Georgia's Living Places

Historic Houses in Their Landscaped Settings

February 1991
Historic Preservation Section
Division of Parks, Recreation & Historic Sites
Georgia Department of Natural Resources

FOREWORD

In 1989, the Historic Preservation Section of the Georgia Department of Natural Resources undertook a special two-year project emphasizing domestic architecture, archeology, and landscape. Funded through a generous grant given by a private donor, *Georgia's Living Places: Historic Houses in Their Landscaped Settings* was divided into two phases. The first focused on the identification and evaluation of these historic resources; the second on their preservation. The following technical material is a product of Phase I and II. Designed to assist homeowners interested in understanding more about their historic houses and landscapes, this material is directed toward the disciplines of architectural history, architecture, landscape architecture, and archeology.

The technical material will be distributed at Georgia's 1991 statewide preservation conference, the theme of which is also *Georgia's Living Places*. Subsequent workshops will be held in the spring of 1991, and material will be made available to participants.

The Historic Preservation Section hopes this information will assist individuals and organizations as they both enjoy and preserve Georgia's "living places."

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INTRODUCTION

Georgia's "living places" are its historic houses, their landscaped yards, and the archeological resources associated with them. Each component of a "living place", its architecture, landscaping, and archeology, represents an important type of "historic resource" worthy of preservation. Together, they constitute the single most significant historic resource in the state.

"Living places" are the most prevalent type of historic property in Georgia, comprising more than 70% of all National Register listings and approximately 80% of all surveyed historic properties. Although inventories are incomplete, there may be 50,000 to 65,000 "living places" in Georgia. These "living places" are widely distributed, following historic settlement patterns and population densities. They also are among the most complex and diverse of the state's resources. Made up of three major components, architecture, landscaping, and archeology, they represent more than 200 years of history, 23 distinct architectural styles, 28 vernacular house types, at least 10 different forms of historic landscaping, and countless archeological resources.

In many respects, these "living places" are the most familiar type of historic resource in Georgia. Whether we live in one or not, the chances are good that we grew up in a house that is now considered historic. We may have worked and played in its landscaped yards. We may have stumbled over its archeological resources, a pile of half-buried bricks, for example, or a curious rusted artifact. Indeed, we may be so familiar with these historic properties that we take them for granted!

In other respects, Georgia's "living places" may be less familiar. The landscaping of historic yards has received much less study than the architecture of historic houses. Far fewer historic landscapes are represented in the state's National Register listings: while 90% reflect architectural significance, only 12% are for historic landscaping. Historic landscaping is all too often taken for granted or misinterpreted as part of the "natural" environment. Similarly, the potential for domestic archeology is poorly understood outside archeological circles. Only 7% of Georgia's National Register listings are specifically for archeological sites, and few of these address the archeology of historic residential properties. Even architecture is sometimes misunderstood. Many people think of the typical Georgia house as a white-columned antebellum plantation manor when in fact the state's most typical architectural styles are the late 19th-century Queen Anne and the early 20th-century Craftsman. Indeed, the majority of Georgia's historic houses, some two-thirds, do not even have an architectural style. Rather, they are examples of historic house types developed in the state's strong vernacular architectural tradition!

To help Georgians, especially owners of the state's "living places", understand, evaluate, and preserve these resources, the following material has been prepared.

The **Overview (I)** includes four reports on the architecture, landscaping, and archeology of Georgia's "living places". The 23 architectural styles, 28 vernacular house types, and 10 major landscape "styles" or traditions that characterize yards are identified. In addition, the archeological potential of Georgia's "living places" is discussed.

Architecture (II) focuses on the treatment of Georgia's "living places." Providing guidance on the repair and maintenance of the historic house, this section includes technical information on issues related to a building's exterior and interior features. Also included is a special section on the conservation of building materials.

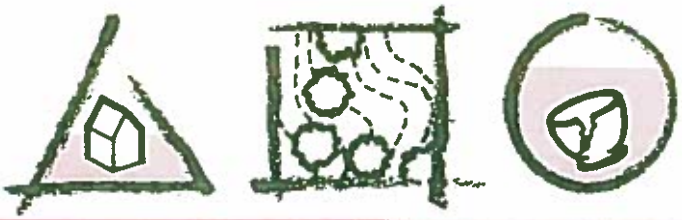
Landscape Architecture (III) provides technical material on Georgia's landscape tradition, popular plants, and guidelines for successfully implementing a landscape preservation plan.

Archeology (IV) provides helpful suggestions to the homeowner who may be interested in, but have little knowledge of, archeology. Included is an explanation of historic archeology and how it relates to a historic house; tips on identifying archeological features; and specific do's and don'ts for homeowners.

Biblographies have been included throughout the text to provide additional sources of assistance and technical guidance.

Living in a historic house is both a privilege and a responsibility. The pleasure derived from historic houses, their intrinsic beauty and the sense of place they promote are some of the reasons we chose to live in them. The responsibility lies in knowing that we are stewards of Georgia's heritage, only holding these places in trust for the next generation.

We hope that the information on the following pages will increase your understanding and enjoyment of Georgia's "living places," as well as assist you in their preservation.



Overview

RESIDENTIAL ARCHITECTURAL STYLES IN GEORGIA

Architectural style, to many people, is the most obvious aspect of a historic house. The architecture of a house, its overall form and ornamentation, is classified as a style, such as Queen Anne, just as the overall form of a tree, the shape of its leaves and bark, might be called an "oak". Houses can also be studied and identified in other ways, by their building materials, method of construction, and house type. Style, however, has long been an important way to identify historic houses and has been a useful tool for describing, analyzing, and evaluating them. This was especially true in very style-conscious 19th-century America. A style often reflects the needs and tastes of the time and place in which it appears. Styles built during a particular time and in a particular location may contribute to an understanding of the culture of that period.

What is architectural style? The definition really has two aspects: one obvious, the other more subtle. First, style is the decoration or ornamentation that has been put on a house in a systematic pattern or arrangement. This is the more familiar and obvious definition. Secondly, style is the design of the overall form of a house: the proportion, scale, massing, symmetry or asymmetry, and the relationships among parts such as solids and voids or height, depth, and width. This is the more subtle and less obvious aspect of style. Sometimes floor plan and interior layout, as well as construction materials and techniques, also play a part in the definition of style.

How did architectural styles develop? The majority of styles used in the United States and Georgia were adapted from European traditions. Europeans were influenced by three main

sources: the ancient classical architecture of the Greeks and Romans; the medieval buildings of Europe; and the Renaissance buildings of 15th- and 16th-century Italy that reinterpreted ancient classical architecture. The same source often influenced different architectural styles. As a result, many styles have similar features, but are distinctive because they use these features in different ways. During the early 20th century several styles developed in the United States that were breaks with architectural traditions and did not draw upon European sources.

How are architectural styles identified? When all elements that define a style come together, a "high style" house results. Most often this house is designed by an architect. In Georgia, the number of "high style" houses is relatively small. When only a few stylistic elements are found, a house is called a "vernacular interpretation" of a style, or one with "elements of a style". These elements are usually the more obvious decorative ones, the applied ornamental features. Most houses in Georgia fall into this latter category. In fact, all over the United States, these are by far the most common houses.

Stylistic tradition in Georgia is one of applied ornament to underlying house forms or types. It is therefore important to understand both style and type as tools for identifying and analyzing historic houses.

In Georgia, there are 23 major styles of historic houses:

Georgian
Federal
Early Classical Revival
Greek Revival
Gothic Revival
Italianate
Second Empire
Stick
Queen Anne
Folk Victorian
High Victorian Eclectic
Neoclassical Revival
Italian Renaissance Revival
English Vernacular Revival
Mediterranean Revival
French Vernacular Revival
Colonial Revival
Dutch Colonial Revival
Spanish Colonial Revival
Federal Revival
Prairie
Craftsman
International

On the following pages is information about predominant architectural styles used for Georgia houses from the late 18th century through the 1940s. Categories are in roughly chronological order according to style development and use. All illustrations are Georgia examples.

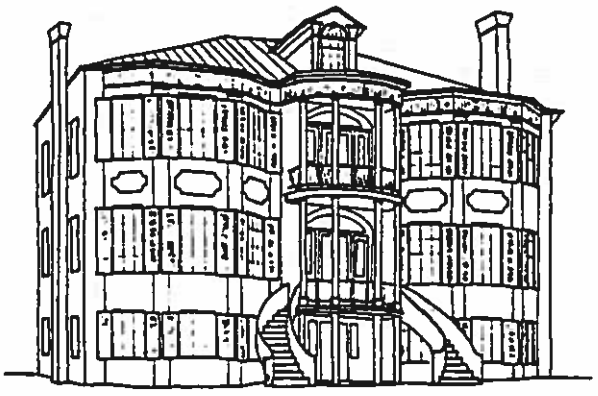
Georgian

Architectural styles in Georgia begin chronologically with the Georgian style. Named for King George I-III of England, Georgian architecture was dominant during the 18th century in the British colonies along the eastern seaboard. The style was based on English Renaissance architecture of the 17th and 18th centuries, which in turn was influenced by ancient classical Roman design. Georgian style buildings were constructed from about 1750 to 1810 in Georgia's coastal areas and along the border with South Carolina. Few examples remain, and most of these may be found in Savannah.

A Georgian style house is a symmetrical, rectangular form with a central entrance and symmetrically placed windows to either side. Bold and big features such as heavy columns and pediments based on classical details are characteristic. Emphasis is placed on the entrance with a transom and decorative crown supported by pilasters or columns surrounding the door. Windows are double-hung, typically with many small panes, often nine-over-nine. The classical cornice is emphasized with a row of dentils or other decorative molding. The roof may be either tall and hipped or side-gabled.

Federal

The Federal style evolved from the English Georgian tradition, yet was refined by a growing interest in the ruins of ancient classical architecture. The style was influenced mainly by English architect Robert Adam. The Federal style was built in Georgia along the coastal plain and up into the Piedmont from the 1790s to the 1830s. It was probably most common in cities such as Savannah, Augusta, and Milledgeville.



A Federal style house, like the Georgian, is a symmetrical, rectangular block. Proportions and scale of Federal style houses are more slender and light; features are flatter and more delicate. Slender columns and fluted pilasters give emphasis to the entrance. Curved surfaces and openings, such as an elliptical fanlight over the door and projecting bays, are characteristic of the style's delicacy. Design elements introduced directly from ancient classical architecture include swags, garlands, urns, and decorative panels. A Federal style roof generally has a lower pitch than a Georgian one and may also be either hipped or side-gabled.

Early Classical Revival

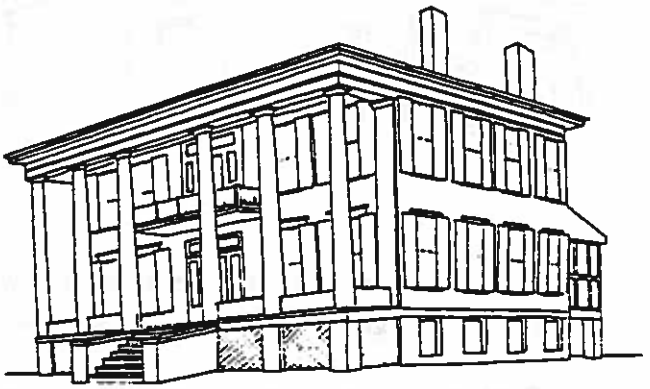
The Early Classical Revival style was based on ancient Roman architecture. Interest in ancient classical forms continued to grow in Europe during the late 18th and early 19th centuries and developed into a classical revival movement. European architects brought this revival to America. The study of ancient ruins continued to provide a better understanding of ancient design, in particular the differences between Greek and Roman architecture. Thomas Jefferson's interest guided the development of the Early Classical Revival style. His theories were idealistic and anti-English, and he promoted an architecture that would break old ties and be symbolic of the new republic. He not only was influenced by Roman architecture but by the French Classical Revival movement. America's Early Classical Revival basically was confined to the South and was popular in Georgia from the 1810s to the 1840s. This style was found in rural areas of the Piedmont as well as in towns.

The most prominent identifying feature of the Early Classical Revival style is a full-height entrance portico of columns supporting a triangular pediment. This robust and heavy portico is taken directly from the ancient Roman temple form. The same symmetrical, rectangular house form is still used, and the central entrance has windows symmetrically placed to either side. The cornice is usually decorated with dentils or modillions. The entrance is emphasized with a semi-circular or elliptical fanlight, sidelights, and pilasters. While the Early Classical Revival may have

features similar to the Federal style, such as an elliptical fanlight or delicately detailed interior mantels, the Early Classical Revival has a more direct association with Roman architecture and, as a result, more correct Roman details and heavier proportions. Sometimes the Roman temple form was simply added onto the front of an otherwise plain farmhouse.

Greek Revival

The Greek Revival style conjures up an image of white columns often associated with Georgia; however, this image conflicts with reality. Only a relatively small number of such houses actually existed in the state and most were found in towns rather than as plantation houses in rural areas. By the 1840s, Georgia was completely settled, and the Greek Revival, used from the 1840s to the 1860s, became the first style to appear statewide. A statement of cultural independence, the Greek Revival was a clear break with English and other European Renaissance traditions. It was the beginning of a romantic revival that drew directly from the original source, a sentimental imitation of the architecture of an ancient people that provided associations with Greek democracy. Thought of as a national style, the Greek Revival was used extensively throughout the United States at every level of society and in many variations.



The Greek Revival style is characterized by details such as prominent columns, pilasters, and wide plain entablatures that encircle a house. Proportions are large and heavy. A symmetrical, rectangular block has a symmetrical front facade with a central entrance. An elaborate door surround contains a rectangular transom, sidelights and pilasters. Occasionally confusion between Roman and Greek design occurred, and Roman rather than Greek columns were used. A typical expression of the Greek Revival in Georgia is a low-pitched, hipped roof supported by columns to form a full-width porch. Porticoes with triangular pediments are also found. Vernacular interpretations with simplified details, such as square rather than round columns, are common. Double-hung windows generally have six-over-six panes. The association of white columns with the Greek Revival is certainly accurate, as almost all Greek Revival houses were painted white.

Gothic Revival

The Gothic Revival style provided a contrast to the Greek Revival. Originating in England in the mid-18th century, the Gothic Revival was part of an overall Picturesque movement that emphasized a house's irregular massing and blending with the landscape. Medieval Gothic buildings constructed through the late 15th century were the inspiration for this style. In the 1840s American builders and architects began looking for design alternatives to the then dominant Greek Revival style. One of their choices was the Gothic Revival, which had a proponent in Andrew Jackson Downing, a New York horticulturist, landscape gardener, and architectural theorist. His popular publications promoted styles that he believed were more picturesque and compatible with the natural landscape than the classical lines of the Greek Revival. The Gothic Revival was never very popular in Georgia and was used only sporadically during the 1850s, but gained some enthusiasts during the 1870s and 1880s.

Gothic Revival houses typically have steeply pitched gabled roofs with both front- and side-facing gables. Decoratively sawn bargeboards are commonly found along the eaves. Window and door openings often have either pointed arched tops or heavily molded or pointed hoods. Porches are usually supported by slender posts with sawn woodwork forming flattened arches or brackets. Some houses have vertical board-and-batten siding. This style emphasized picturesqueness, verticality, and varied use of materials. To encourage blending with the landscape, Gothic Revival houses were usually painted with earth tones. The irregular lines and dark colors of this style contrasted with the regular lines and stark whiteness of the Greek Revival.

Italianate

The Italianate style also contrasted with the straight classical lines of the Greek Revival. Part of the Picturesque movement in England, the Italianate was modeled on the informal farmhouses or villas of the Italian countryside and on the formal townhouses of the Italian cities. The style was popularized by Andrew Jackson Downing in his publications on architecture and landscaping and adapted to fit American tastes and needs. Occurring in

Georgia immediately preceding the Civil War and through Reconstruction years and competing with the Greek Revival style, the Italianate was never extremely popular here. When it did appear, it was mainly in cities during the 1850s and 1870s.

Italianate houses modeled after rural villas are generally asymmetrical with an L-shaped or other irregularly shaped plan and gabled roof. Those modeled after townhouses are symmetrical box-shaped houses with low-pitched hipped roofs. Both have details that identify them as Italianate. Distinguishing features are the widely overhanging boxed eaves with decorative brackets that emphasize the cornice. Typically tall narrow windows with large two-over-two or one-over-one panes are often paired, arched, and topped with elaborate hoods. Bay windows are also common. The porch is supported with either slender columns or posts separated by sawn decorative brackets. The informal, asymmetrical houses may have a square tower. Formal houses are more likely to have classically inspired features such as columns, corner quoins, and cornices with dentils. There may also be a cupola. The proportions of both symmetrical and asymmetrical Italianate houses are tall to emphasize height and verticality.

The Victorian era in American architecture took place during the second half of the 19th century and during the latter part of Queen Victoria's reign. The styles popular during this era are generally referred to as Victorian. Changes in industry and technology took place that made building materials more accessible and house construction easier. The balloon frame construction method–thin vertical wooden studs fastened to horizontal plates with wire nails–became popular. As a result, house construction became more complex as did styles. Breaking from the preceding romantic revivals when attempts were made to recreate specific past styles, the Victorian era encouraged new styles by combining ideas from many sources, both past and present.

Second Empire

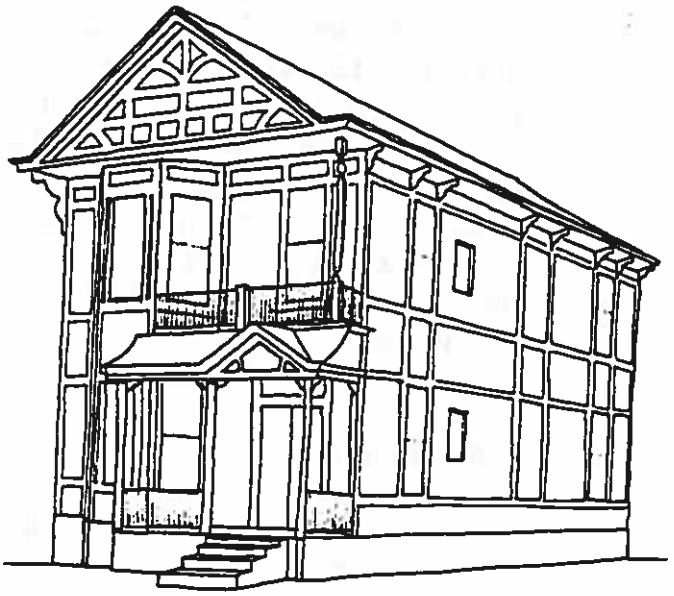
The Second Empire style was one of the first of this era. Based on the current building fashion in France, it was considered very modern. The style was popular in France during the reign of Napoleon III (1852-1870), the era from which it got its name. It was a modern expression of classical precedents. Rare in Georgia, the Second Empire style was built mainly in cities during the 1870s and 1880s. Popularly called the "General Grant" style, it was associated with the industrial cities of the North; its popularity in the South was not great.

The most characteristic feature of the Second Empire style is its mansard, or dual-pitched, hipped roof, named for 17th-century French architect Francois Mansart. The roof's very steeply pitched first slope almost always has dormer windows. The style has robust and heavy proportions. Details are similar to the Italianate but are more massive and loosely based on Renaissance classical sources. These include eave brackets, windows with heavy moldings or hoods, porch columns that may be paired, bay windows, and two-over-two or one-over-one window sashes. The facade may have a forward projection known as a pavilion. With its distinctive mansard roof, the Second Empire is often confused with other styles, such as High Victorian Eclectic and the Italianate, that also make use of this roof shape.

Stick

The Stick style was rare in Georgia. A combination of several influences, it continued the mid-19th-century emphasis on structure promoted by Andrew Jackson Downing, while adapting medieval English building traditions. After incorporating techniques of the newly popular balloon frame construction method, the Stick style emerged. Its main characteristic was the expression of the wooden skeletal frame of a building on its wall surface. This was done by applying flat stickwork over the wall material to represent the building's structural members. Used only occasionally in Georgia during the 1870s and 1880s, the Stick style was most often found in cities.

A Stick style house is always of wood. Its major identifying feature consists of horizontal, vertical, and sometimes diagonal wooden bands applied to exterior wall surfaces to emphasize structural members. The roof is steeply pitched and often gabled with decorative trusses. Cross gables usually exist, and eaves often have brackets. The porch is supported by slender posts with angled braces or brackets. The Stick style house is usually asymmetrically shaped; bay windows are often used to break up the wall surface.



