminum. The latter part of the 20th century also saw the development of vinyl windows which appeared at this time as inexpensive and thermally efficient, although they are used primarily in the replacement market. Modern windows are also made of fiberglass and polymer-based composites.

Limited commercial use of insulated glass (double-pane) in windows began in 1930 but it was not readily available until about 1950. Since then, work has continued to improve its efficiency

and to reduce the effect of ultra-violet rays with tinted and low-e glass. Impact-resistant glass is not new, but its use in windows continues to expand to meet modern hurricane code requirements and in response to terrorist threats.

**Entrances and Porches**

Entrances and porches are quite often the focus of historic American buildings, particularly those on primary elevations. Together with their functional and decorative features, such as doors, steps, balustrades, columns, pilasters and entablatures, they can be extremely important in defining the overall character of a building. In many cases, porches were also energy-saving features and remain so today, shading southern and western elevations. Usually, entrances and porches were integral components of a historic building's design; for example, porches on Greek Revival houses, with Doric or Ionic columns and pediments, echoed the architectural elements and features of the building itself. Center, single-bay porches or arcaded porches are evident in Italianate-style buildings of the 1860s. Doors of Renaissance Revival-style buildings frequently supported entablatures or pediments. Porches were especially prominent features of Eastlake and Stick Style houses in which lathe-turned porch posts, railings, and balusters were characterized by a massive and robust quality. Deep porches on bungalows and Craftsman-style houses of the early-20th century feature tapered posts, exposed posts and beams, and low-pitched roofs with wide overhangs. Late-19th and early-20th century high-rise buildings are often distinguished by ornate, highly-ornamented entrances, some with revolving doors which were introduced around the turn of the century. Some commercial structures from this period have recessed entrances with colorful terrazzo flooring. Entrances to Art Deco-style residential and commercial buildings often feature stylized glass and stainless-steel doors with geometric designs. Entrances on modernist buildings may have simple, glazing and, frequently, projecting concrete or metal canopies.

**Storefronts**

The earliest storefronts in America, dating from the late-18th and early -19th centuries, had bay or oriel windows with limited display space. The 19th century witnessed the progressive enlargement of storefront display windows as plate glass became available in increasingly larger units. The use of cast-iron columns and lintels at ground-floor level permitted structural members to be reduced in size. Storefronts and the entire building façade were soon constructed entirely of cast iron, which were later followed by galvanized metal storefronts. In the 19th century, awnings became a storefront feature. Permanent metal canopies attached to the facade or supported by free-standing posts or columns, as well as retractable canvas awnings, provided shelter for customers and merchandise alike. Later, distinctive, sometimes deeply recessed entrances provided shelter for sidewalk patrons and further enlarged display areas. In the 1920s and 1930s, structural pigmented glass such as Carrara Glass, Vitrolite, and Sani Onyx; aluminum and stainless steel; porcelain enamel; glass block; neon signs; and other new materials were introduced in Art Deco storefronts.



The storefront is often the most prominent feature of a historic commercial building, playing a crucial role in a store's advertising and merchandising strategy. Although a storefront normally does not extend beyond the first story, the rest of the building is often related to it visually through a unity of form and detail. Although window bays on the upper floors, cornice elements, and other decorative features may not always follow the configuration of the storefront.

**Curtain Walls**

*Curtain wall* construction was originally based on a steel framework. However, most curtain wall construction today utilizes an extruded aluminum framework. Curtain wall construction with an aluminum framework became popular in the 1930s in the U.S. and came into its own after World War II. A curtain wall is not a structural system and it does not carry the weight of the building. Rather, it is an exterior wall attached to the structural system. Although, perhaps most frequently associated with glass, metal panels, thin stone veneer, louvers, and vents are also commonly used in curtain wall construction, which, like glass panels, are set into the metal framework. Because curtain wall construction uses relatively lightweight and less expensive materials, it reduces building costs, which, in part,explains its popularity.



Glass curtain-wall panels, which can be operable, include various types of spandrel glass, clear and tinted glass. Stone veneer panels may be granite, marble, travertine, or limestone. Metal panels can be aluminum plate, stainless steel, copper or other non-corrosive types of metal. Composite panels are also used, including honeycomb composite panels consisting of two thin sheets of aluminum bonded to a thin plastic layer or rigid insulation in the middle. Panels can also be architectural terra cotta or fiber-reinforced plastic (FRP).