Queen Anne

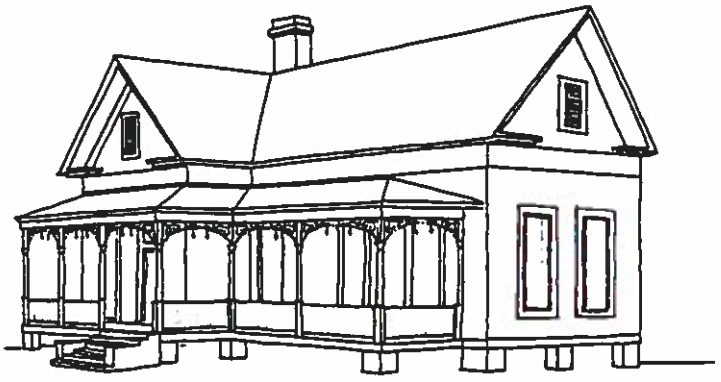
The Queen Anne was Georgia's most popular 19th-century style. It was developed in England through the work of architects who drew on late medieval Elizabethan and Jacobean sources. In England, Queen Anne houses were masonry and their design based on large country manor houses. In the United States, the Queen Anne was creatively adapted into a wood-framed house that met American needs and traditions of building in wood. The style was extremely popular across Georgia and widely used in many variations all over the state from the 1880s to about 1910.

A Queen Anne style house is asymmetrical with complex roof and wall shapes. It displays a variety of textures, materials, and detailing. Details are generally a combination of medieval and classically inspired features. The asymmetrical shape results from a floor plan that is open and flowing. The roof is often steeply pitched and hipped with both front- and side-facing, or cross, gables. Wall surfaces avoid a smooth appearance through the use of projecting bays and materials such as patterned shin-

gles that provide texture. The porch is usually asymmetrical and often wraps around two sides of the house. It is supported with slender turned posts and often decorated with sawn brackets and spindlework friezes. Roof gables may also be decorated with sawn ornamentation or spindlework and covered with patterned shingles. There are often prominent and elaborate brick chimneys with patterned and corbeled brickwork. A round or multi-sided tower may be found at a corner. Some Queen Anne houses have more classically inspired details such as porch columns, Palladian windows, and cornices with dentils. Windows are generally one-over-one or may have a multi-paned border around the top sash.

Folk Victorian

Folk Victorian houses were built across Georgia in very large numbers. They were simple house forms, or house types, with Victorian-era decorative detailing. This detailing generally was taken from the elaborate styles, such as Queen Anne or Italianate, that were popular during the mid to late 19th century. Features were borrowed and added onto such places as porches and roof gables. This provided some hint of stylistic detailing on what was otherwise an unadorned traditional house form. This style is actually more a way of decorating a house than a precise stylistic category; however, the Folk Victorian house is so widespread that it demands a name. The style was commonly found in both urban and rural parts of the state from the 1870s to the 1910s.



The Folk Victorian house is basically a house type such as a gabled ell, central hallway, or I-house. Decorative details are added to the porch, in the gables, and around the window and door openings. Details are usually turned or jigsawn woodwork such as brackets, spindlework, porch posts, other bric-a-brac and gingerbread. This elaborately applied ornamentation is sometimes referred to as Eastlake detailing.

High Victorian Eclectic

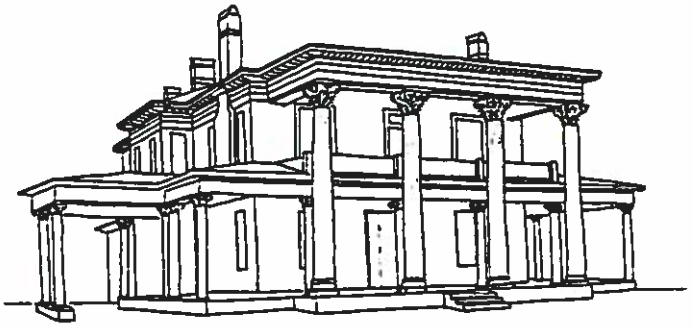
The High Victorian Eclectic is a deliberate blending of two or more styles to produce an unusual result. This style appeared in the last part of the 19th century during the height of the excesses of the Victorian era. The High Victorian Eclectic style was not commonly used in Georgia. Houses that fit into this category were architect-designed and generally located in larger cities. They were built from the 1890s to about 1910.

The High Victorian Eclectic house is unique. In the example shown, several styles may be identified: slender and shaped porch posts, brackets, and window surrounds from the Italianate; horizontal, vertical, and diagonal stickwork representing structural members from the Stick style; the wing with widely overhanging gable and curved gable end emphasized with stickwork from the Swiss chalet tradition; and the variety of wall materials such as patterned shingles and diagonal siding, multi-paned windows, and sawn woodwork common in many Victorian-era styles. While stylistic influences are identifiable, this example is clearly Eclectic design.

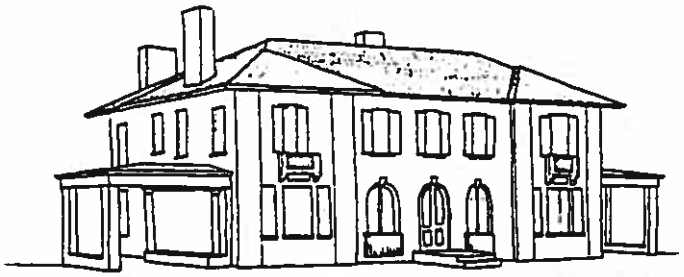
In the late 19th and early 20th centuries, an eclectic movement began that drew on both European and American architectural traditions. Emphasis shifted from the Victorian era's practice of combining ideas from many sources to create a new style to one of closely replicating a single past style. Interest in a variety of architectural traditions developed at the same time; these traditions became known as "period" styles, based on precedents in specific historic periods. This trend was popularized by the 1876 Centennial Exposition which focused attention on American colonial architecture and by the 1893 Columbian Exposition which encouraged interest in classical architecture and emphasized correct interpretations of European styles. The return to classical order and simplicity was a reaction against the excesses and seeming lack of architectural rules of the Victorian era. Also part of this eclectic movement was the turn-of-the-century development of modern house design and a break with copying styles from the past.

Neoclassical Revival

The Neoclassical Revival style was very popular in Georgia. Almost every small town across the state has at least one example. The style was part of the revival of interest in classically inspired architecture as well as a reaction against Victorian styles. It drew mostly on the Early Classical Revival and Greek Revival of the early 19th century and was often a combination of both Greek and Roman details. Sometimes even the earlier Georgian and Federal styles were used as sources. The Neoclassical Revival was built in Georgia's rural areas, cities, and small towns from the 1890s through the 1930s. Perhaps its popularity was based on its association with the "white columns" of antebellum Georgia.



The most common feature of the Neoclassical Revival style is a dominant full-height front portico with classical columns. The portico may be at the entry or may cover the full facade; it may have a triangular pediment or be part of the overall roof. A full-height entry portico is often coupled with a one-story full-facade porch. The facade is more or less symmetrical, and the central entrance, surrounded with pilasters and columns, is elaborated with fanlights, sidelights, and transoms. There is almost always a classical cornice with dentils or modillions. The roof is usually low-pitched and hipped and may have a balustrade. A porte-cochere and side porches supported by columns are common. The Neoclassical Revival is often confused with the early 19th-century styles from which it is derived, but there are obvious differences. Neoclassical Revival houses are generally larger, have more elaborate detailing, and may have an irregular shape. Specific features that distinguish the early 20th-century house include a two-story entry portico coupled with a one-story porch, the presence of a porte-cochere or side porch, paired windows with large one-over-one panes, and elaborate column capitals.



Italian Renaissance Revival
The Italian Renaissance Revival was not a common house style in Georgia but was more often used for public buildings. Resulting from the revival of interest in classical architecture brought about by the 1893 Columbian Exposition, this style drew directly from Italian Renaissance models. Italian Renaissance Revival houses were usually architect-designed and located in Georgia's larger cities. They were built from about 1900 to the 1920s.

The Italian Renaissance Revival house is generally a large symmetrical block with stuccoed or masonry walls designed to imitate Italian originals. The low-pitched, usually hipped roof of clay tiles has broadly overhanging eaves with decorative brackets. Renaissance classical details are dominant, including columns and pilasters, pediments over openings, and corner quoins. First-floor windows and doors are elaborated with classical details and are often arched. Porches may be recessed to represent a loggia or open porch. High-style examples may have a flat roof and parapet wall with balustrade and prominent classical cornice.

English Vernacular Revival
The English Vernacular Revival was a common early 20th-century style in Georgia's suburban neighborhoods. Drawn from the domestic architecture of medieval England, this style was based on English country and vernacular houses, ranging from small cottages to large manor houses. The result was a combination of medieval English features. English Vernacular Revival houses were built all across the state in neighborhoods of both large cities and small towns during the 1920s and 1930s. Entire planned residential areas were developed around this theme. This and other revival styles made early 20th-century neighborhoods representative of diverse styles adapted from many parts of the world.

Characteristics of English Vernacular Revival houses are a steeply pitched gabled roof with dominant front-facing gable and decorative half-timbering in the gables. Almost all have masonry walls. Most are masonry-veneered, a recently developed technique for applying a thin layer of masonry to a wall. Some houses have patterned brickwork, while others may be completely

stuccoed. Often a variety of materials are used, such as brick walls with stone trim, wood half-timbering, and stuccoed gables. Massive masonry chimneys with decorative tops are common. Windows are generally tall and narrow, grouped together, multi-paned, and casements rather than double-hung. Some openings, particularly the entrance, may be emphasized by a round arch. Houses of this style are generally asymmetrical.

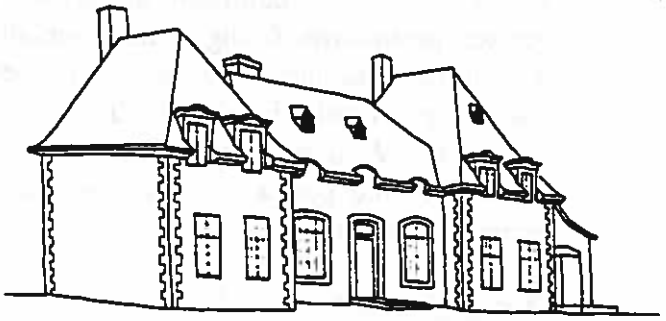
Mediterranean Revival

The Mediterranean Revival style was found in Georgia's suburban neighborhoods during the 1920s and 1930s. It was based on both Spanish and Italian vernacular country houses in the Mediterranean Sea area. It was not as popular in Georgia as other revival styles.

A Mediterranean Revival house has smooth stuccoed or masonry walls and is usually asymmetrical. The roof is covered with clay tile, is low-pitched, and may be either hipped or gabled. Houses following the Spanish tradition will have little or no eave overhang, while those following the Italian influence will have widely overhanging eaves with exposed rafters. Recessed and arcaded loggias, or open porches, are common. Windows are generally arched and may be grouped together. Sometimes columns and pilasters are used to elaborate openings.

French Vernacular Revival

The French Vernacular Revival style also was built in Georgia's early 20th-century suburban neighborhoods. It was based on the vernacular architecture of the French countryside, including both farmhouses and small manor houses. Only occasionally built during the 1920s and 1930s, the style was not common in Georgia.



The most characteristic feature of the French Vernacular Revival house is a very tall, steeply pitched, hipped roof with dormers. Walls are always either masonry or stuccoed. Houses may be either symmetrical or asymmetrical and may have projecting pavilions or wings. More symmetrical examples tend to have Renaissance classical details such as pediments, pilasters, and quoins. Openings may be round or segmentally arched. Windows may be grouped and either casement or double-hung with multi-panes. Upper windows may extend through the roof line. In some of the asymmetrical examples, there may be a round tower with a conical roof containing the entrance.

Colonial Revival

The term Colonial Revival is sometimes used to mean all of the revivals of American colonial buildings. In discussing Georgia's styles, however, Colonial and Georgian Revival should be considered the same; other revival styles have separate names and features. The Colonial Revival expressed a renewal of interest in American colonial architecture based on English precedent. Interest in America's colonial heritage grew out of the 1876 Centennial Exposition. Following the centennial, colonial buildings were studied carefully. Some of the Colonial Revival houses that resulted were close copies of originals; others only borrowed details. Often Colonial Revival details were simply added onto buildings of other styles. The Colonial Revival was very popular in Georgia for a long period, from the 1890s through the 1940s and beyond. It was often found in suburban neighborhoods next to many other revivals popular at the same time. During the 1930s and 1940s the style was sometimes referred to as Williamsburg.

Most Colonial Revival houses are symmetrical. A central entranceway is elaborated with a pediment supported by pilasters or columns. The use of broken pediments, fanlights and sidelights is common. Classical cornices with dentils or modillions are usually present. These features tend to be larger than original colonial details. The roof may be hipped or side-gabled with dormers. Windows have double-hung sashes, usually with six-over-six or nine-over-nine panes and may be paired. Walls are of masonry, masonry-veneer or wood.

Dutch Colonial Revival

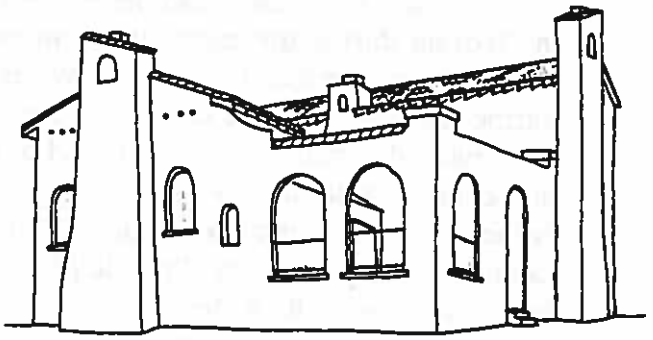
The Dutch Colonial Revival also was part of the movement to revive America's colonial architectural heritage. This style reflected the colonial architecture of the early Dutch colonists and also grew out of the 1876 Centennial Exposition. Along with other revivals of the same period, Dutch Colonial Revival houses were fairly common in Georgia's suburban neighborhoods during the 1920s and 1930s.

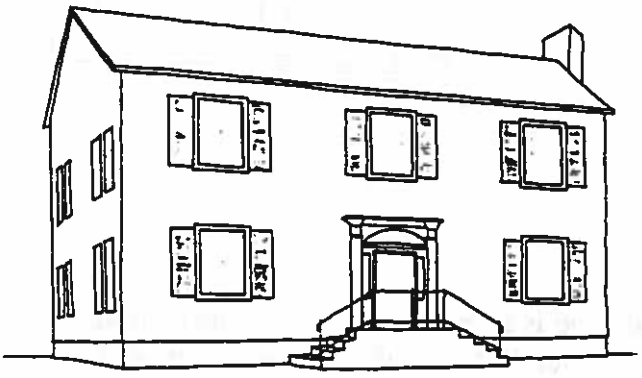
Dutch Colonial Revival houses borrow distinctive features from the Dutch tradition, rather than copying the original colonial form. Their major characteristic is the gambrel roof, steeply pitched and side-gabled with two different slopes. Roof eaves are sometimes flared. A continuous shed roof dormer is common as are other kinds of single dormers. The first floor may have a small entry porch with columns, or the porch may be formed by the eave of the gambrel roof. Occasionally a front-facing gable in the gambrel shape is present.

Spanish Colonial Revival

The Spanish Colonial Revival, another part of the American colonial revival movement, occasionally was built in Georgia's suburban neighborhoods during the 1920s and 1930s. The style revived the Spanish colonial architectural heritage of the American southwest and Florida, including the mission building traditions of California. As with other colonial revivals, this style developed as a result of interest in America's colonial past. Along with the other revival styles of the same period, it added a great degree of diversity to early 20th-century neighborhoods.

A Spanish Colonial Revival house has a clay tile roof that is usually gabled with little eave overhang. Walls are of smooth stucco. Arched openings and arcaded loggias, or open porches, are common. Windows are generally casement and grouped together. The roof may be elaborated with curvilinear gables or parapets from the mission tradition. Exposed roof beams may protrude from the walls to emphasize construction methods.





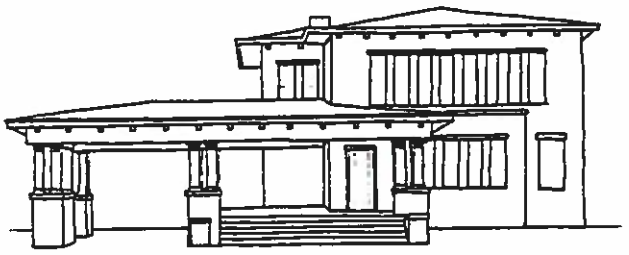
Federal Revival

The Federal Revival style was built in Georgia in conjunction with the renewed interest in American colonial architecture and the classically inspired styles of the early 19th century. The original early 19th-century Federal style was sometimes viewed as colonial even though it technically developed after the Revolution. The Federal Revival emphasized the Federal style and the work of Robert Adam in England. Never very widespread, it was found only sporadically in Georgia's neighborhoods from about 1900 to the 1920s.

A Federal Revival house generally has a symmetrical facade. The main focus is on the entrance, which is elaborated with a fanlight, sidelights, and pilasters or columns. There may be a small entry porch. As in the original style, detail proportions tend to be more slender and delicate than the Georgian-based Colonial Revival designs. Fanlights are almost always elliptical. Decorative features may include panels with swags, garlands, and urns. The early 20th-century Federal Revival house is distinguished from the early 19th-century original by larger, less delicate features and larger window and door openings.

Prairie

The Prairie style was a complete break from the revival styles so popular in Georgia during the early 20th century. This modern style was developed by American architect Frank Lloyd Wright, who worked in the Midwest during the late 19th and early 20th centuries. The Prairie style is one of the few styles developed in the United States and not taken from European precedents. Although a break with tradition, it did draw from several influences. These included Japanese architecture displayed at both the 1876 Centennial Exposition in Philadelphia and the 1893 Columbian Exposition in Chicago, as well as the English Arts and Crafts Movement that emphasized use of materials and picturesque irregularity of form. These influences were creatively combined and re-interpreted by Wright to give a new and modern direction to house design. The Prairie style was rarely used in Georgia largely due to the immense popularity of the many revival styles from the turn of the century through the 1930s. Examples that were built were generally constructed during the 1910s and 1920s in city neighborhoods.



A defining characteristic of the Prairie style is its emphasis on the horizontal. This developed from the idea that a building should relate to its site, specifically the flat Midwestern prairie. A Prairie style house is usually two stories with one-story porches and wings. The roof is low-pitched and may be hipped or gabled. Eaves are widely overhanging and open with exposed rafters. Windows may be placed in rows. These features all combine to create a horizontal effect. Porches have massive masonry supports. There is emphasis on expression of structure and materials. The Prairie house as developed by Wright had an open and functional plan that revolved around a central living area and was a move toward the development of the modern house plan. Most Prairie examples in Georgia do not incorporate this interior plan but simply add exterior Prairie style features to an already established house form. Prairie features may also be combined with other stylistic influences, particularly the Craftsman style.

Craftsman

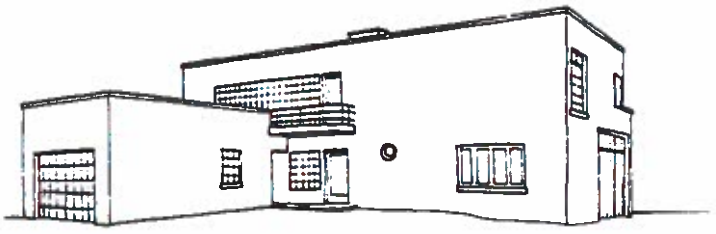
The Craftsman style was the most popular early 20th-century style in Georgia. Like the Prairie style, it was also American in origin. Created primarily in California, it spread rapidly across the country by means of pattern books and magazines. The Craftsman style was a break with the popular revivals of historical styles and a movement toward the modern house. It was influenced by the English Arts and Crafts movement and by the wooden architecture of Japan. There was a major emphasis on materials and craftsmanship. The Craftsman style produced carefully designed houses, in which materials, especially woodwork, and the way in which they were put together into a structure were emphasized. Craftsman houses were built across the state in rural, small town, and urban settings from the 1910s through the 1930s. Entire neighborhoods of Craftsman style houses are common.

The Craftsman house uses a wide variety of materials both for its structure and decorative detailing. It has a low-pitched roof that is usually gabled but may also be hipped, giving a generally horizontal effect. The widely overhanging eaves are open with exposed rafters. Large gables have decorative brackets or braces at the eaves and may be covered with half-timbering. Roof dormers are sometimes found. Walls are most often wood but may also be covered with shingles or a masonry veneer of stone or brick. Porches have short square columns set on heavy masonry piers extending to the ground. Windows may have a multi-paned sash over a large one-pane sash. Craftsman houses are most often asymmetrical with a generally open and functional plan. The Craftsman style is closely associated with the bungalow house type; however, it was popular as ornamentation for many different house forms.

International

The International style, rarely built in Georgia, provided a radical break with architectural traditions. It was developed in the 1920s and 1930s by European architects who wanted to break with historical precedent and take advantage of modern building materials and technology. The result was a structural skeleton covered with a thin exterior skin of material. Design was

stripped to its basics; the efficient functioning of a house without decorative ornamentation became the guiding principle. Brought from Europe to the United States in the 1930s, the International style was not popular in Georgia. Its radically different approach conflicted with conservative architectural traditions and popular ongoing stylistic revivals. Any Georgia examples were generally constructed in cities during the 1930s and 1940s and were architect-designed.



An International style house consists of simple geometric shapes that reflect the structural skeleton underneath exterior wall material. The roof is always flat. Windows are flush with the walls, often grouped in bands, and may turn a corner. Usually windows are metal casements, and structural glass block may also be used to let in light. Thin exterior wall material is smooth and unornamented and usually stucco. The overall shape of the house is generally asymmetrical, often with cantilevered projections.

HOUSE TYPES IN GEORGIA

In addition to architectural style, Georgia houses may be categorized by type, such as "shotgun," "bungalow" or "plantation plain." House type is the **overall form**, the outline or "envelope" of the main or original part of the house, as well as the general layout of interior rooms. Using the name of a house type rather than a lengthy description efficiently communicates a house's main characteristics. Knowing the type allows us to compare one house to others of the same form and can also show the general distribution of similar houses throughout the state. House type can also indicate whether a building form is rare or common and, in some cases, identifies the historical period in which the house was most likely built.

The simplest definition of house type is the formula: **plan + height = type**. Two houses with the same floor plan and the same height will belong to the same type. In some cases, other architectural traits become part of the definition. Roof form, the location of doors or chimneys, or the kind of porch may help determine type or subtype.

When determining type, consider only the **core**, or main part, of the house and exclude side wings, rear service ells, later additions and attached outbuildings. Additions may be important, however, if they change one house type into another. For example, if a single-pen house was expanded by adding a second pen, or room, on the opposite side of the chimney, the resulting house type would be a "saddlebag".

Type or form is frequently confused with **style**, even by experts. "Style" should be thought of as the external ornament or decoration of a house; "type" is the unadorned form and interior layout. Ten houses belonging to the same type may exhibit ten different styles; ten buildings of the same style may illustrate ten different types. As an example, a shotgun house, one of the most common types in Georgia, may have been decorated with architectural details from the Queen Anne style, the Colonial Revival style, or no style at all. In all three cases, the house would still illustrate the shotgun type, regardless of the style with which it is ornamented. Confusing types with styles results in such misnomers as "shotgun style" and "Greek Revival type."

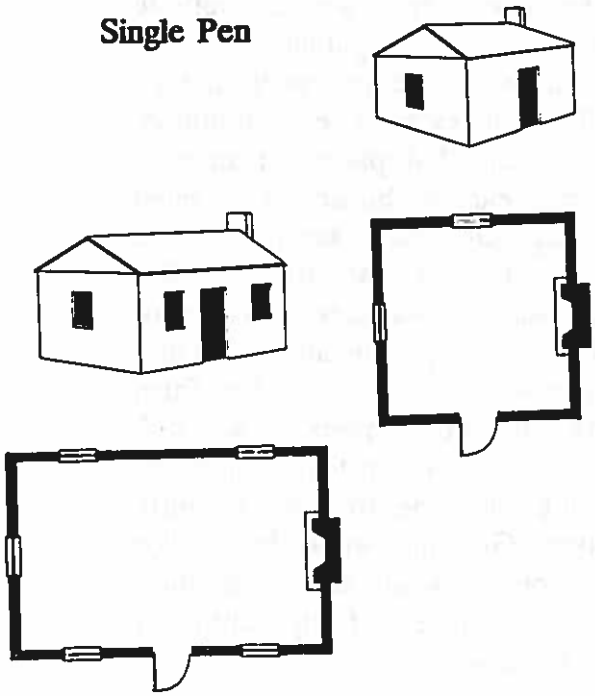
Method of construction and **exterior materials** should not be confused with the overall form and plan of a house. A shotgun house may be constructed of load-bearing masonry, wood frame, or logs, and it may be sheathed in clapboards, brick, vinyl siding or permastone. Regardless of construction method or exterior material, the house is still a shotgun house if it has the overall form and plan of the shotgun type.

House types can sometimes provide valuable clues to construction dates, usually to within several decades; however, they should not be too closely linked with a particular historical period. The changing popularity of a particular type over time sometimes make this sort of dating difficult. For example, the saddlebag house was common in three distinct periods: 1830–1850, 1880–1890, and 1910–1930.

House types described and illustrated on the following pages do not account for all houses in Georgia. Buildings that do not fit easily into a type have unusual forms and plans that make categorizing difficult. Others have simply not yet been studied in sufficient detail to be recognized as members of a type. The following list does account, however, for Georgia's most common, recurring historic house types.

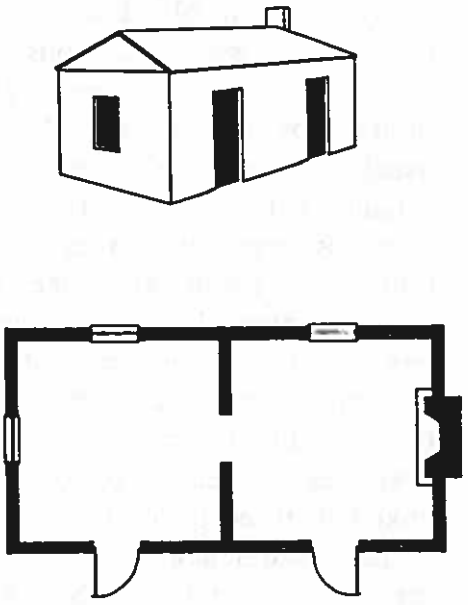
Houses 1 to 1 1/2 Stories High

Single Pen



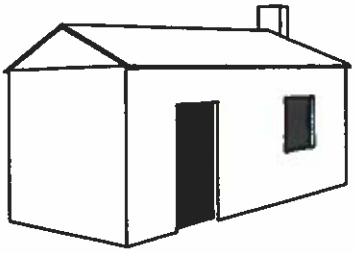
Single-pen houses consist of a single unit, either square or rectangular. Location and arrangement of doors and windows vary. The roof is usually gabled, and the chimney or flue is at the exterior of one gable-end. Sometimes the rectangular version is partitioned into two rooms. Because of its small size, the single-pen house was usually enlarged by additions, so few remain in their original form. Most surviving single-pen houses in Georgia were built between about 1850 and 1900. Found in small towns and rural areas in much of the state, they seem most plentiful in North Georgia.

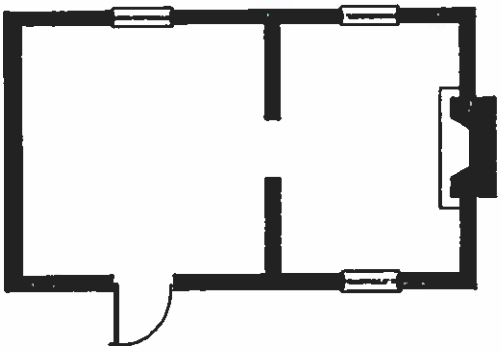
Double Pen



Double-pen houses consist of two rooms, typically square. As in the single-pen, the arrangement and location of openings vary, but the most easily recognizable double-pen house has two doors in the main facade. Chimneys or flues may be located at either or both ends. Gabled roofs are the most common. Few Georgia double-pen houses remain in their original form. Most were constructed for agricultural or industrial workers between the 1870s and the 1930s. Like the single-pen, the surviving double pens seem to be most plentiful in North Georgia.

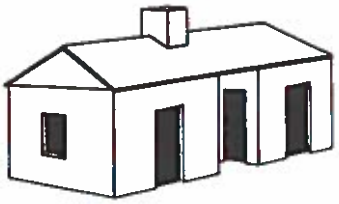
Hall-Parlor

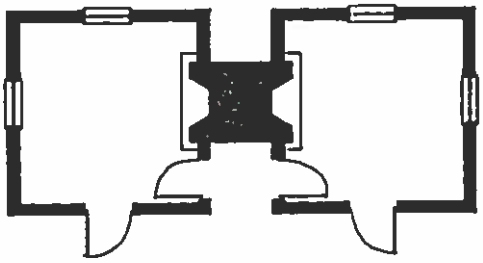




Named after two old-fashioned uses for rooms, the hall-parlor house consists of two unequal rooms. Entry is into the larger of the two, the hall (not hallway), which served multiple functions. Typically gabled, the hall-parlor house is heated with one or two flues or exterior end-chimneys. Although the hall-parlor is one of America's earliest house types, most remaining Georgia examples were built in the last half of the 19th century and the first three decades of the 20th. The type was adaptable and expandable and popular for farm owners, tenant farmers, and mill workers alike. Farmstead houses of the hall-parlor type are most plentiful in North Georgia, while hall-parlor houses for industrial and agricultural workers are spread fairly uniformly across the state.

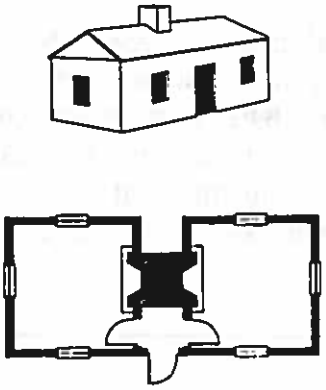
Saddlebag



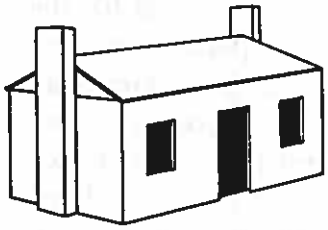


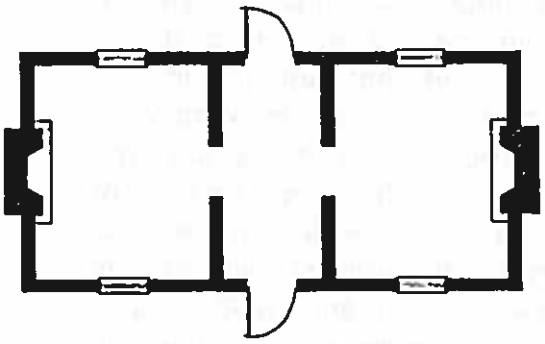
One of the most distinctive and easily recognizable house types in Georgia, the saddlebag house derives its name from a central chimney flanked by two rooms. Rooms are usually square, and the roof is usually gabled. There are two subtypes, one with an exterior door into each room and one with a single, central door into a vestibule beside the chimney. Georgia's saddlebag houses seem to have been built mainly in three periods, with examples in each period strongly linked to three general settings. The earliest saddlebag houses, built in the 1830s and 1840s in rural agricultural areas, are quite rare statewide. In the last few decades of

the century saddlebags were popular alternatives for modest housing in outlying fringes of Georgia's towns and cities. Far more examples survive today from the great period of mill village construction, from about 1910 to 1930.



Central Hallway

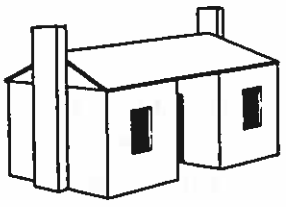


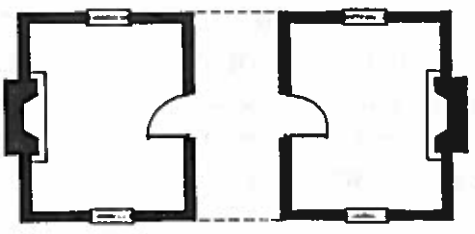


A favorite for Georgians throughout the 19th century, this type consists of a central hallway or passageway between two rooms. It is distinguished from other types with central hallways by being only one room deep. The central hallway type most frequently has a gabled roof and exterior end chimneys. The type seems to be fairly evenly distributed across the state, appearing mainly on average-sized farmsteads and on principal residential streets in Georgia's towns and cities. Most examples were built between 1830 and 1930, with clusters occurring in the periods 1840-60 and 1870-1890.

Dogtrot

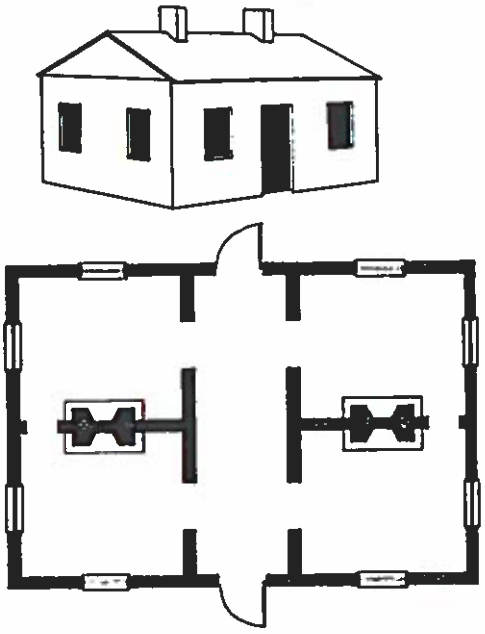
Famous for both its picturesque name and for its distinctive appearance (when found in its rare original state), the dogtrot house has an open passage between two rooms. Like the central hallway house, the dogtrot house is only one room deep, and it usually has a gabled roof and exterior end chimneys. Most frequently, the open dogtrot was enclosed at a later date, giving the house the appearance of a





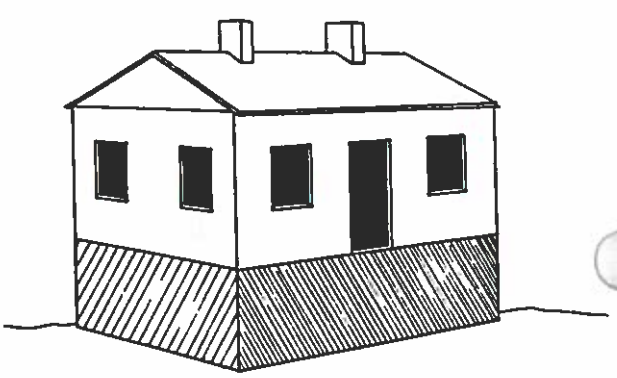
central hallway type. Most dogtrot houses in Georgia were constructed in the 1840s and 1850s. Geographic distribution seems to have been fairly uniform, but most surviving examples are above the Fall Line.

Georgian Cottage



Possibly the single most popular and long-lived house type in Georgia, the Georgian cottage is named not for the state but for its floor plan, associated with 18th century English Georgian architecture. The Georgian plan consists of a central hallway with two rooms on either side. The plan shape is square or nearly so; the roof is usually hipped but sometimes gabled; and chimneys are sometimes in the exterior walls but usually in the interior of the house, between each pair of rooms. Houses of this type were built in almost all periods of Georgia's history, well into the 20th century, but the greatest concentration is between 1850 and 1890. Most surviving examples are found in the Piedmont region.

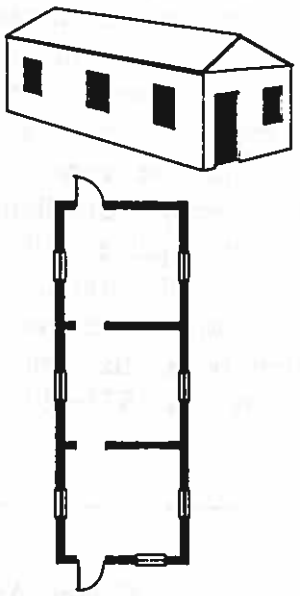
Sand Hills Cottage



The Sand Hills cottage is one of the state's few regional house types. Linked with the Augusta area, it consists of a one-story house on a raised basement. The floor plan is two rooms deep, either with a central hallway or a hall-parlor plan. The roof is usually gabled, and chimneys are usually located along exterior walls. The height of the

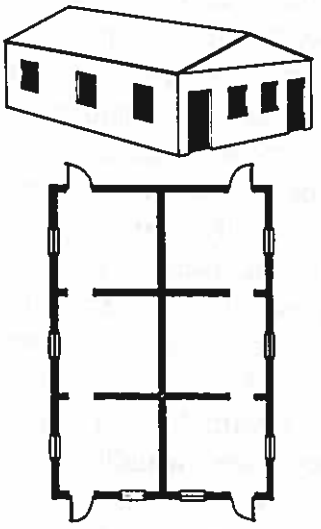
main floor required a prominent flight of stairs to the front entry.

Shotgun



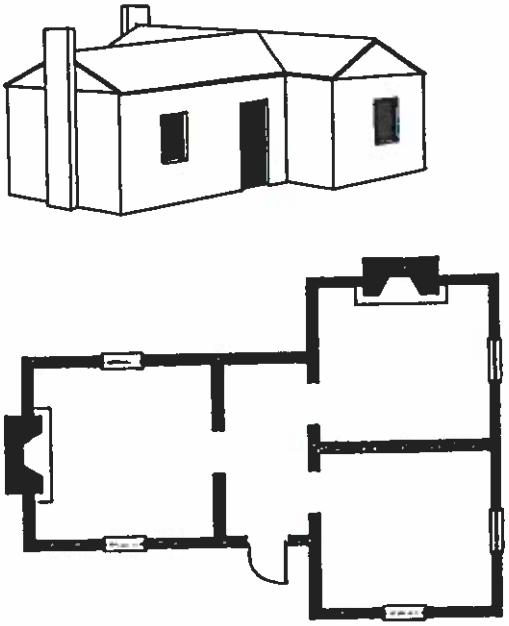
One of Georgia's better-known house types, shotgun houses are predominantly an urban phenomenon, built mainly for low-income workers between the 1870s and the 1920s. Shotgun houses are one room wide and two or more rooms deep, usually three. There is no hallway, and all doors typically line up front to back. The roof is usually gabled, but hipped roofs were also used. The shotgun house was especially popular in larger cities but may be found in small and medium-sized towns as well.

Double Shotgun



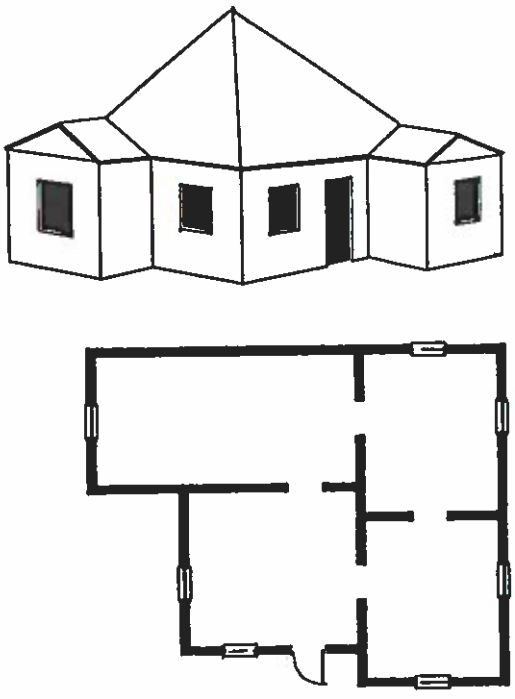
A two-family dwelling, the double-shotgun consists of two shotgun houses side by side with no openings in the shared party wall. Usually a single hipped or gabled roof covers both sections. Like the shotgun type, the double shotgun was built mostly for low-income workers in the late 19th and early 20th centuries. The double shotgun was limited almost entirely to the state's eight to ten largest cities.

Gabled Ell Cottage



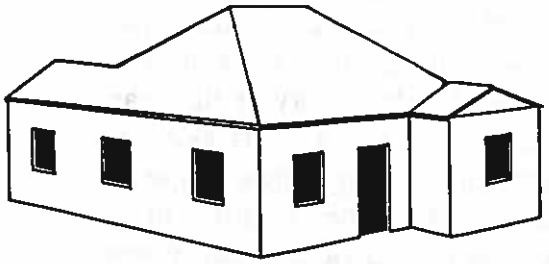
Of late-19th century house types in Georgia, the gabled ell cottage perhaps has the most examples. In plan, it is T- or L-shaped, and it usually, though not always, has a gabled roof. Sometimes called the gable-front-and-wing house type, the gabled ell cottage consists of a gable-front at one end of a recessed wing that is parallel to the facade. The front door, located in the recessed wing, may lead into a hallway or directly into the room in the wing. Fairly evenly distributed across Georgia, the gabled ell cottage was popular in both rural and urban areas and in both modest and well-to-do neighborhoods. Its period of greatest popularity was 1875–1915.

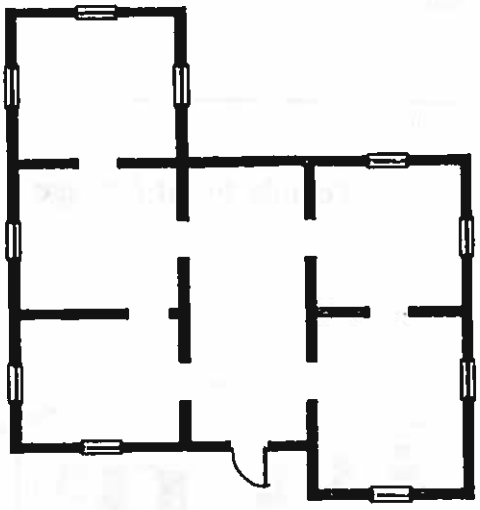
Queen Anne Cottage



Although the name of the Queen Anne cottage derives from the architectural style with which it is frequently linked, the house type also occurs with elements from other styles or no style at all. It is characterized by a square main mass with projecting gables on the front and side. The rooms are arranged asymmetrically, and there is no central hallway–two traits that distinguish the Queen Anne cottage from another similar house type, the New South cottage. The roof is either pyramidal or hipped, and chimneys are usually found in the interior. Although not as common as the gabled ell cottage, the Queen Anne cottage does appear in both urban and rural areas as popular middle-class housing of the 1880s and 1890s.