There are essentially two types of curtain wall systems: *stick* systems and *unitized* or *modular* systems. A *stick* system is a framing system composed of long metal pieces (sticks) put together individually using vertical pieces (mullions) between floors and horizontal pieces between the vertical members. The framing members may sometimes be assembled in a factory, but the installation and glazing is done onsite.

A *unitized* or *modular* curtain wall system consists of ready-to-hang, pre-assembled modules which include glazing or other panel infill. These modular units are usually one story in height and approximately five to six feet wide. Both types of curtain walls are attached to floor slabs or columns with field-drilled bolts in mated, adjustable anchor brackets. The fact that a curtain wall expands and contracts at a different rate from the building's structural system is significant and it is an important consideration in the design of a curtain wall system.

**Structural Systems**

The types of structural systems found in historic buildings in America include, but are not limited to, the following: *wood -frame* construction (17th century), *load-bearing masonry* construction (18th century), *balloon-frame* construction (19th century), *brick cavity-wall* construction (19th century), *heavy-timber post and beam* industrial construction (19th century), *fireproof iron* construction (19th century), *heavy masonry and steel* construction (19th century), *skeletal steel* construction (19th century), *light frame and veneer brick* construction (20th century), and *concrete slab and post* construction (20th century).



If features of the historic structural system are exposed, such as load-bearing brick walls, cast-iron columns, roof trusses, post and beams, vigas and outriggers, or masonry foundation walls, they are likely to be important in defining the building's overall historic character. A concealed structural system, although not character defining, may be significant in the history of building technology.

## Spaces, Features, and Finishes

### Spaces

The earliest buildings in America were very basic and likely to have only one or perhaps two rooms. As communities became more established and prosperous, buildings increased in size and construction became more elaborate and sophisticated—reflecting the wealth and tastes of individual owners. Larger buildings inevitably included multiple rooms designed to accommodate a variety of purposes. Thus, the interior floor plan, the arrangement and sequence of spaces, and built-in features and applied finishes are individually and collectively important in defining the historic character of the building. With the exception of most historic utilitarian buildings, such as barns and farm out buildings, manufacturing and industrial buildings, garages and maintenance facilities, interiors are typically composed of a series of primary and secondary spaces. This succession of spaces is applicable to many historic buildings from courthouses to cathedrals, to cottages and commercial structures. Primary spaces, including entrance halls, lobbies, doubles parlors, living rooms, corridors, and assembly spaces, are defined not only by their function, but also by their features, finishes, size, and proportion.

Secondary spaces in historic interiors are generally more functional than decorative and, depending on the building's use, and may include kitchens, bathrooms, utility rooms, attics, basements, mail rooms, rear hallways, and office spaces. Although these spaces were important to how the building functioned historically, they are less significant than primary spaces and, thus, are usually the most appropriate places to make changes, such as those required to meet code, which may be necessary in a historic building. The sequence of interior spaces was no longer so important in defining the historic character of the building with the arrival of mid-20th century modern, high-rise office buildings, which were often built on speculation and, therefore, were constructed with open floor plans that could be fitted out to meet specific tenant needs.

### Features and Finishes

Historic character-defining features and finishes can range from very elaborate to very simple and plain or from formal to utilitarian. The interior features that are important to a particular building generally reflect its original or historic use. Thus, the interior features and finishes of industrial and factory buildings are basic and practical with exposed structural systems, wood, brick or concrete walls and floors, large windows or monitors with clerestory windows to provide natural light, and minimal door and window surrounds, or none at all. Commercial, office, hotel and high-rise apartment buildings have public spaces that often include highly-decorated lobbies, elevator lobbies with marble flooring, and wood or marble wainscoting in the upper corridors and, particularly in office buildings, heavy doors with glass transoms and glass wall partitions separating the hallway from offices. The repetitive pattern itself of the corridors on the upper floors of these multi-story buildings is also often significant in defining their historic character. Individual historic residential structures frequently have painted plaster walls and ceilings, door and window trim, fireplaces with mantels, wood flooring and a staircase, if the house has more than one story. Like the interior of many contemporary high-rise commercial buildings, some houses of the era are less traditional in design and may also feature more streamlined interiors.