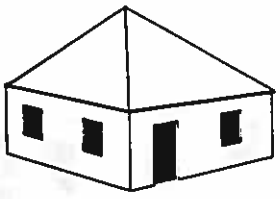
New South Cottage

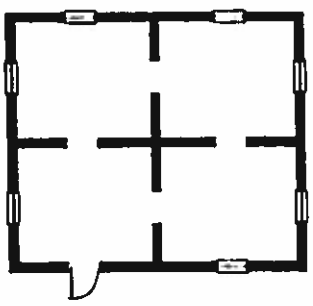




Named after the turn-of-the-century period of great economic growth and regional confidence, the New South cottage was a very popular house type for middle- and upper-middle-income Georgians between the 1890s and 1920s. Although examples survive statewide, in both rural and urban areas, the greatest numbers are in a central band across the state, in the Piedmont and Upper Coastal Plain, and in the state's largest cities and towns. The New South cottage resembles the Queen Anne cottage in that it has a central square mass, usually with a hipped roof, and gabled projections. The main distinguishing trait of the New South cottage is its emphasis on symmetry, the key element of which is the central hallway plan. The central hallway is flanked by pairs of rooms, one or both of which might project forward. A pair of gables in the facade, either over projecting rooms or flush with the wall of the main mass, frequently provided additional symmetry to this house type.

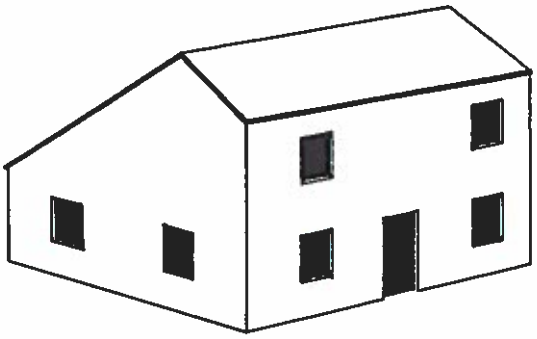
Pyramid Cottage





One of the simplest housing forms in early 20th century Georgia, this house type consists of a square main mass, typically with four principal rooms and no hallway. The most memorable feature is the steeply-pitched pyramidal roof. Most pyramid cottages were built between 1910 and 1930. This type seems to have been more popular in the regions between the Fall Line and the Coast, in rural sections, and on the fringes of towns.

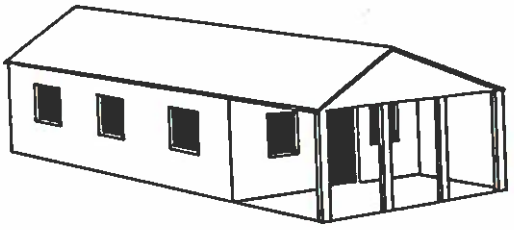
Saltbox



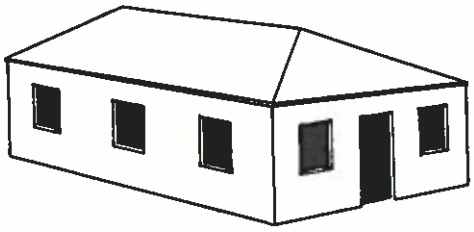
This house type is an import from New England. Rare in Georgia, it is limited almost entirely to mill villages, many of which were built by companies based in New England. It consists of a rectangular block two rooms wide and deep, 1 1/2 stories in the front and only 1 story at the rear. The gabled roof has a short slope in the front and a long single slope in the rear, giving the outline of a saltbox. Its period of popularity was about 1920 to 1940.

Temple Front Cottage

A long, rectangular house, the temple-front cottage has a full-width front porch beneath either a gabled or hipped roof. The house type is three or more rooms deep, with either a central hallway or hall-parlor plan. Almost exclusively a rural type, the temple-front cottage was popular in the 1920s and 1930s, distributed fairly evenly throughout all regions of the state.



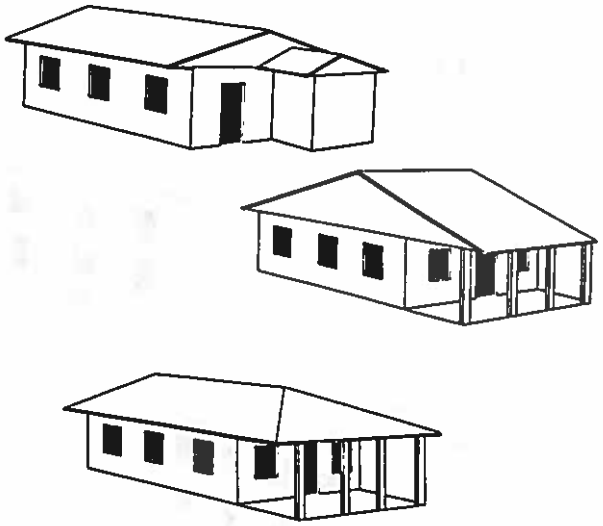
Extended Hall-Parlor



Like the temple-front cottage, this house type has a long, rectangular shape with the facade in the narrow end, but no recessed front porch. The plan is three or more rooms deep; the roof may be hipped or gabled. The extended hall-parlor house may closely resemble several bungalow subtypes. Most surviving examples date from the 1920s and 1930s and are found across the state, in both rural areas and outlying parts of towns and cities.

Sometimes mistakenly referred to as a style, bungalow house forms are long and low with irregular floor plans within an overall rectangular shape. Integral porches are common, as are low-pitched roofs with wide overhangs. Bungalows were very popular in all regions of Georgia between 1900 and 1930, both in rural areas and cities and towns. The bungalow type is divided into four subtypes based on roof forms and roof orientation: front gable, side gable, hipped, and cross gable. The front and side gable versions greatly outnumber hipped bungalows, while cross gable bungalows are rare.

Bungalow

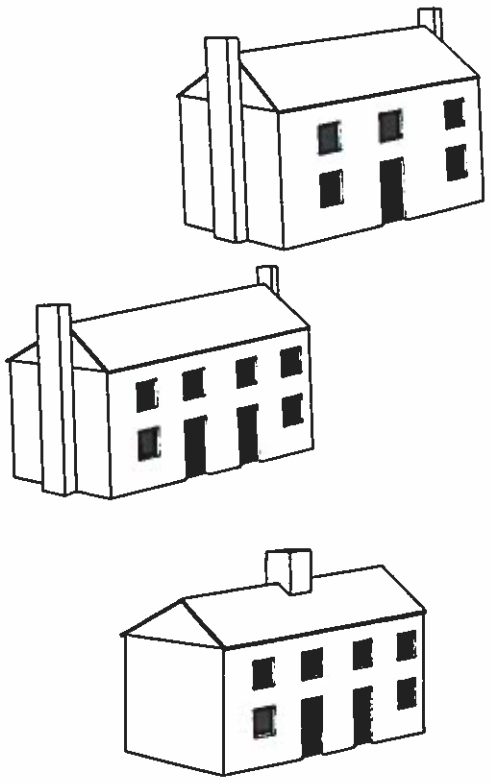


Two house types of the middle 20th century that are not yet old enough to receive much attention are the ranch house and mobile home. Additional time is needed to give proper perspective to understanding these forms, but they can be defined as types. The ranch house has a long, narrow, rectangular shape, with or without projections. Bedrooms are clustered at one end; the principal entry and living spaces near the center; and the garage or carport at the other end. The roof is typically low-pitched. The mobile home also has a long, narrow, rectangular shape. Bedrooms are grouped in one end; entry and living spaces in the other. The roof is usually flat or nearly so.

Ranch House
Mobile Home
(not illustrated)

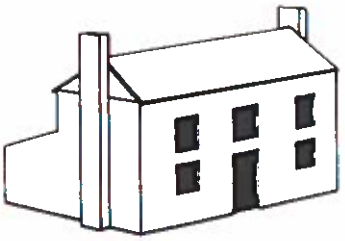
Houses 2 Stories High

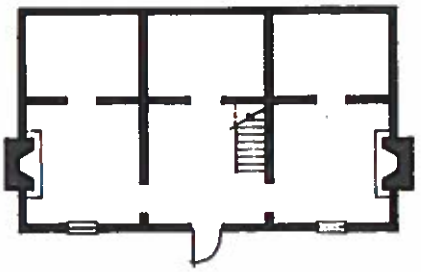
I-House



So-called because it is common house type in Midwestern states beginning with the letter "I", such as Illinois, Iowa and Indiana, the I-house is far less common in Georgia than in other southeastern states. Appearing sporadically in Georgia throughout the 19th century, most of the remaining I-houses were built in the 1840s, 1850s, 1870s, and 1880s. I-houses are one room deep and at least two rooms wide. The various floor plans of I-houses (all found in one-story houses as well) determine the subtype: central hallway, hall-parlor, double-pen, and saddlebag. The I-house type is uncommon in many areas of Georgia, as are two-story houses in general. Most survivors are found in small towns in the Piedmont and Upper Coastal Plain regions of the state.

Plantation Plain

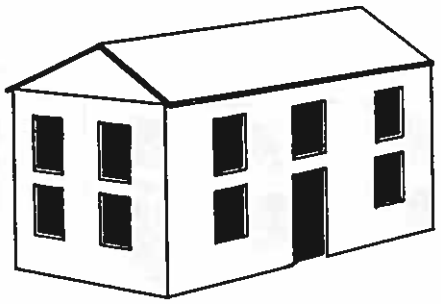




Georgians seem to have a special fondness for this house type, which is often mistakenly referred to as a style. One of the earliest house types in Georgia, the plantation plain is almost strictly a rural phenomenon. Most of the few surviving examples were built between about 1820 and 1850 in the Piedmont and Coastal Plain regions. A plantation plain house has a two-story block at the front, with either a central hallway or hall-parlor plan, and a one-story range of rooms at the rear, consisting of either three

rooms or, more commonly, a short rear hallway flanked by a pair of rooms. The rear section is typically shed-roofed; the two-story block is usually gabled; and there is most often a full-width, one-story front porch.

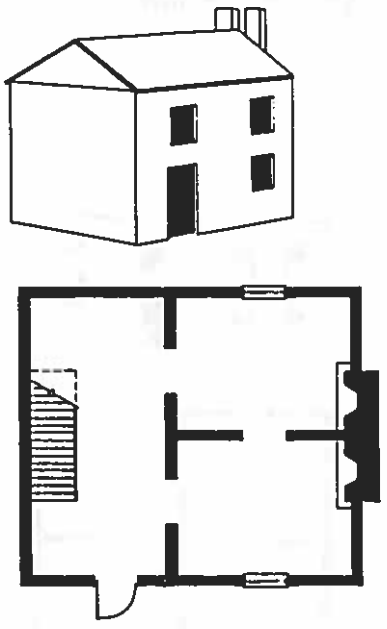
Georgian House



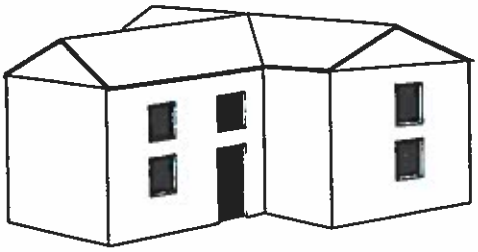
Except for its two-story height, the Georgian house has all the characteristics of the Georgian cottage. Although the two-story house is less numerous than the one-story cottage, particularly in rural settings, it too was popular from the first decades of the 19th century well into the 20th. Most examples of the type, however, were built in the periods 1850-1860 and 1900-1930, chiefly in the larger towns and cities.

Side Hallway

Named after the location of the hallway at the side of the house, this type is relatively uncommon in Georgia. The hallway normally contained the staircase, and the house was usually two rooms deep. Because of its narrow facade, the side hallway house was especially suitable for urban housing. Most examples of the house type were built between about 1820 and 1850 in the oldest cities of the state, particularly Savannah and Augusta.

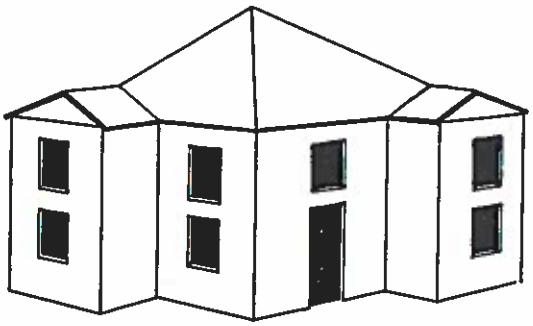


Gabled Ell



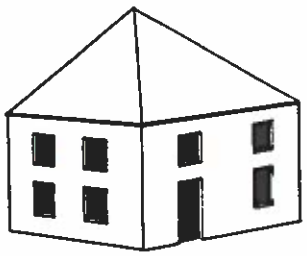
This is the two-story version of the gabled ell cottage. T-shaped and usually gabled, the gabled ell house is far less common than the gabled ell cottage. Most examples were built in the last quarter of the 19th century for well-to-do occupants, more often in Georgia's towns and cities.

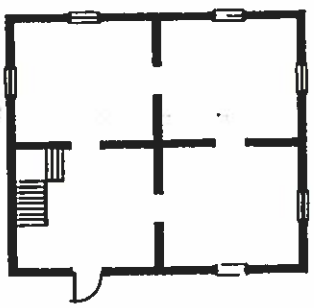
Queen Anne House



This house type is the two-story version of the Queen Anne cottage, and except for height, traits of the two types are identical. Both were popular in the 1880s and 1890s, although far fewer Queen Anne houses were built. While the Queen Anne cottage appeared in both rural and urban areas, the two-story version was almost limited to residential neighborhoods of Georgia's towns and cities.

American Foursquare





Very popular nationwide in the early 20th century, the American Foursquare was recognized as a separate type only within the last ten years. In Georgia, the type appears mostly in urban settings, occasionally in rural areas. The American Foursquare, consisting of a cubical mass capped by a pyramidal roof, was reputed to provide maximum interior space for the cost. There are four principal rooms on each floor; one of the front two typically serves as the entry and stairhall. The American Foursquare was popular for only about 15 years, between 1915 and 1930.

Split Level
(not illustrated)

Largely a product of the American suburbs in the 1950s, the split level house type is not yet on many lists of preservable resources, but, as in the case of ranch houses and mobile homes, this situation is likely to change. The split level house consists of three levels, two of them stacked and the third to one side, raised above the lowest level but below the highest. The main doorway is near the center, in the middle level, and a garage is typically in the lowest level.

HISTORIC RESIDENTIAL LANDSCAPES IN GEORGIA

Georgia's historic houses do not exist in a vacuum, but rather in physical settings that are often landscaped. In some instances, this landscaping simply complements the historic house and its architectural features. In other instances, landscaping is a significant historic resource in and of itself, equal in importance to the architecture of the house, and equally worthy of preservation.

To most people, historic residential landscapes are not as apparent as historic architecture. Landscapes do not sort themselves into neat categories corresponding to architectural styles or types. Moreover, the history of residential landscaping in Georgia is not one of simple progression from one "style" to another; landscaping trends and fashions tend to overlap and even merge, more so than architectural styles. Historic landscapes by their very nature are dynamic. They change with the seasons, and they change over time as plants grow, mature, decay, die, and are replaced. Finally, Georgia's landscaping has been studied less than its architecture. It is no wonder, then, that Georgia's historic residential landscapes have been considered secondary to its architecture!

Recent research and analysis by Catherine Howett at the University of Georgia and by the Historic Preservation Section of the Georgia Department of Natural Resources have shed new light on the state's historic residential landscapes. This new information can help us better understand, appreciate, and preserve Georgia's landscape legacy.

Historic residential landscapes generally consist of four main components: **gardens**; **yards**; **grounds** beyond the immediate yard if the property is extensive; and larger **surroundings**. Gardens, yards, and grounds are typically landscaped according to prevailing trends, fashions, or conventions. Larger surroundings correspond to the major settlement patterns of the state: rural, small town, urban, and suburban.

The making of Georgia's historic residential landscapes–the actual putting together of basic landscape components–involved at least four major variables: (1) the site itself, its size, shape, topography, hydrology, soils, vegetation, orientation, and previous development; (2) prevailing landscape styles, fashions, trends, or conventions, whether "high-style" or vernacular; (3) the intentions and capabilities of the landscape designer, whether a trained landscape architect or a homeowner with an avocational interest in gardening; and (4) the availability of time, money, labor, and materials. The complexity of this process is responsible for the diversity of Georgia's landscapes. The state's mild climate, varied geography, and abundance of water have further encouraged a variety of landscape developments.

Out of this complex landscaping process came at least ten major types or forms of historic residential landscapes:

- The landscape of work
- Ornamental yards
- The swept yard
- The Downingesque landscape
- The horticultural landscape
- New South landscaping
- Landscape revivals at the turn of the century
- Craftsman landscaping
- 20th-century suburban landscaping
- The landscape of play

Examples of each type survive today in Georgia's "living places."

The Landscape of Work

Among Georgia's earliest and most basic forms of historic residential landscaping is what might be called "the landscape of work." This is also among the most common and most enduring landscape form.

As its name suggests, the landscape of work was, first and foremost, functional. Occurring primarily in a rural-agricultural setting, it brought a sense of order, neatness, and efficiency to the working environment of the farm. It met practical, everyday needs yet, at the same time, reflected traditional values of rural life. The landscape of work, it might be said, made a virtue out of necessity.

Major components include a farmhouse, outbuildings, outdoor activity areas, a well, a small "kitchen garden" in a side or rear yard, agricultural fields and woodlots, and sometimes a small grove of fruit or nut trees. These components are linked by networks of paths, fences, and functional sight lines. Everything is arranged according to a simple, practical, but not always rigid geometry of straight lines and rectangles. There is often a straight path, unpaved, through the front yard from the road to the front door; this path frequently "extends" through the central hallway of the farmhouse to a rear porch and the back yard. Porches, both front and rear, and trees in the front and back yards provide shade for the house and outdoor activities.

The landscape of work is usually bordered by similar landscapes on adjacent farms or by the natural, usually wooded environment. It occurs primarily on farms of all sizes, dating from the 18th century to the present.

Ornamental Yards

Contemporary with the landscape of work but radically different was the "ornamental farm." Inspired by 18th-century English estates, this form of landscaping transformed the entire landscape of work into a work of landscape architecture. The end result was a working farm with the appearance of a public park. Several attempts to create ornamental farms were made along the Georgia coast during the late 18th century. No complete examples survive.

An offshoot of the ornamental-farm approach was extremely popular across Georgia throughout the 18th and 19th centuries. This derivative form might be called the "ornamental yard." Many examples still exist.

In the ornamental yard, a central core of land within a larger landscape of work, usually around or adjacent to the main house, is heavily embellished with formal landscaping. This is primarily aesthetic in nature and contributes little if anything to the basic operations of the property. It is generally self-contained; sometimes literally enclosed by fences, walls, or terraces; sometimes delineated by dramatic changes in landscape treatment. Usually it is situated along with the house on a high point of ground.

The "island" of formal landscaping in the ornamental yard is embellished in various ways. One, most common in the late 18th and early 19th centuries, is through enclosed, geometric gardens or planting beds (parterres), clearly separated from the surrounding landscape of work by fences, walls, hedges, or terraced slopes. Another way, common after the middle of the 19th century, is through a more informal, picturesque arrangement of trees, shrubbery, and lawn. This park-like area might be clearly delineated from the surrounding landscape of work, or it might blend into it, with the lawn becoming pasture or field and trees becoming forest or woodlot. Other design treatments include axial and semi-circular tree-lined driveways and paths. Occasionally outbuildings such as a plantation office might be worked into the design of the ornamental yard.

Because of the nature of this type of landscaping and the amount of space required, the ornamental yard occurs primarily in rural settings and on the fringes of towns and cities; occasionally it is found on larger residential lots in communities. A popular "in-town" version of the ornamental yard, featuring small, enclosed, geometric gardens, usually but not always in the back yard, is found on smaller residential lots in towns and cities.

The Swept Yard

Combining traditional virtues of rural life and its landscape of work with emerging notions of aesthetics and the ornamental yard is that peculiarly Southern form of landscaping known as the "swept yard." Extremely popular throughout Georgia during the 18th and 19th centuries, this vernacular interpretation of the ornamental yard has virtually disappeared from today's landscape.

As its name implies, the swept yard featured a dirt yard cleanly swept of all grass, weeds, and other ground cover. Almost always it was the front yard that was swept, although the area often extended to the side and rear yards as well. The yard frequently was covered with a thin layer of sand.

Whether sanded or not, the ground surface usually was "finished off" with sweeping ornamental patterns.

The overall arrangement of swept yards varied greatly. Some were merely cleared areas in the middle of a traditional landscape of work. Others, particularly front yards, were arranged in formal geometric patterns, with the swept areas defining paths and low planting beds. Still others were more informally and picturesquely arranged with trees and shrubbery. Usually the swept area was set off from the surrounding landscape of work by walls, fences, walks, or terraces.

The historical popularity of the swept yard is undeniable. Reasons for this popularity, like those of many vernacular traditions, are less certain. Some historians believe that yards were swept because grass, considered a weed, was deemed unsightly and indicative of poor housekeeping. Others think that swept yards dried out the ground and prevented "miasma." Still others believe that clean yards discouraged mice, rats, snakes, and other forms of vermin from taking up residence close to the house. Whatever the reason, the swept yard was a dominant residential landscape convention in Georgia until the late 19th century, when it was replaced by that contemporary landscape convention, the lawn.

The Downingesque Landscape

New forms of residential landscaping were introduced to Georgia toward the middle of the 19th century. Most were inspired by the ideas of Alexander Jackson Downing of New York who achieved national fame, if not fortune, for popularizing "English" landscaping in America through a series of books, magazine articles, and lectures.

The new "Downingesque" landscapes were meticulously designed yet informal in appearance. They featured a picturesque or naturalistic aesthetic which was in sharp contrast to the rigid geometries of European landscape conventions. They also were broadly expansive, integrating all four components of the residential landscape–gardens, yards, grounds, and surroundings–into a single unified "landscape composition." Downing also argued that only certain architectural styles, like the Gothic Revival, were compatible with these new landscape forms. He railed against such "incompatibilities" as four-square white-painted houses, like those of the Greek Revival style, set starkly amidst naturalistic landscapes.

Downingesque landscapes were less popular in the South than in the North. Nevertheless, Downing's designs spread across Georgia through his books and through articles in popular horticultural and agricultural magazines. He gained a Southern disciple in Jarvis Van Buren of Clarkesville who created several genuine Downingesque "compositions" in north Georgia by combining Gothic Revival architecture and picturesque landscaping. Other good examples of Downingesque landscaping are rare. They are generally found in towns or cities, associated with high-style Gothic Revival houses or in the country where they provide the setting for seasonal retreats.

The Horticultural Landscape

Paralleling the development of Downingesque landscapes and sometimes merging with them (although Downing would not have approved!) was a landscape phenomenon that some historians have called "the horticultural landscape." Beginning in the mid-19th century, it became possible to obtain exotic plants from all over the world, and interest was heightened by clubs and magazines devoted to horticulture. This led to the planting of exotic specimen plants in the domestic landscape–plants whose primary purpose was to display their beauty or uniqueness.

Ways in which these new, exotic specimen plants were introduced into the domestic landscape varied. In some instances, plants were simply set down into the existing landscape, usually in the front yard, for better or worse. In other cases, the entire landscape would be arranged or rearranged to highlight a few selected specimens. More frequently, plants would be worked into an existing landscape. At its extreme the horticultural landscape took on a plants-for-plants'-sake character.

The horticultural landscape was most popular until the turn of the century, although the tradition is still with us today. Specimen plants can be found on display all across the state.

New South Landscaping

During the latter decades of the 19th century, residential landscaping activity in Georgia reached an all-time high. In terms of sheer quantity, this era represents the hey-day of Georgia's domestic landscaping. Statewide, more residential properties were landscaped–more trees planted, more lawns

seeded, more designs drawn, more articles and books published–than ever before. More of this historic landscaping survives today than from any other period. Corresponding as it does to Henry Grady's "New South" in Georgia, this popular late-Victorian landscaping might best be called the landscape of the New South.

"New South landscaping" in Georgia, like the landscaping in much of the country at the time, can be described as a popular, mass-marketed version of the earlier Downingesque landscaping with elements of the horticultural landscape and the ornamental yard worked in for good measure. The overall effect of New South landscaping is informal–what one historian of Georgia landscaping has termed "picturesque randomness." This aesthetic is the same as the "picturesque eclecticism" characterizing late-Victorian architectural design and interior decorating. And it often suffers the same ironic, unfortunate fate: its carefully contrived picturesque randomness is frequently misconstrued as the absence of landscaping principles and designs!

Chief characteristics of New South landscaping are its informal, almost casual quality and its great variety of landscape features. Soft, curvilinear lines and contours rather than hard geometric edges mark the various landscaped areas. Most features, particularly trees and shrubbery, are blended together for overall effect, although the occasional specimen plant or landscape object may be highlighted. Carpets of grass, appearing in quantity for the first time in Georgia, create broad lawns that tie together various landscapes elements. New fences, if they occur at all, are made nearly transparent by the use of cast iron and wire; frequently they are replaced by low retaining walls, curbs, and hedges. Flower beds highlight the predominantly green landscape. The landscape of work, if present at all, is relegated to remote areas of the property and screened from view. The traditional components of residential landscaping–the gardens, yard, grounds, and surroundings–are suffused into a larger park-like landscaped environment.

New South landscaping transformed the appearance of Georgia. It was most pronounced, however, in towns and cities where increasing numbers of houses were built to accommodate the state's rapidly expanding population.

Within this urban environment–newly built houses with newly landscaped grounds–the New South landscape produced yet another new landscape form: that of the residential neighborhood. Created from the composite of individually landscaped yards and from the results of new community landscaping activities by local governments and civic organizations, the landscape of 19th-century neighborhoods took on many

of the characteristics still associated with them today: tree-lined streets, bordered by curbs and sidewalks, with uniformly set-back houses, and spacious front yards informally landscaped and blended together, all creating the appearance of a large landscaped park. This "streetscape" distinguishes Georgia's late 19th-century neighborhoods from the residential landscaping which had preceded them and from the suburban landscaping which would follow.

New South landscaping was the agent for yet another new phenomenon: the wholesale re-landscaping of older residential properties. This made the New South landscape transformation even more complete and led to the demise of much of the state's prior residential landscaping. In some instances, new elements and features were merely worked into an existing landscape. In other cases, existing landscapes were wholly remodeled, literally torn up and done over, in the pervasive style of the New South. Fences in particular were banished, either by being made transparent through the use of cast iron or wire or by being literally pulled down and replaced by hedges, retaining walls, and landscaped ditches known as "ha-has."

Landscape Revivals

At the turn of the century, there was a backlash against the rampant picturesque randomness of New South landscaping, just as there was a reaction to the picturesque eclecticism of late Victorian architecture. This backlash came from several quarters: from the emerging profession of landscape architecture, which wanted to impose a greater and more evident sense of "design" on the landscape; from the waves of classical revivalism sweeping through the world of architecture; from new interest in English vernacular design traditions; and from growing interest in colonial and early American landscaping.

Reaction to New South landscaping manifested in four different ways. One was the reproduction of historic landscapes, usually French or Italian, all classically inspired, with all of their geometric complexities, usually at the hands of professional landscape architects working for wealthy clients. Another was the less exact interpretation of historic landscape styles, scaled down to smaller residential properties, and carried out by landscape architects or trained commercial gardeners. A third was the loose interpretation of English vernacular landscaping, sometimes called "cottage" landscaping, with its emphasis on naturalness and simplicity. The fourth was the imitation of colonial and early American gardens, usually more fanciful

than factual, given the absence of authentic examples and reliable documentation.

Early 20th-century landscape revivals occurred on country, suburban, and urban estates, in the newer, more "up-scale" suburban developments, and occasionally in smaller cities and towns. They often corresponded to residential architectural styles. A Mediterranean villa, for example, would be given an "Italian" landscape, while a Tudor Revival house would be given an "English" landscape. Apart from the occasional plantation and country estate, they are almost never found in rural areas.

Craftsman Landscaping

Shadowing turn-of-the-century landscape revivals, but contrasting with them at virtually every step, is a little-researched early 20th-century domestic landscape movement that, for want of a better term, might be called "Craftsman" landscaping. Paralleling the development of Craftsman architecture and interior design, and apparently inspired by the same interest in arts and crafts, Craftsman landscaping was the standard accompaniment to the many new Craftsman-style bungalows which were built in Georgia cities and small towns. It is similar in many respects to the English vernacular revivals of the same period but scaled down to the more modest size of the bungalow house lot.

Craftsman landscaping displays a cozy, homey quality, informal but not random, carefully crafted to make the most of small suburban lots. Lawns, trees, shrubbery, and flower beds are standard features. Fences are nowhere to be seen. Natural material, especially stone, is used in the construction of retaining walls, patios, and walks. Porches, patios, and trellises lessen the distinction between inside and outside. A new element appears in the Craftsman landscape: the driveway for the automobile. Often its impact in the front yard is minimized by reducing it to two narrow parallel strips of pavement, with grass between.

Many Craftsman landscapes survive today, yet little research has been done on this aspect of Georgia's residential landscaping.

20th-Century Suburban Landscaping

The early 20th century brought yet another new development: the large-scale landscaped suburb. Here was a new form of residential development in Georgia, one which took shape literally overnight, generally on the outskirts of established cities and towns, and on a scale not previously experienced. It had no landscape traditions to adhere to and no conventions to follow apart from the standard "residential park" model of English and American suburban development.

In most instances, landscaping of these new suburban developments followed the proven model–the residential park. Resulting characteristics are: an overall irregular or curvilinear arrangement of streets, fitted into rather than imposed upon the natural topography of the ground; relatively large and irregularly shaped lots; retention of existing natural features of the site, including topography and vegetation; uniform setback of houses, creating generally broad or deep front yards; retention of unsuitable building lots as natural open space; and the introduction of small "domestic" landscapes on each lot, consisting primarily of open lawns, trees, and shrubbery. Shrubbery was kept close to the house, rather than dispersed throughout the landscape, to hide the foundation line and to integrate the architecture with the setting. (From this new development comes our present-day convention of foundation planting.) New utilities such as electrical and telephone wires and gas pipes were increasingly relegated underground.

The development of landscaped suburbs brought with it a new way of creating a neighborhood landscape. Previously, most neighborhoods in Georgia had developed incrementally over the years, and landscaping was done in the same way by individual property owners. But in new suburbs, development and landscaping took place in a relatively short period of time, largely at the hands of a single developer and according to an overall plan. As a result, the effect was frequently one of uniformity. Within this overall framework, individual property owners then made their own smaller-scale landscape improvements. Questions of compatibility or conformance arose immediately and were resolved in a variety of ways. Some suburban developers took a hands-off approach, and let individual property owners do whatever they wanted, subject to the peer pressure of their neighbors. Others incorporated landscape specifications into deed covenants and subdivision design guidelines. Still others developed all the landscaping themselves, down to the last foundation shrub, before selling individual properties, in the hopes that this overall design would perpetuate itself. In most cases, by intent or otherwise, a relatively uniform suburban residential landscape was the result.

The Landscape of Play

A recent development in Georgia's residential landscaping is the emergence of what might be called "the landscape of play."

In this form, the front yard is generally but not always given over to public purposes with its landscaping contributing to the overall residential-park environment of the neighborhood. Its overall appearance is little compromised by practical or recreational conveniences. The back yard, however, is entirely given over to private leisure-time pursuits, including avocational landscaping. Hedges and fences, rock and rose gardens, patios and decks, barbecue pits and swimming pools, children's play equipment and a woodpile for weekend fires in the fireplace, perhaps even a satellite dish antenna or a recreational vehicle, all coexist in the back yard. In extreme cases, the landscape of play spills over into the side and front yards, creating yet another residential landscape form, one that is completely opposite in every respect from the landscape of work, Georgia's first landscape tradition.

This document is based on a larger manuscript prepared by Catherine Howett at the University of Georgia for the Historic Preservation Section of the Georgia Department of Natural Resources.

THE ARCHEOLOGY OF RESIDENTIAL PROPERTIES: IN MY BACKYARD?

You may not know it, but the yard around your historic house contains important information. Indeed, archeologists will tell you that a house and yard are simply above-ground components of a historic house archeological site. From their investigations, archeologists have learned that the yards and grounds of every historic house contain important clues to past activities. Potentially, a historic house site can yield information about previous uses of the property, the people who lived there and what they did, and physical changes to the house, outbuildings, and landscape. Your yard has this archeological potential, too!

What Makes Your Yard an Archeological Site?

The people who once owned your property, lived and worked there, built its structures and landscaped it, left behind physical evidence of their activities. This evidence, called an "archeological resource," can range from a nail or piece of glass left on the ground to entire foundation remains of buildings and structures. They are the archeological components of the historical record of your property and, in some form, are present on the site of every historic house in Georgia!

What Kinds of Archeological Resources Might Be In Your Yard?

Your historic house and its landscaping are the most obvious archeological resources on your property, but you probably have never thought about them this way. Not all archeological resources are in the ground and out of sight. Some may be only partially buried, while others may lie on the ground's surface. An archeological investigation of your house and grounds could produce valuable information about their history and development.

Some archeological resources may be in plain sight. Included could be items which were thrown away, abandoned, or perhaps lost. These are called "artifacts." Examples may include a broken dish or bottle, a leftover board, or a dropped nail. Other archeological resources on the surface of the ground might include remnants of brick foundations or stone walls, chimneys, walkways, or fence posts. In places where the ground has eroded away, archeological resources previously buried may be exposed. Such places should be investigated.

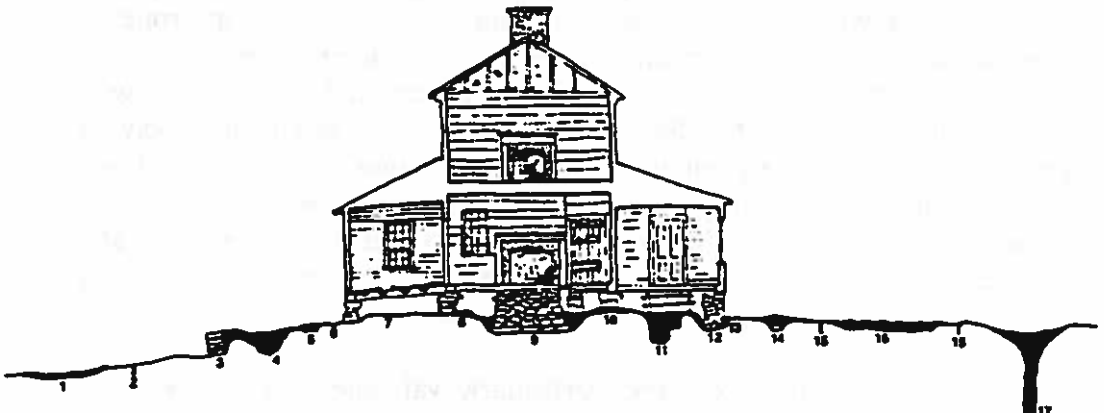
Still other archeological resources may be evident from indications on the surface of the ground. A depression may indicate the location of a well, privy pit, cistern, or even a grave. Mounds may signal the location of a foundation of a former building or landscape feature such as a flower bed or garden furrows. Terraced slopes may mark where formal landscape gardens once existed or where outdoor activities took place. Indeed, any unnatural-looking bumps or depressions may indicate the presence of archeological resources.

Vegetation may indicate archeological resources not visible on the ground's surface. A line of trees could suggest an old road or the edge of a forgotten field, even an old property line. Parallel rows of perennial flowers might outline the course of a former driveway or path, while others ring old flower beds. Differences among the way plants grow may also reveal the locations of archeological resources. Stunted flowers and shrubs or bare spots in a lawn may indicate where something has packed down the soil. Perhaps many feet on the path to a privy or some other often repeated activity hardened the dirt. Plants do not root well in such soil, and water runs off of it. Early blooming or unusually fast-growing plants may indicate areas where soil has been enriched unintentionally, including a filled-in privy hole, well, or garbage pit. Exceptionally dry or damp areas may also be worth investigating. Of course, many important archeological resources exist underground, where most people expect them to be. Little or nothing

on the ground indicates their presence. Only archeological testing can find out if they are there.

Occasionally, the grounds or yard of a historic house may contain archeological resources which do not relate to that particular house or its landscape. An early settler may have built a cabin or trading post there. Prehistoric (Indian) archeological resources may be discovered. Most of these resources, however, have probably been disturbed, if not destroyed, by later construction, as well as the development of the landscape. Some may survive, though, if the property is large or development scattered.

Most commonly found prehistoric materials are stone and clay artifacts such as arrowheads and potsherds. Stone was also shaped into forms such as axes, hammer and grinding stones, pipes, bowls, ornaments, and blades. Not only were pots made of clay but so were jugs, saucers, plates, bowls, jars, pipes, and figurines. They might be plain or decorated. Animal bone was carved for use as pins, hooks, needles, and earspools. Historic materials might include items such as glass beads and iron tools traded to the Indians by Europeans. Early settlers and those that followed brought items of metal (nails, tools, gun parts, bullets, coins, tackle), glass (bottles, windows, beads, glasses), bone (buttons and handles), and stone (gun flints). All of these are important in identifying and dating the culture or cultures that made and used them. An archeologist should be contacted to help determine whether these items are important and what they may tell about the property and the people who lived on it.



1. Roadbed
2. Fence post hole
3. Terrace wall
4. Tree stump hole
5. Flower bed
6. Drip line
7. Original land surface
8. Fill dirt (from chimney base hole)
9. Chimney base hole
10. Fill dirt (from root cellar)
11. Root cellar
12. Foundation pier trench (builder's trench)
13. Drip line
14. Buried foundation pier of former porch
15. Post holes of garden fence
16. Garden furrows
17. Filled-in well

What Can All These Archeological Resources Tell You About Your Property?

Archeological resources in your yard can reveal a great deal about the history and development of your house, landscape, and property. In particular, they can provide information about:

1. The use of the land over time: what, where, and when things happened under and around your house;

2. The way of life of the people who lived there;

3. The development of the property: what, where, and when changes occurred. This includes the location and kind of outbuildings and auxiliary structures; evidence of earlier buildings (including, perhaps, a previous house on the site) and former landscape features; and

4. Additions and alterations to existing buildings and landscape features.

Why Are These Archeological Resources Important?

Archeological resources contain "hard" evidence about a property's history. Almost like fingerprints, archeological resources are remains left behind by those who lived, built, worked, and even died on your property. As such, they are as important as the books, papers, deeds, diaries, photographs, recollections, and other pieces of historical documentation with which you may be more familiar. Just as you would not throw away or willfully damage a historic photograph of your house, so you should not damage or destroy your property's archeological resources. If recognized, evaluated, recorded, and analyzed in relation to the rest of the property and what is known about it, archeological resources can add important chapters to the record of your historic house and landscape.

Archeological resources are particularly valuable in that they may provide information that you have no other way of obtaining. This is especially true if there is little historical documentation about your house or property, or if what is available does not answer your questions. What kind of building was supported by those old foundations behind the house? Where was the first barn located? What was the size and shape of the porch which fell down before you bought the house? What was the arrangement of the formal garden which used to be on the east side of the

house? How old is that tenant house out by the highway? Was there an Indian village down by the creek where those arrowheads were found?

Even if a property is well documented historically, its archeological resources can supplement or reinforce this information. Just as any good reporter requires more than one source for a story, so should you look for more than one source of information about your property. Historical records can be misleading. They are not always accurate and are sometimes misinterpreted. Archeology can help keep the historical record straight by providing additional information or offering another interpretation of past events.

Architecture

REPAIR AND MAINTENANCE OF YOUR OLD HOUSE

The purchase of an old house may be the largest investment you ever make. It is important to care for this investment properly so that it will serve you well, maintain its value and act as a tangible link to the history of Georgia. While owning a historic house can be enjoyable, it also can be a challenge to maintain and repair. The following information is designed to assist you in making the correct preservation decision when working on your home.

Preservation maintenance and sensible repairs are the keys to protecting your house from costly deterioration. You will own your house for only a short portion of its life, and it is important that the decisions you make about changes or repairs be informed and sensitive to its history.

The unique character and irreplaceable features in your old house should be treated with respect. Irreversible design changes should be avoided or have minimal impact on the historic fabric of the building. Repair rather than replace a damaged building element. If it cannot be repaired, it should be replaced with an element that is as close to the original as possible.

To better understand the philosophy behind working on historic buildings, the United States Department of the Interior has defined the terminology used in historic preservation. These definitions are used by governmental agencies, non-profit organizations and private individuals to clarify the different preservation treatments possible.

Stabilization is the act or process of applying measures necessary to re-establish the stability of an unsafe, damaged or deteriorated property while retaining the essential form as it exists at present. (For example, providing a temporary support system for an unsafe porch roof).

Preservation is the act or process of applying measures necessary to sustain the existing form, integrity and material of a historic property. It may include initial stabilization work, where necessary, as well as ongoing maintenance and repair of the historic materials and features. (For example, repainting).

Rehabilitation is the act or process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions or features of the property which are significant to its historical and cultural values. (For example, replacing deteriorated mechanical systems with new ones that cause the least alteration or damage to the historic material).