**Building Site**

The building site consists of a historic building or buildings, structures, and associated landscape features and their relationship within a designed or legally-defined parcel of land. A site may be significant in its own right, or because of its association with the historic building or buildings.

**Setting (District/Neighborhood)**

The setting is the larger area or environment in which a historic building is located. It may be an urban, suburban, or rural neighborhood or a natural landscape in which buildings have been constructed. The relationship of buildings to each other, setbacks, fence patterns, views, driveways and walkways, and street trees together establish the character of a district or neighborhood.



**Special Requirements: Code-Required Work**

*Sensitive solutions to meeting code requirements are an important part of protecting the historic character of the building. Thus, work that must be done to meet accessibility and life-safety requirements must also be accessed for its potential impact on the historic building.*

**Accessibility**

It is often necessary to make modifications to a historic building so that it will be in compliance with accessibility code requirements. Federal rules, regulations, and standards have been developed that provide guidance on how to make historic buildings accessible to people needing barrier-free access. Work must be carefully planned and undertaken so that it does not result in the loss of exterior or interior historic, character-defining spaces, features, or finishes. The goal should be to provide the highest level of access with the least impact to the historic building.

**Life Safety**

When undertaking work on historic buildings, it is also necessary to consider the impact that meeting life-safety codes (public health, occupational health, life safety, electrical, seismic, structural, and building codes) will have on both exterior and interior spaces, features, and finishes. Historic building materials that are hazardous, such as lead paint and asbestos, will require abatement or encapsulation. Some, newer life-safety codes are more flexible and allow greater leniency for historic buildings when making them code compliant. It also may be possible to obtain a variance that allows an alternative approach to meeting codes that will be less damaging to the historic building. Coordinating with code officials early in project planning will ensure that the cod requirements can be met in a historic building without negatively impacting its character.

**Climate Change and Natural Hazards**

The potential future impacts of climate change and natural hazards on a historic building should be carefully evaluated and considered. If foreseeable loss, damage, or destruction to the building, or its features, can be reasonably anticipated as a result of climate change and natural hazards, treatments should be undertaken to avoid or minimize the impacts and ensure the continued preservation of the building and its historic character. In some other instances the effects of climate change and natural hazards may be minimal or more gradual, and the impacts unknown, unanticipated at the present time, or not anticipated to affect the property until sometime in the future. In all instances, a building should be maintained in good condition, monitored regularly, and historic documentation should be prepared as a record of the building and to help guide future treatments.

Some impacts of climate change and natural hazards may be particularly sudden and destructive to a historic building, such as riverine flash flooding or coastal storm surge, and may require preventive treatments that are more invasive. When a treatment is proposed for a building to address the potential impacts of climate change and natural hazards that will impact its historic character, other feasible alternatives that would require less change to its character should always be considered first. In some instances, a certain degree of impact on a building's historic character may be necessary to ensure its retention and continued preservation. In other instances a proposed treatment may have too great an impact to preserve the historic character of the building. A historic building may have existing characteristics or features that help to address or minimize the impacts of climate change and natural hazards. These should always be taken into consideration when planning preventive treatments

Additional information and guidance on the topic of climate change and natural hazards may be found on the Technical Preservation Services website.

**Sustainability**

Before implementing any energy improvements to enhance the sustainability of a historic building, the existing energy-efficient characteristics of the building should be evaluated. Historic building construction methods and materials often maximized natural sources of heating, lighting, and ventilation to respond to local climatic conditions. The key to a successful project is to identify and understand any lost original and existing energy-efficient aspects of the historic building, as well as to identify and understand its character-defining features to ensure they are taken into account. The most sustainable building is one that already exists. Thus, good preservation practice is often synonymous with sustainability. There are numerous treatments—traditional as well as new technological innovations—that may be used to upgrade a historic building to help it operate more efficiently while retaining its character.

The topic of sustainability is addressed in detail in **The Secretary of the Interior's Standards for Rehabilitation & Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings**. Although specifically developed for the treatment Rehabilitation, the Sustainability Guidelines can be used to help guide the other treatments.