Restoration is the act or process of accurately recovering the form, features and details of a property as it appeared at a particular period of time by means of the removal of later work or by the replacement of missing earlier work. (For example, removing an asphalt shingle roof and replacing it with wooden shingles, as were originally on the building).

Reconstruction is the act or process of reproducing by new construction, the exact form, features and details of a vanished building, structure, landscape or object as it appeared at a specific period of time and on its original site. (For example, by rebuilding a missing porch, duplicating the original, by using historic photographs).

The majority of work done on historic buildings in Georgia falls under the definition of rehabilitation. The information included in this technical material will emphasize that approach. Restoration of a building, however, is certainly justified if the owner wishes it and the building is architecturally, materially or historically important. Restoration or partial reconstruction should be attempted only after finding proper documentation to verify the proposed changes to the building.

The condition of the building may dictate stabilization as the proper course until further study is done or resources assembled to do additional work. The information included in this section can be helpful in carrying out any of these approaches.

Planning

One of the most important aspects of any significant rehabilitation work on your old house is to plan ahead. Careful planning is the best way to prevent a project from getting out of hand, progressing too slowly, or resulting in a poorly finished product.

Before starting any rehabilitation project, photograph the existing conditions of your building. These "before" photographs can help in putting things back together the way they were originally. If any parts of the house have been stolen, damaged by fire, or accidentally thrown away, these photographs provide evidence for the design of replacement parts.

Photographs should be general views of each room, the exterior facades of the building, and details of the parts of the building where work will take place. These details could include mantels, wainscot, doors, windows or other decorative ornaments. "Before" photographs can also help you appreciate the progress being made. If you are applying for any type of tax incentives based on project work, "before" photographs are absolutely necessary.

Become familiar with your house by learning about its history and physical condition. Historical investigation acquaints you with its style, construction date, and builder. Check and see if your house has been surveyed or is in either a National Register or a local historic district. Talk with local historians and preservationists to see if they have any information about your building.

The physical investigation acquaints you with the current condition of the house and its site. Walk around the yard and look at the grounds. Are there any remaining gardens or outbuildings? On the outside of the building, examine the roof, exterior skin and foundation. Once inside, begin with the attic and proceed methodically through the house, ending with the basement. Note any signs of deterioration or evidence that the building has undergone changes. The "Building Investigation Checklist" that follows should help.

Before construction begins, find out if your municipality has any local design guidelines that apply to exterior work. Contact your community's building or planning department to see what approvals, permits or certificates are needed.

Once you understand the applicable requirements to be followed, develop the actual plan of how and when the work will be done. Consider

the climate, the time of year, and what activities need to be done where. Consult the Secretary of the Interior's *Standards for Rehabilitation* for guidance on preservation philosophy. You may want to begin the rehabilitation work yourself; however, if the project seems to be overwhelming, contact a preservation architect or a contractor who has this type of experience. Remember to ask for references and be sure to get estimates for the proposed work.

Before You Begin. To make your rehabilitation easier and safer, consider the following items:

- Temporarily cover or seal any opening to halt water penetration. Most interior deterioration in a structure is caused by water or moisture penetrating from the exterior. Broken windows, leaking roofs, and missing exterior siding allow excess moisture inside where it can cause serious damage.
- Remove any fire hazards such as exposed wiring or overloaded electrical circuits. Fix any broken steps, and clean up trash or debris both inside and outside the structure.
- Remove and store doors, fireplace mantels, stair railings or special fixtures to keep them out of harm's way. Before removing an architectural feature, photograph it in place, number it, and note its location so it can be put back after being repaired.
- Cover floors, bathroom fixtures, or ceramic tiles to prevent damage during rehabilitation.

BUILDING INVESTIGATION CHECKLIST

Materials and Tools

Necessary:

- Comfortable old clothes
- Writing pad and pencil
- Clipboard
- Flashlight
- Pocket knife
- Screw driver
- Tape measure

Optional:

- Binoculars
- Level
- Pry bar
- Hammer
- Magnifying glass
- Plumb bob
- Camera with flash
- Towel

General Information

Construction Date(s):_____

Additions:_____

Style:_____

Number of Stories:_____

Exterior

Roof Type:_____

Roof Material:_____

Chimney:_____

Exterior Wall Construction:_____

Exterior Wall Material(s):_____

Foundation Material(s):_____

Basement/Crawl Space:_____

Doors:_____

Windows:_____

Porch(es):_____

Interior

Heating System:_____

Plumbing System:_____

Electrical System:_____

Floor Plan:_____

Floor Material(s):_____

Baseboard:_____

Wainscoting:_____

Wall Material(s):_____

Ceiling Material(s):_____

Picture Molding:_____

Cornice Molding:_____

Doors:_____

Kitchen Cabinets:_____

Bathroom Fixtures:_____

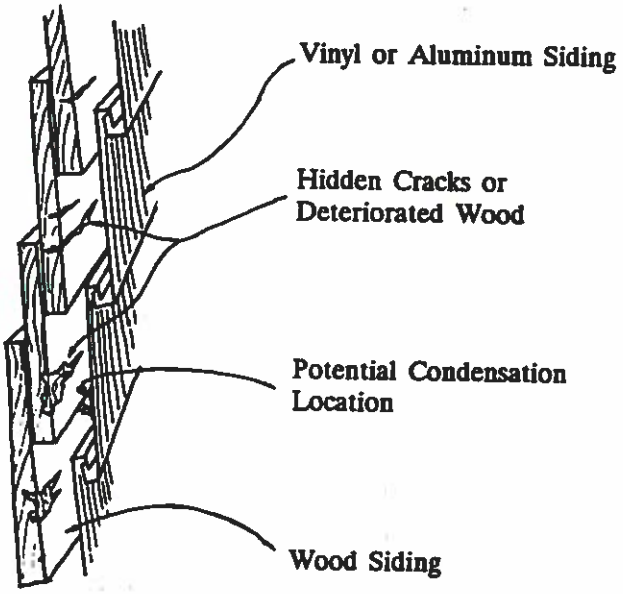
BUILDING EXTERIORS

The exterior building envelope is not only structurally important, but also helps define the character of a house. Obscuring or altering the visual impact of the historic exterior should be avoided. Whether the house is a frame structure covered with wood siding or one of brick construction, exterior material provides a visual impression of the building, its texture, shape and color. The original exterior wall surface of your home should be retained during a rehabilitation. If deteriorated pieces need to be replaced, where possible, the same material as the original should be used.

Aluminum or vinyl siding should not be installed over the original siding of historic homes. Application of these materials can damage the original siding, hide potential problems from view, and obscure the character of the historic house. Synthetic siding materials are not historic and are not appropriate for use on historic buildings.

Foundations in Georgia are often made of brick piers, supporting the base of a building. Many owners want to fill in the area between these piers to enclose the crawl space. The best approach is to use a compatible brick infill, set back slightly from the piers so that the orginal form of the foundation is still visible. If concrete block is to be used, this should also be set back and painted or stuccoed a dark color to diminish its visual impact. This infill could also be covered with wood lattice to conceal it. The original brick piers, however, should not be painted or covered with stucco.

Application of Synthetic Siding



Adapted from an illustration in *Cheraw Preservation and Maintenance Manual*

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ROOFS

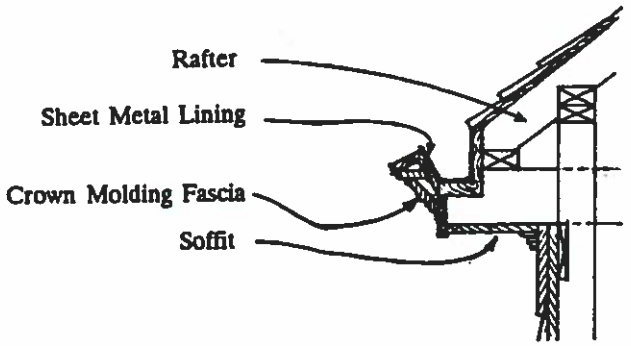
Roof maintenance and repair is usually the most important aspect of preserving a historic house. A leaking roof will quickly lead to deterioration of structural and decorative elements.

The form and material of the roof contribute greatly to the character of a house and both should be maintained. Whether a house has a gabled, hipped, mansard or flat roof with a parapet (or a combination of these), the original form as well as the pitch of the roof should be preserved.

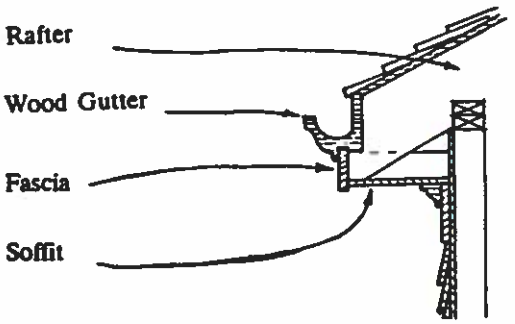
If the roof material, such as slate, clay, tile, wood shingles or metal, is a significant feature of the house, replacement should be done using the same materials. In a similar fashion, the design and material used for the flashing, gutters, and downspouts which carry water off the roof and away from the building should be replaced in kind. Adding new skylights to the roof should be avoided, but if they must be installed, they should not be visible on the primary facades of the building and should be of low profile. "Bubble-top" skylights should be avoided.

Adapted from an illustration in
Cheraw Preservation and Maintenance Manual

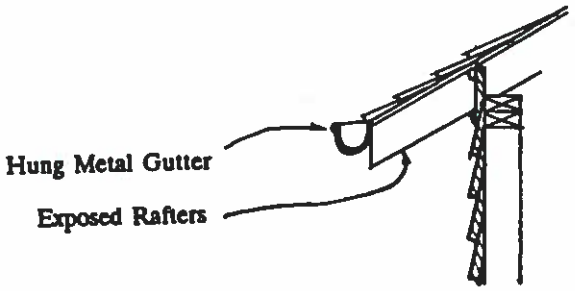
Gutter Types



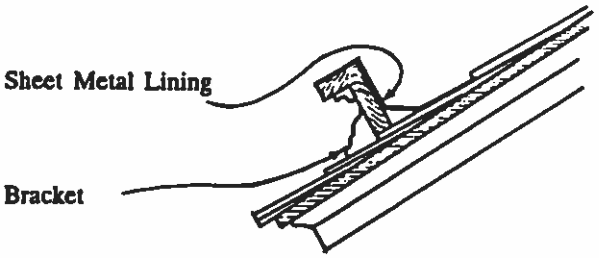
Built - In (Box Cornice)



Wood (Box Cornice)



Hung Half Round



Flush or Pole

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ENTRANCES AND PORCHES

A house's entrance and porch are focal points of its architectural style. Usually on the front or principle facade of a building, the porch and entryway help characterize the building and define its relationship to the sidewalk, landscape and street. These decorative and functional features, together with their accompanying steps, balastrades, columns, pediments and pilasters should be repaired and retained as part of a rehabilitation project. The removal or alteration of an original porch or entry should be avoided. Replacing columns with ones that are inappropriate to the style and design of the building should also be avoided. In addition, wood floors should not be replaced with concrete, and roof lines should not be altered.

Features of an entrance, such as the doors, fanlight, sidelights or pediment should be retained. The addition of a screen or storm door should be carried out in a manner that minimizes its visual impact and damage to the historic doorway.

Enclosing porches, if done at all, should be carefully designed. The enclosure should be done in such a way as to visually maintain the original features such as columns and balastrades. Enclosing materials should be either screen or clear glass and be installed behind (inside of) the porch features.

If a porch has already been removed, its replacement design should be based on accurate photographs or remaining physical evidence of the original porch. In this manner, the replacement will be faithful to the form, decorative features and materials originally intended.

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WINDOWS AND DOORS

The appearance of a historic house is greatly influenced by its windows and exterior doors. Original windows and doors are important design elements that should be maintained and repaired when necessary. These elements are especially susceptible to deterioration and decay due to weathering, so maintenance is often needed.

Original materials that make up windows, doors and shutters include glass panes, wooden members and hardware. To maintain the historic appearance, these elements should be repaired rather than replaced during a rehabilitation project. These elements help to define the building's character. During rehabilitation, each sash and door should be individually inspected for deterioration. Repairs should be made on only those elements that require them. Wholesale repairs are rarely justified and unduly increase the project cost.

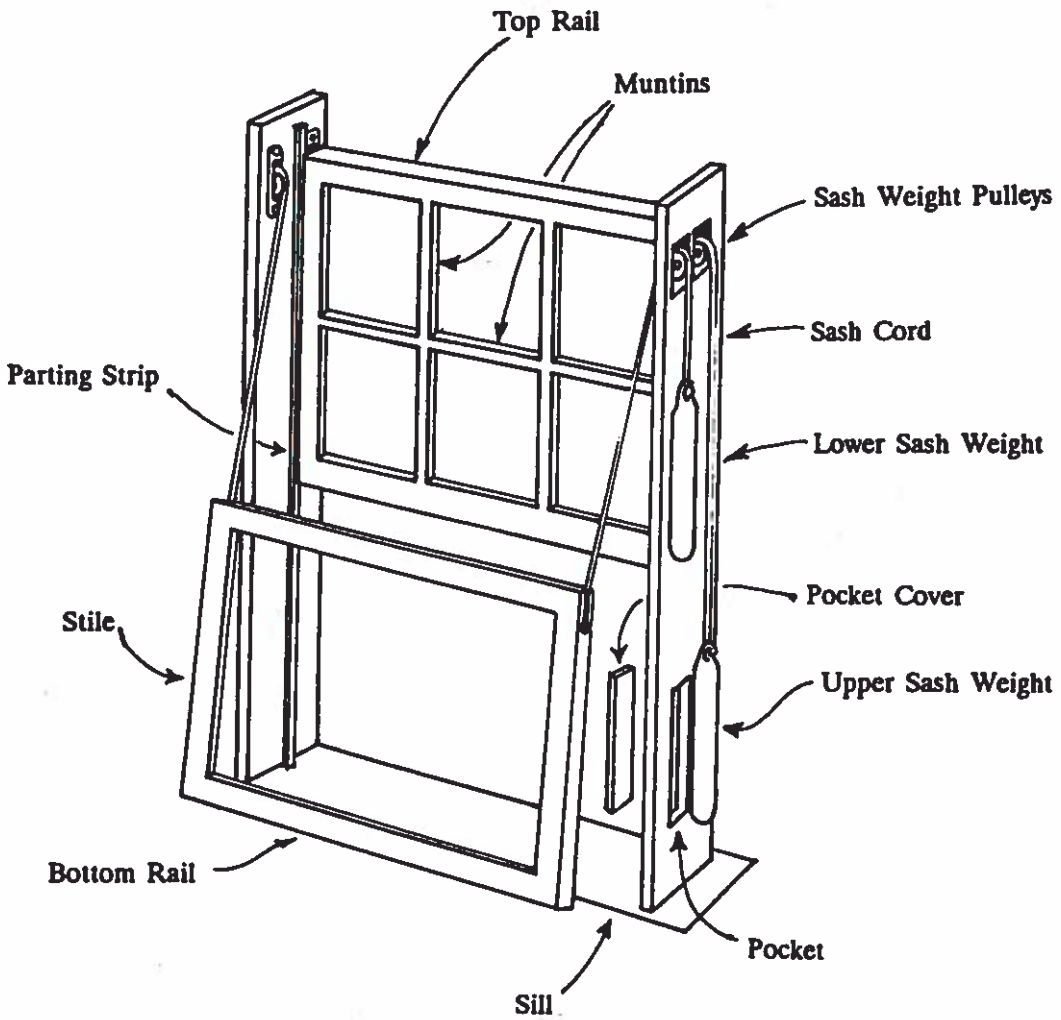
If windows are missing or severely deteriorated, great care should be taken to install appropriate new ones. If the original sash was wooden, the replacement should be wood, not metal. The size of the window opening should not be reduced or enlarged to accommodate "stock" sash. Custom sized sash are available and should be used.

The window pane configuration (the number and design of each sash) and size should be the same as the original window. Tinted or reflective glass and "snap-in" or applied muntins should be avoided.

Any original hardware or window shutters should be saved,

repaired and re-used if possible. New shutters, however, should not be added to homes that never had them. Non-functioning shutters should be avoided.

Parts of a Double-Hung Window



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EXTERIOR PAINT

Painting the wooden exterior of an old house is something that must be done periodically as a maintenance and preservation technique. New paint, correctly applied, not only protects wood against moisture and other atmospheric pollutants, it can also help to define the architectural features and details that make each historic building unique. Painting on a well prepared surface and using quality paints can protect and enhance your home from five to eight years.

Surface Preparation

Proper surface preparation before repainting is the key to a good, long-lasting paint job. If the surface of the existing paint is chalking or dirty, it may be that complete repainting is not necessary and merely a thorough cleaning is all that is needed. A soft bristle brush, a light detergent and a garden hose can usually get the cleaning done.

Repainting a house should be considered when the existing paint surface is crazing, blistering, wrinkling, peeling, cracking (alligatoring), or the intercoat is peeling.

Intercoat peeling can be caused by improper surface preparation before the last repainting or incompatibility between paint layers. An example of incompatible paints could be when an oil-based paint is applied over a layer of latex (water-based) paint. The top layer (oil paint) will begin to peel as it hardens and becomes less elastic than the latex paint below it. If a latex paint is to be applied over oil, an oil-based primer should be

applied first, to a clean surface, free of chalking.

Crazing, or surface cracking, shows up as thin, interconnected cracks in the top layer of paint. This usually is the result of paint becoming hard and brittle with age. It is not able to expand or contract with the wood substrate and crazing results. Although crazing is not serious, over time it will allow moisture to penetrate into the wall, leading to deterioration.

To repaint a wall with crazing paint, the surface should be sanded smooth by hand or with a fine grit paper on a belt sander. The sanding does not need to get down to bare wood, only to a solid layer. Then the wood can be cleaned of dust and repainted.

Blistering and wrinkling are the result of moisture trapped under the paint surface or improper drying of previous coats. In this case, the source of the moisture must be eliminated and the wall dried out before the paint is scraped and sanded. Then the wall can be primed and painted. Paint should never be applied to a building in direct sunlight or during cold or damp weather. Sufficient time should be allowed for paint to dry between coats.

Peeling or cracking of paint down to bare wood is an indication of moisture in the wood underneath the paint. This is sometimes caused by water vapor, migrating through the wood siding from the interior. Before scraping and repainting, the source of the excess moisture should be removed. This may involve ventilating areas of high humidity within the house such as kitchens, laundry rooms or bathrooms. In addition, leaking gutter or downspouts should be repaired, and vegetation grown too close to the house should be cut back.

Generally, it is not advisable to completely strip your house of paint before repainting. Unless there is severe paint buildup which obscures important details or there is widespread paint failure, only partial removal is necessary. Completely stripping a house of old paint is rarely appropriate. Fresh paint will adhere just as well to clean old paint as it will to bare wood. Cleaning and spot scraping or sanding down to a sound, smooth surface is often all that is necessary.

Paint Removal

When paint removal is justified several methods can be used. Hand scraping and hand sanding is a method that is effective and will cause little damage to the historic building material. This method is, however, time-

consuming and most effective on flat surfaces.

On thick layers of paint, thermal methods can be used. A heat gun or heat plate will soften and blister paint so that it can be easily scraped. A heat gun can be especially effective for removing paint from curved details or crevices. **Do not**, however, use an open flame heat source such as a blowtorch. An open flame can char the wood surface, ignite debris within the wall cavity and will also vaporize lead paint, creating a health hazard.

Chemical strippers can be effective in removing paint from small areas of detailing and from exterior surfaces where paint build-up is not severe. Brick buildings can also be safely stripped using chemical methods, although generally an experienced professional is required.

Paint removal using mechanical methods is usually too abrasive for older houses. Orbital sanders, however, can be used for smoothing or finishing the surface, but not for the removal of multiple paint layers. A medium grit sandpaper should be used to feather the areas where paint has been scraped. A belt sander can be used, with a medium grit sandpaper, but should be limited to flat areas. A light touch is needed and sanding should be done only with (parallel to) the grain of the wood. Rotary drill attachments such as wire strippers and disc sanders should be avoided. They can shred the wood surface leaving scars that cannot be covered by the new paint. **Sandblasting or waterblasting should never be used to remove paint from historic houses.** These methods will erode the wood or brick surface, permanently damage details and raise the grain of the wood. Blasting is the most damaging of all paint removal methods and should be avoided.

Paint removal can be a health hazard, so taking appropriate safety precautions is important. Many old paint layers (prior to 1970) contain various levels of lead. Lead can be dangerous, especially to young children who can ingest the dust or paint chips. When sanding or scraping, always wear a dust mask and wash yourself and your clothes afterward. When using a heat gun, make sure the area is well ventilated. After the paint has been removed, sweep and vacuum up all debris.

Priming and Painting

After all loose paint has been removed, all cracks, nail holes or seams should be filled before applying a primer coat. Wood filler or exterior grade caulk can be used for small areas. Larger voids can be filled with auto body putty or epoxy wood fillers.

Primer should be applied only to areas of exposed wood or new material. Priming the entire building may not be necessary if the existing top coat is not peeling or chalking. One or two finish coats of oil-based paint should be applied over the oil-based primer. Oil-based paints generally give better adhesion to a previously painted building and should last longer than latex paint.

If a latex top coat is being used, an oil primer should still be applied first. Latex paints applied directly over old paint are apt to fail.

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CONSERVATION OF BUILDING MATERIALS

The following section includes descriptions of, and repair techniques for, various materials used historically in residential construction. In addition, a bibliography for each material type is included.

MASONRY: BRICK

Description

Historically brick was one of the most widespread materials used in the construction of buildings, largely due to the ease of its manufacture. Made chiefly from clay and sand, materials found in abundance nearly everywhere, the muddy mixture was simply packed into molds, allowed to dry out, and then baked in some type of kiln. The character of the brick varied due to different local manufacturing processes. Brick color is greatly dependent on the content of oxides of iron, lime, magnesia, and alumina in the clay. Large percentages of iron oxides lead to a red color; magnesia and alumina produce a buff; lime causes a yellow or greenish-yellow; and manganese gives the brick a brown color. The brick of early American buildings is much different from that made today. Larger quantities of sand made the brick more brittle, and handmade processes created bricks that were lighter and more porous than those made today.

Brief History

Brick has been a popular building material in America since colonial times. Bricks were manufactured in nearly every community by brickmakers who brought their skills and practices with them from various parts of Europe. As brickmaking became more efficient, especially with the advent of machines, the use of brick became more widespread. Quality improved, as well as the methods of laying up brick. Early masonry workmanship was often very poor, especially in walls that were not visible. The mortar used was soft and weak by today's standards, being made only of lime and sand with no cement. The porosity of the brick itself often led the owners to paint their brick buildings, a consideration to bear in mind when thinking of stripping the paint off a historic building. Currently, brick manufacture is a highly technical field, resulting in better quality and a less expensive product.

Deterioration and Repair

Deterioration problems most commonly associated with historic brick masonry are generally the result of the high porosity and softness of the brick and the mortar. High porosity leads to moisture penetration into the wall, either as liquid or vapor, from exposure to rain, from rising damp, or from condensation on the inner face of the brick. The absorption of water can cause problems of efflorescence as salts are leached onto the surface. Freeze-thaw cycles can seriously damage water-saturated bricks, causing spalling and cracking, and making the brick more susceptible to the weathering effects of erosion. Mortar often erodes away before brick, leaving sections of the wall without structural integrity. In addition to erosion, soft brick and mortar are also susceptible to the deteriorating effects of acid rain and other pollutants.

The cleaning of brick should be carried out with great care. The accumulation of large amounts of dirt may be undesirable since this increases the potential for water absorption into the brick. Some stains may simply be the result of old age, and it may be best to leave the wall as is. **In no case should sandblasting be used to clean brick.** The results in the long run will be much more damaging and far outweigh the benefits of immediate cleaning. When brick is fired in the manufacturing process, it forms a hard, protective crust which sandblasting removes.

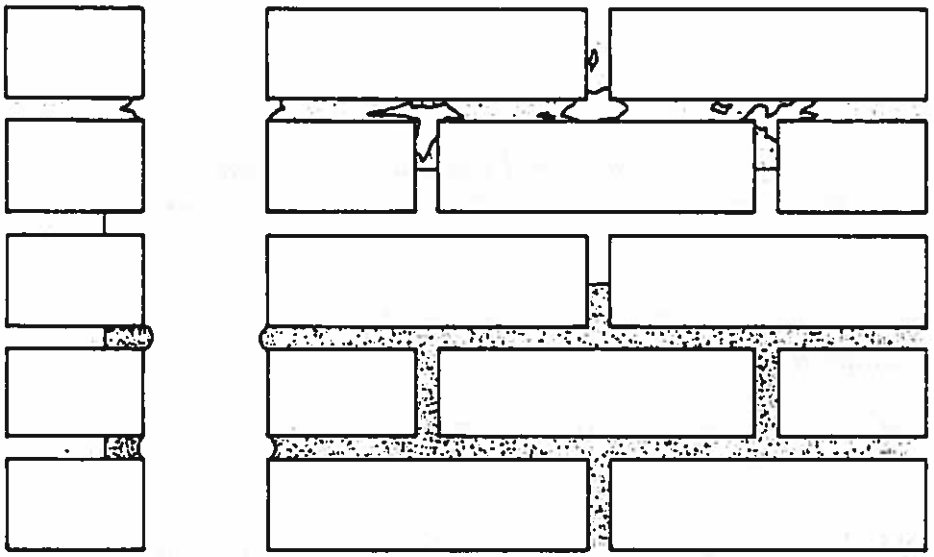
Water rinsing and soft scrubbing (possibly supplemented with non-ionic detergents) are probably the safest methods of cleaning. Water should be applied under low pressure, as high pressure application can be as damaging as sandblasting. Chemical cleaning can be a safe and effective method, but caution must be exercised in anticipation of the effects of chemicals on all building materials. A thorough rinsing with water must precede and follow chemical washing. Application of professionally prepared chemical solutions is the recommended method of removing paint. Paint, however, often was an original feature and removal may be historically inappropriate. Paint may be protecting very porous brick. Before any treatment is chosen, it should be tested in an inconspicuous location to determine its effectiveness and whether or not it will damage the masonry or surrounding materials. The safest methods, water rinsing and soft scrubbing, should be tested first, progressing to harsher methods until an acceptable result is achieved without damaging historic materials.

Waterproof and water repellent coatings are generally not recommended for historic masonry. The exception is extremely porous brick which may require a protective coat of waterproof paint. Typically, these buildings will have been painted for many years. Water penetration is

usually from sources other than the brick itself, such as leaky gutters, moisture in the ground (rising damp), condensation, or deteriorated mortar joints. Coatings cannot stop water penetration from these sources. They usually increase the resulting damage by trapping moisture in the wall or causing subflorescence (salt crystallization below the surface of the masonry) which can lead to severe spalling of the brick.

Replacement of damaged units and repointing are the only two methods of restoring a deteriorated brick wall. Replacement bricks should be of similar appearance and physical characteristics to the originals. Perhaps a brick from a less visible area of the building can be used, replacing that brick with a new one. Because of weathering, it is extremely difficult to match historic brick with new brick. In repointing, it is important to match the texture, color, strength, and composition of the old mortar. The tooling and width of the joint should also be matched. Texture is dependent on the amount and type of sand in the mixture, and strength is dependent on the amount of portland cement. Old mortars typically had no cement. If repointing is carried out with a harder, cement type mortar, the historic brickwork could start crumbling due to thermal expansion stresses. The mortar used for repointing historic brickwork should contain a minimal amount of modern portland cement. For every part portland cement, about two to four times as much lime should be added, and ten to twelve parts of sand. This soft mortar will allow for expansion and contraction of the bricks.

How to Repoint



Remove 3/4" of Crumbling Mortar

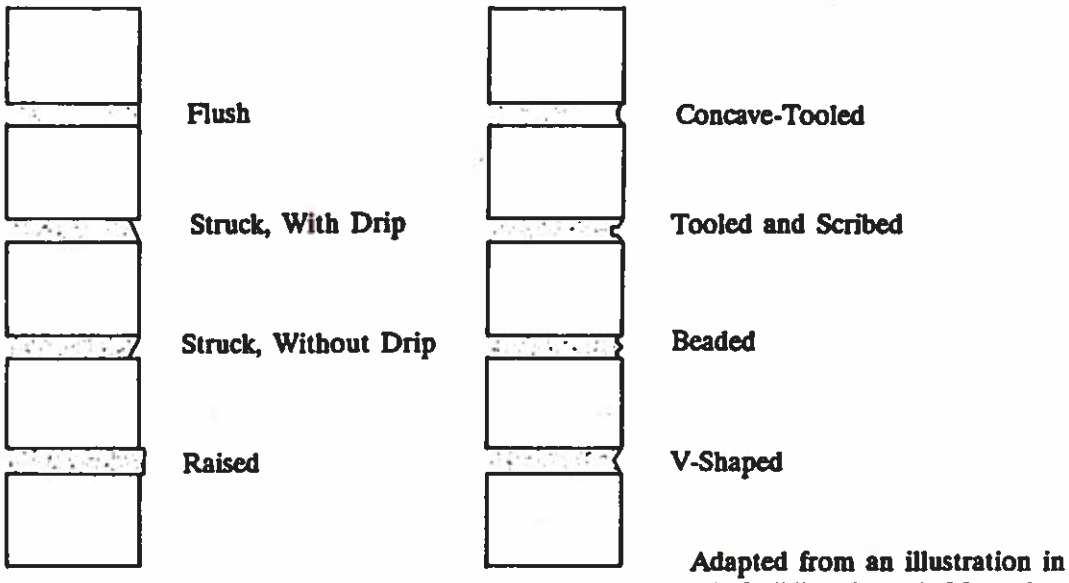
Clean Joint, Then Wet Mortar and Bricks

Add New Mortar

Match Shape of Original Joint

Adapted from an illustration in *Old-Building Owner's Manual*

Typical Mortar Joints



Adapted from an illustration in *Old-Building Owner's Manual*

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(703) 620-0010

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MASONRY: LIMESTONE

Description

Limestone is a sedimentary rock, formed from fossil remains of living creatures. It consists of calcium carbonate together with small percentages of clay, iron, magnesia, and silica. Limestone has been a popular building material due to its durability, workability, and appearance. The structural quality of the stone can vary greatly, ranging from soft, poorly consolidated types to hard, densely compacted varieties. Limestone has been recognized as a fairly weather-resistant stone; however, this can vary with environmental conditions and the quality of the stone. It is generally light in color and can be finished in a number of ways, either chiseled, hammered, or smooth-cut.

Brief History

The first limestone quarry in the United States began operating in 1740 in Harrisburg, Pennsylvania. Limestone has been used throughout America's history, mostly in public and civic architecture, or in the residential architecture of the more affluent population. Until the mid-19th century, high cost and the lack of practical transportation precluded the widespread use of limestone in "common" architecture. Even in more monumental structures, its use was often limited to such elements as steps, quoins, sills, and pediments. At first, the quality of the limestone was dependent on the quality of the stone at the nearest quarry, leading to a certain degree of regional styles and construction techniques. However, as transportation and quarrying practices improved, more buildings were constructed of a larger percentage of limestone, and builders were more able to secure good quality material for the elements which required it.

Deterioration and Repair

Although limestone is durable, it is subject to many of the same deterioration problems that plague other stone masonry materials. Over

time, water can have damaging effects. Limestone, like most stone, is somewhat porous and will absorb moisture from rain, surface condensation, damp soil and other sources. Water which is absorbed into the stone can freeze, causing cracking, spalling and serious structural problems. Most moisture-related deterioration results from leaky gutters or similar faulty conditions rather than absorption through the exterior surface of the wall. The source of moisture should be identified and eliminated. Waterproof coatings are generally not recommended and can accelerate deterioration of the stone. A dampproof course of waterproof material, near the ground, can check the problem of the rising damp.

Air pollution, in the form of acid rain, is a serious threat to limestone structures. Chemicals contained in pollutants can severely deteriorate limestone, causing pitting, peeling, and other forms of disintegration. No remedy currently exists; however, keeping the surface clean will help minimize damage.

Another problem associated with limestone is surface delamination. Generally, delamination is the result of laying limestone improperly. All sedimentary stone, including limestone, consists of layers which are prone to separation, called delamination. Stone should always be laid with the edges of the laminations exposed to the weather, similar to a stack of cards. Otherwise the exterior layer may be split away by the forces of salt crystallization or moisture freezing within the stone.

Many methods of cleaning limestone exist, with varying degrees of appropriateness and acceptability. Least acceptable are abrasive techniques. Sandblasting, wire brushes, rotary wheels, power sanding disks, and belt sanders "clean" by abrading the surface of the stone; surface texture and detailed carving can be irreparably damaged. These techniques are never recommended.

Water washing techniques are much gentler. Both low-pressure and high pressure techniques may be carried out with success; however, extremely high pressure (over 400 psi) can have the same damaging effects as abrasive cleaning methods. Chemicals or detergents can be used with water to strengthen cleaning power, and scrubbing with natural bristle brushes can aid in loosening dirt. Water washing should only be done when there will be sufficient time for the limestone to dry out before freezing temperatures are encountered, as freezing moisture can cause spalling. Soft water should not be used to clean limestone because it contains salts.

Chemical cleaning should be carried out by experienced professionals, and the proposed method should be thoroughly tested in an inconspicuous location. The limestone should be prewetted before the chemicals are

applied. Alkaline cleaners are recommended. After the chemical has worked for the specified length of time, the surface should be rinsed in a two-step process. First give the surface a slightly acidic wash, and then a thorough water wash. Poultices can be effective in removing stains without damaging limestone but should be applied prior to general cleaning.

Broken and pitted limestone elements can be repaired either by replacement or patching. Replacement stone can be anchored with mortar or epoxy. Patching compounds are of a cementitious mix and should always be weaker than the limestone which is being repaired. Artificial coloring can be added to the mix to match the stone, but most colorings will tend to fade over time. The area to be patched should be sound, clean and lightly moistened. The edges should be undercut so that the patch will be securely locked in place. The edges of the patch should never be feathered as these thin edges will invariably crack and allow moisture to work its way under the patch. If the patch is large, it may be advisable to provide the additional support of steel or polyester reinforcing pins. The patch should be finished to match the texture of the existing limestone.

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MASONRY: GRANITE

Description

Granite is an igneous rock made up of quartz, feldspar and mica. The stone will vary greatly in color, depending on the amount and proportions of these three components. Granite is strong, hard, and dense. It is extremely resistant to the effects of weathering. In addition, its low porosity and low water permeability make granite ideal for use as building foundations, water tables and other elements in contact with soil.

Granite has been traditionally used for high traffic areas such as steps, pavers, and thresholds because of its durability. Due to its coarse grain, however, granite is normally not used for decorative carvings.

Granite is found along the eastern edge of the Appalachian Mountains and in the mountains of New England and Pennsylvania. Georgia granite has been quarried for over 100 years.

Deterioration and Repair

Although granite is quite durable and resistant to weathering, over time it is susceptible to the effects of atmospheric pollution, acid rain and freezing. Although it has low water permeability, if exposed to excessive amounts of water due to leaky gutters or bad drainage, granite will absorb enough moisture to cause damage. During cold weather, this absorbed water will freeze within the stone, causing weakness and eventual deterioration. To alleviate this problem, the first step is to identify and eliminate the source of water by repairing gutters and downspouts, and by providing positive drainage away from the building. This will generally prevent further deterioration of the stone, after it has sufficiently dried out.

Air pollution may cause dirt and chemicals to be deposited on the outer surface of the stone. These surface deposits can hold water and harmful chemicals against the stone, leading to flaking and the peeling off of the stone surface. Unchecked, this can lead to exfoliation or

delamination and eventual failure. To repair this type of damage, remove all soft or deteriorating portions of the stone surface. With proper periodic cleaning, damage can usually be avoided. Waterproof coatings, however, are not recommended for use on granite.

The cleaning of a granite surface should only be undertaken when surface accumulations are such that it is necessary to avoid potential stone deterioration. As with all cleaning processes, the gentlest means possible is recommended. Sandblasting or other abrasive cleaning methods such as wire brushing, rotary grinders or power sanders should not be used on granite or any other masonry material.

When choosing a cleaning technique, start with simple methods such as low pressure water wash, detergents and a natural bristle brush. Water washing should be done when there is no threat of freezing temperatures. High pressure water washing (above 400 psi) should be avoided, as this can also abrade the stone surface.

If soap and water are not successful, a chemical cleaner may be employed. This procedure should be carried out by experienced professionals. For most granite surfaces, an acidic cleaner can be used with good results. If, however, the surface is polished, an alkaline cleaner is more appropriate.

On unpolished granite, acidic cleaner is applied to the pre-wet stone surface. After a period of time (as short as possible), the chemical is rinsed from the surface. Hydrofluoric acid can be used successfully on granite in concentrations ranging from 0.5% to 5.0%. Test patches should always be done when applying a chemical cleaner, varying the length of time the chemical is in contact with the surface and the concentration.

On polished granite, an alkaline cleaner, not an acidic one, should be used to retain the polished surface.

If a piece of granite is severely damaged or deteriorated, a replacement stone that exhibits the same visual qualities can be inserted or the stone can be patched. This should only be undertaken when the stone is broken or deterioration is extensive. If not, the original stone should be stabilized and retained in place.

A replacement stone should match the original as closely as possible. Stone from the same quarry is preferred. If the repair is small, a new piece of stone can be mechanically attached to the existing with non-rusting pins and epoxied in place. Another repair technique is to use a composite patch of visually compatible stucco that can be applied to the damaged stone

surface and worked to mimic the original appearance.

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MASONRY: MARBLE

Description

Marble is stone that has been metamorphosed from limestone. It has been a highly valued building material due to its beauty, durability and ability to be highly polished. With its fine, consistent grain, marble is easily worked and carved. Marble has been used for centuries for both exterior construction (because of its resistance to moisture) and interior decoration. Certain marbles, however, are sensitive to atmospheric pollutants and acid rain and are not suitable for exterior use.

Marble has been quarried in Georgia since the 1840s and has been a significant natural resource for the state. Georgia marble has been used extensively as a building material and for monumental use.

Deterioration and Repair

Acid rain and other atmospheric pollutants can be extremely harmful to exposed marble. It is important that the marble surface be cleaned periodically to reduce the amount of dirt on the stone. Dirt tends to hold the pollutants in contact with the marble, leading to deterioration.

Because it is an acid sensitive material, marble should be cleaned with either a water and detergent wash (applied with a soft bristle brush) or an alkaline cleaner. If an alkaline cleaner is applied, it should be used by professionals, and only after several test patches have been done to determine the length of exposure of the chemical on the stone surface and the concentration to be used. (See "Limestone" section for details). As with all masonry materials, abrasive cleaning methods such as sandblasting, rotary grinders, power sanders or wire brushes should not be used.

Broken marble pieces can be re-attached using non-corrosive rods (nylon, stainless steel) and polyester resin, but this process should be carried out only by trained professionals. If large portions of a stone are missing,

new marble (matching in color) can be attached to the original stone in the same manner.

In cases when small voids have occurred in the marble, a composite patch can be applied. The patching material must be compatible with the stone in strength, color, texture and water permeability. These patches generally consist of lime, white portland cement and marble dust. When it dries, this mixture forms a simulated stone, matching the original. Again, this procedure should be performed by professionals experienced with this type of work.

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MASONRY: SANDSTONE

Description

Sandstone, like limestone, is a sedimentary rock composed of the reconsolidated debris of igneous rocks. Specifically, it contains grains of quartz cemented by silica, alumina, iron oxide, clay, or other substances. The cementing material has a great deal to do with the character of the stone, affecting its color, texture, and hardness. If this cementing material is mostly silica, the stone will be light in color and very hard to work. An abundance of iron oxides, on the other hand, will result in a reddish or brownish coloring and a stone that is soft and very workable, but more highly susceptible to weathering. Texture can also vary greatly, ranging from very finely grained stones in which the grain is almost imperceptible, to those having a coarse, sandy texture. Brownstone, which is a class of sandstone, derives its name from its coloring. Most sandstone contains a considerable amount of water when quarried. As the water evaporates over time due to exposure, the sandstone becomes harder and harder, attaining its full strength when it is completely dried out.

Brief History

Historically, sandstone was a very popular building material in the United States since it was widely available and could be worked with relative ease. Expensive initially, sandstone was used sparingly for such items as steps, columns, cornices, pediments, and sills. As quarrying and finishing practices improved, making sandstone more affordable, the material was used for more applications. By the late 1800s brownstone rowhouses had become extremely popular in large cities such as Boston, New York, and Chicago. Exterior walls of these rowhouses were constructed entirely of the durable stone. Current use of sandstone is somewhat limited, being restricted to more monumental structures and individual building components.

Deterioration and Repair

The single most frequent culprit in the deterioration of sandstone is water. Sandstone is a somewhat porous material and tends to absorb water upon prolonged exposure. If water then goes through freeze-thaw cycles, the stone can crack and break-up. If salts are leached through the stone and deposited on or near the surface, spalling can occur, a condition in which the outer layer or layers begin to break off unevenly. It is important to understand that sandstone is configured in layers and has a grain. The correct way to lay the stone is with the edge-grain facing the weather. Laying it with the face of a single layer exposed to the weather, called "face bedding" greatly increases the likelihood of spalling and delaminating. The chemicals found in acid rain are also a source of deterioration, leading to pitting of the stone. Sandstone is quite susceptible to erosion, especially from wind and rain. Finely crafted details and sharp corners can lose their definition rather quickly, depending on the quality of the stone and the harshness of the environment.

Keeping the stone clean is very important in preventing water damage. The accumulation of dirt, stains, and debris provide areas where the water can easily collect and begin to absorb into the stone. Many methods of cleaning sandstone are practiced, some being more acceptable or more effective than others. Sandblasting or any other type of grit blasting is emphatically discouraged. If used, the resultant damage to the surface of the stone is likely to accelerate further deterioration and destroys the original surface texture and finer details. The safest cleaning method is simply washing the stone with a low-pressure water spray, possibly assisted by detergent and gentle scrubbing with natural bristle brushes. This approach, however, may not completely remove a number of stains. Chemical cleaners are also available and can be effective, but should be professionally tested and applied. For sandstone, only acidic solutions should be used, and the building should be thoroughly rinsed with water before and after the application of the chemical wash.

Chipping, delaminating, pitting, and other surface damage can be repaired by patching with cementitious compounds if damage is not too extensive. First, all the poor stone is chipped away and then a "scratch coat" of portland cement mortar matching the strength of the stone is applied to within 3/16" of the sandstone surface. Once this dries, a coating of sandstone stucco, matching the sandstone in hardness, color, texture, and tooling finish is applied. For more extreme cases of damage, it may be necessary to replace the damaged areas with new stone. Again, replacement should match the existing stone, except it must be softer than the original. For replacement of the entire sandstone elements, it may be possible to use

wood painted to match the sandstone.

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MASONRY: TERRA COTTA

Description

Terra Cotta is basically an enriched clay brick or block. It is composed of a high grade of aged or weathered clay mixed with sand or pulverized fired clay. Pressed into molds, terra cotta allows for the mass production of highly detailed designs. Simpler shapes can also be extruded. After drying, the terra cotta is fired at very high temperature, resulting in a hard and durable material. Terra Cotta is commonly found in colors ranging from reds and browns to white. Applied glazes allow for a wide variety of colors and textures. In fact, glazes are capable of creating an exact imitation of stone, both in color and texture. Glazes are also relatively impervious to the weather and resist fading.

Brief History

Terra Cotta has been in use architecturally since the time of the ancient Greeks. Historically, terra cotta has been used both structurally and as a veneer or cladding. In the United States, terra cotta was most popular from the late 1800s to the 1930s. Its use was particularly important to the Chicago School and the development of high rise buildings. A type called "brownstone terra cotta," which simulated other masonry materials and sandstone, was used extensively by such architects as Richard Upjohn, James Renwick, and H. H. Richardson. Fireproof construction terra cotta was developed later, and in the 1930s ceramic veneer came into the market and is still being used today. Glazed architectural terra cotta gained the most widespread popularity, finding proponents in such architects as Daniel Burnham and Louis Sullivan. It became one of the most popular materials of the time due to its variety of colors, resistance to fading, economy of production, ease of construction, lack of required maintenance, and supposed high level of fire protection.

Deterioration and Repair

Deterioration of terra cotta is usually caused by one of four situations: uncontrolled water penetration; faulty original craftsmanship; excessive stresses; or inappropriate additions, alterations or cleaning methods. Water penetration can lead to problems of crazing and spalling as the terra cotta absorbs moisture and expands. This causes the glazing to go into tension which leads to cracking, or water pressure builds up under the glazing and eventually causes it to pop off. More severe is the case of material spalling, where pieces of the actual terra cotta unit, or even the whole unit are caused to break away. Material spalling may be caused by deterioration of the internal metal anchoring system, or the action of the freeze thaw cycles.

Deterioration of the anchoring system is a severe problem in and of itself. During the earliest use of the material, terra cotta was mistakenly believed to be a highly waterproof system. This belief led to inadequately protected systems which suffered from water penetration and rusting of metal anchoring systems. Unfortunately, detection of deteriorated anchors is extremely difficult until the units are nearly falling off. As with other types of masonry construction, mortar deterioration can also occur due to water penetration.

Another problem results from stresses within the building system, especially in high rises. Again, original construction methods are greatly responsible. Without an understanding of the magnitude of building movement that occurs in such structures, there were no stress-relieving details such as flexible expansion joints or shelf angles incorporated into the system. This often led to the development of large stress-related cracks across great areas of the building and even wholesale deterioration of material.

Cleaning of glazed terra cotta is best carried out with water, detergent, and a natural or nylon bristle brush. Some stains may require steam cleaning or washing with a weak solution of oxalic acid. Alkaline cleaners are recommended over acidic cleaners because both mortar and glazing can be very sensitive to strong acids. Other cleaning methods which are definitely not recommended for glazed architectural terra cotta include all abrasive cleaning techniques, high pressure water cleaning, and the use of metal bristle brushes.

Repair of deteriorated terra cotta can be an extremely difficult proposition because failure of the terra cotta usually implies failure of the entire system, including the mortar, metal anchors, and masonry backfill.

Therefore, piecemeal repair is often ineffective. Before beginning any repairs, the source of the problem should first be determined and corrected. Repointing should be a part of an ongoing maintenance program, since mortar is the first line of defense against water penetration. The mortar that is used must be of a lower compressive strength than the terra cotta units around it or the units could eventually become damaged. Caulk should never be used as a repointing material. Caulking is, however, an appropriate method for filling cracks and holes in the terra cotta units to prevent water penetration. In cases of minor material and glaze spalling, the easiest solution is to paint the area with an acrylic based masonry paint. No permanently effective re-glazing materials are currently available, although use of epoxy patches can be effective, and repair technology is rapidly improving. Cases of major spalling will require replacement of the deteriorating material.

Replacement of deteriorated terra cotta units should ideally be carried out with new terra cotta. Replacement units are available, but the need for custom molds and the time delays for fabrication make terra cotta extremely expensive for small jobs. Stone may be a suitable substitute if it is not cost prohibitive and if the extra weight will not be problematic. Fiberglass is also a viable alternative, especially as an economic means of duplicating ornate material. Problems can arise, however, with respect to fire code compatibility and weathering. Precast concrete probably shows the most promise of all as a substitute material, since it can be cast hollow and with great precision of detail. Where possible, replacement units should be anchored in a manner similar to the original terra cotta pieces.

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P.O. Box 42193
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MASONRY: CONCRETE

Description

Concrete is a composite building material, consisting of cement, sand, coarse aggregate, and water. Reinforced concrete also contains steel. As a material in historic buildings, concrete was usually poured-in-place with the ingredients being mixed on the site, as opposed to being precast. The character of the concrete depended primarily on the proportions of the ingredients, the nature of the formwork, and the method of finishing, if any. A plastic material, concrete is capable of taking on a nearly infinite variety of shapes, as well as formed surface textures. In the historic context, however, it was not often used in an exposed, aesthetic manner, being restricted instead to mostly structural applications in which the concrete was usually covered or in less visible locations.

Brief History

The use of concrete in architecture can be traced to the ancient Romans. Their discovery and use of pozzolona, a natural cement used in ancient times, led to a concrete of great strength which made buildings such as the Pantheon possible. In the United States, much later, the composition of concrete remained basically the same up until the late 19th century. Instead of pozzolona, however, trass, another natural cement, was imported from Europe. Later, natural cement rock was discovered in the United States, leading to the production of Rosedale cement, which found extremely wide application throughout the country. The lack of strength and durability of natural cements led to the creation of "portland cement", a closely controlled, manufactured product. It entered the market in the mid 19th century and is still the major cement type today. Shortly after the introduction of portland cement came the development of reinforced concrete. With an increasing understanding of the properties and structural capabilities of the material, there came an accompanying confidence and popularity in using it. By the 1930s and 1940s American architects such as

Frank Lloyd Wright were exploiting the aesthetic as well as the structural characteristics of the material. Concrete is as popular as it has ever been, with new applications and treatments being explored.

Deterioration and Repair

The deterioration of historic concrete due to weathering and material failure is often caused by the lack of quality control during the preparation of the material, poor design, or bad construction techniques. Appropriate consideration was not always given to the quality and composition of the aggregates or of the cement, and the effects of additives were not always fully understood. Also, regulations governing the provision of adequate concrete cover over steel reinforcing were not enforced as strictly as they are today, thus increasing the likelihood of steel becoming corroded. Corrosion of steel is probably the most serious problem to afflict historic concrete structures. Detailing of the building often leads to deterioration problems as well. Neglecting to incorporate such things as expansion joints and drip caps often has destructive effects on the building.

Concrete deterioration can take several forms, the most common of which is cracking. Cracking can occur for a number of different reasons, and it is important to correct the situation before attempting any repairs. Common causes of cracking include steel reinforcement corrosion, deflection, settlement, thermal expansion and contraction, and shrinkage during curing. The location, configuration, and pattern of the cracks are significant, and determination of the precise cause of the cracking may often be more complicated than simple visual inspection at the site. Laboratory testing to determine qualities, such as compressive strength and composition, may be necessary to understand the complete cause of deterioration.

Other types of deterioration include spalling, staining, erosion, and chemical deterioration. Spalling occurs due to corrosion of the reinforcement, to the composition of the concrete and the aggregate alkalinity, or most commonly to the action of freeze-thaw cycles. Staining is a common, but not serious, problem and is often caused by rust corrosion from reinforcement steel or adjacent metal components. Salt crystallization, freeze-thaw cycles, and weathering can all lead to deterioration of concrete. Weathering can also induce chemical deterioration, especially in the case of acid rain, which can dissolve the cement binder and leave aggregate exposed.

Concrete can be cleaned using a high-pressure water wash. Stains may require the use of trisodium phosphate or chemical cleaners formulated to remove the specific stains involved.

Patching damaged or broken concrete requires thorough surface

preparation. Unsound or broken concrete should be chipped away and any exposed reinforcing should be wire-brushed or sandblasted to remove rust. Steel reinforcing is usually coated or primed prior to patching the concrete. Existing concrete should be undercut to provide a key to hold the new concrete patch in place. The edges of the patch should never be feathered, as this leads to cracking around the perimeter of the patch, allowing water penetration and subsequent spalling of the entire patch.

Figure 1

Correct

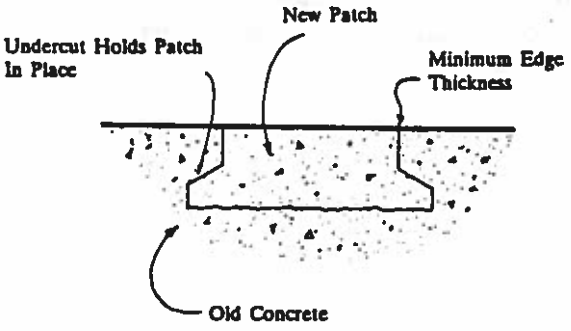
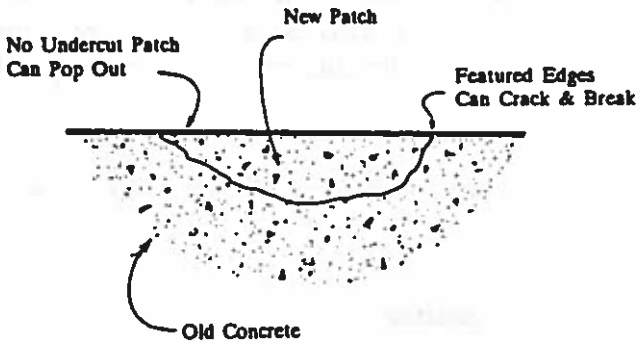


Figure 2

Incorrect



The surface of the old concrete must be thoroughly cleaned and allowed to dry prior to patching. Epoxy bonding agents are often applied to ensure a good bond between the old concrete and the new patch. Matching the color of the concrete will generally require experimenting with various aggregates and different proportions of white and grey portland cement. In some instances, the addition of non-organic pigments may be necessary to achieve an adequate color match.

When patching concrete, it is important that the patch be compatible with the original material. This may require a laboratory analysis of the old concrete. Modern portland cement is generally compatible with early portland cement, even though the composition has changed somewhat over the years. Pre 1900 buildings may have utilized a lime based concrete, and

modern portland cement would not be compatible as a patching material. In these cases, a lime based concrete with a small percentage of white portland cement added is recommended.

Repairs of cracked structural members can most often be carried out with an epoxy injection technique. This is usually best left to experienced professionals. The formulas for these resins are worked out on a job-by-job basis, but they generally consist of epoxies, polyesters, or combinations of epoxides and polyurethanes. Application of the resin is usually done with pressure injection which requires preparation of the crack, removal of loose debris, placement of injection ports and sealing of the remainder of the cracks, injection of the resin, removal and plugging of injection ports, and finally, removal of sealing strips. The advantages of such injection systems are low viscosity, ability to bond wet surfaces, low shrinkage, and high strength characteristics. For structural damage not exceeding 4" deep, another repair technique which can be used involves the use of reinforced shotcrete. This method is commonly used for repairing surface damage and areas where large sections of concrete have spalled away. In cases where the concrete deterioration is the result of reinforcement corrosion, the faulty reinforcement will have to be completely uncovered and cleaned to bare metal. If corrosion is severe enough, lap splices of new reinforcement will have to be incorporated before patching the concrete.

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P.O. Box 19150
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MASONRY: STUCCO

Description

Stucco has been used as a coating for the exterior of buildings for many centuries. The first use of stucco in the United States was to cover brick or rubble stone structures. More recently, stucco has been used to cover wood frame structures, applied directly to wood or metal lath.

Historically, stucco is generally composed of portland cement, sand, lime and water which is applied to the lath on the building facade in several coats. The finished surface is either troweled smooth, left in any number of rough textures, or scored to simulate the mortar joints between courses of cut stone.

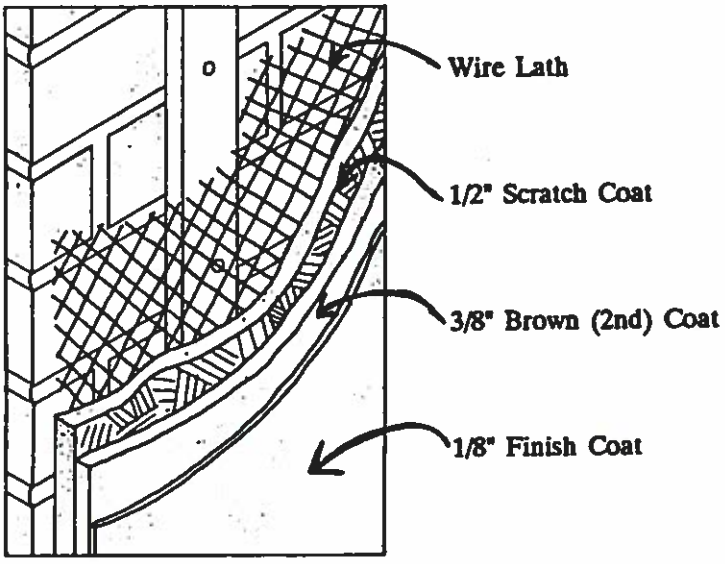
Deterioration and Repair

The most important method of maintaining stucco walls is to keep them dry, both from water coming from above (from leaking roofs, gutters or downspouts) and from water coming up from the ground (rising damp). If water penetration has damaged the stucco coating on a building, the first step, as always, is to eliminate the source of the moisture. Fixing roofs, gutters, downspouts or improving drainage can alleviate water penetration and damage.

Once the source of water has been eliminated, the wall should be repaired by removing the damaged stucco and patching in new material. The new stucco material should match the original as closely as possible in texture, composition, color and strength of the mixture. Many portland cement based mortar mixes are readily available in today's market, but these ready-mixed compounds are not appropriate for historic stucco buildings and should not be used. These mixtures set up far too hard, do not transmit moisture as historic stucco does, and may expand and contract differently than the original material, leading to cracking. In addition, the color is generally much too gray to match the existing coating.

A mixture that contains about one part portland cement, 3-4 parts of lime and 9-10 parts clean sand can be generally used. The stucco is applied in three coats, the first applied directly to the masonry or to galvanized metal lath. The first coat, called the scratch coat, is applied about 1/2 inch thick and then scored. The second coat, the brown coat, is applied a day later to the wetted scratch coat to within about 1/4 inch of the finished surface. This coat is then lightly scored. Several days later, the wall is wetted and the finish coat is applied. Usually, the finish coat has a higher lime content and uses a finer sand as aggregate. In addition, special mortar tints and white portland cement can be used in the finish coat to match the original stucco color. This final coat is then smoothed, textured or scored to match the original. Several samples of the finish coat mixture should be made up before hand to compare against the original in order to match it as closely as possible.

Stucco Construction



Adapted from an illustration in *Masonry: How to Care for Old and Historic Brick and Stone*

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WOOD

Description

All wood can be broadly categorized into two groups: hardwoods and softwoods. Hardwoods are derived from broad-leaved deciduous trees which can be found worldwide. Oak, cherry and maple are examples of commonly used hardwoods. Softwoods are derived from conifers, which are commonly used in building. Properties of species (including color, hardness, density, strength and decay resistance) vary greatly, thus making some wood more suitable for certain applications than others. Compositionally, all wood consists of cellulose and lignin. The cellulose forms the walls of the long tube-like cells and the lignin holds the cells together.

Brief History

In areas where trees are part of the natural vegetation, wood has been used as a traditional building material. Until the 1800s, it was virtually the only material available for structural purposes. In addition, and especially as carpentry techniques improved, wood was also used for other purposes including flooring, roofing, wall sheathing, trim and decoration. With the early 1800s came the introduction of balloon framing, mass production of nails, and a rapid gain in the popularity of all-wood construction buildings. Heavy timber construction continued, but the traditional mortise and tenon method of joinery was replaced with techniques which utilized iron straps and collars, thus requiring less time and providing a more sturdy connection. An accompanying popularity of such architectural styles as Gothic Revival, Stick Style, Queen Anne, Folk Victorian, and others led to a profusion of various types of wood ornamentation and trim, both on the interior and exterior of buildings. Wood flooring has always been extremely common. Pre-civil war wood floors were usually constructed of heavy planks (usually white pine) laid directly on the joists. Later, the more common practice was the use of a finish flooring material laid over a subfloor.

Deterioration and Repair

With proper maintenance, wood can be a long-lasting material. Decay, however, is a natural phenomenon and preventative measures must be followed rigorously. The most common causes of decay are due to moisture and fungi. The ground contact area is often the critical point of the decay process, and special attention must be paid to preventative measures used in this area.

Prevention of decay involves the elimination of at least one of four elements which the fungi need to survive: oxygen, moisture, food and moderate temperatures. Of these, moisture and food are probably the most controllable. The wood itself is food for the fungus. Application of a wood preservative such as pentachlorophenal, will act as a poison and prevent fungi from growing on wood. Charring the ends of fence posts before putting them into the ground and wrapping the ends of joists and beams with copper sheet or wire will have a similar toxic effect on fungi. To further reduce the chances of dry rot damage, try to keep all dead and rotted wood away from the building. Also try to provide light and air circulation to all areas of wood construction and dehumidify damp basements and crawl spaces.

Moisture problems generally come from four possible sources: ground water, precipitation, plumbing leaks, and condensation. Sound water-tight construction is obviously imperative, as well as water-shedding details such as sloped sills and drip edges. A separation of eight inches between the ground and wood siding is the minimum recommendation. Vapor barriers on the inner side of an insulated wall and on the ground in a crawl space can help prevent condensation problems. Painting of exterior surfaces is recommended, remembering that proper surface preparation beforehand is the single most important step of the painting process.

Several methods of cleaning wood exist with varying levels of appropriateness. Depending on the type of surface deterioration, methods range from simple water rinses to much more involved mechanical, chemical or thermal processes. The mildest approach possible is always the recommended one, and paint removal should be avoided if at all possible. When paint removal is necessary due to crazing, blistering, intercoat peeling, or wrinkling, it should be removed only down to the next sound layer. Scraping and hand or mechanical sanding are recommended procedures in these cases. When deterioration is more advanced and cracking or peeling down to the wood is occurring, total paint removal is probably necessary. Appropriate measures in this case may involve orbital or belt sanders, electric heat plates or heat guns, and/or chemical strippers. In no case is it

advisable to use sandblasting, waterblasting, rotary drill attachments, or blow torches.

Proper repainting requires the use of the right paint. As a general rule, it is best to use the same type of paint (oil base or latex) for the new coat as is the coat which is being covered. When covering an old water-based calcimine paint, however, it is best to wash off the chalky surface and then cover with an oil-based primer, followed by a compatible oil-based finish coat. Repainting over glossy surfaces necessitates light sanding beforehand in order to get better adhesion. Before painting wood which has been left exposed for several years and has become very porous, it is probably a good idea to recondition the wood, using a solution of two parts boiled linseed oil to one part turpentine.

If deterioration goes beyond mere paint problems, replacement or wood repair may be necessary. In cases of structural decay, wood epoxy reinforcement has proven over the years to be a very adequate repair system. It strengthens the member by combining the epoxy with steel rods or plates. This system can also be used for consolidation of non-structural pieces such as window sashes and ornamental pieces.

Molded fiberglass, as well as some pressed metals have been used successfully as a substitute replacement material. Once painted, substitute materials can be barely discerned. Aluminum and vinyl siding are not recommended unless all other courses of action have been determined to be unworkable. If this siding must be used, be certain it is the same width and profile as the original siding.

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WOOD SIDING

Description

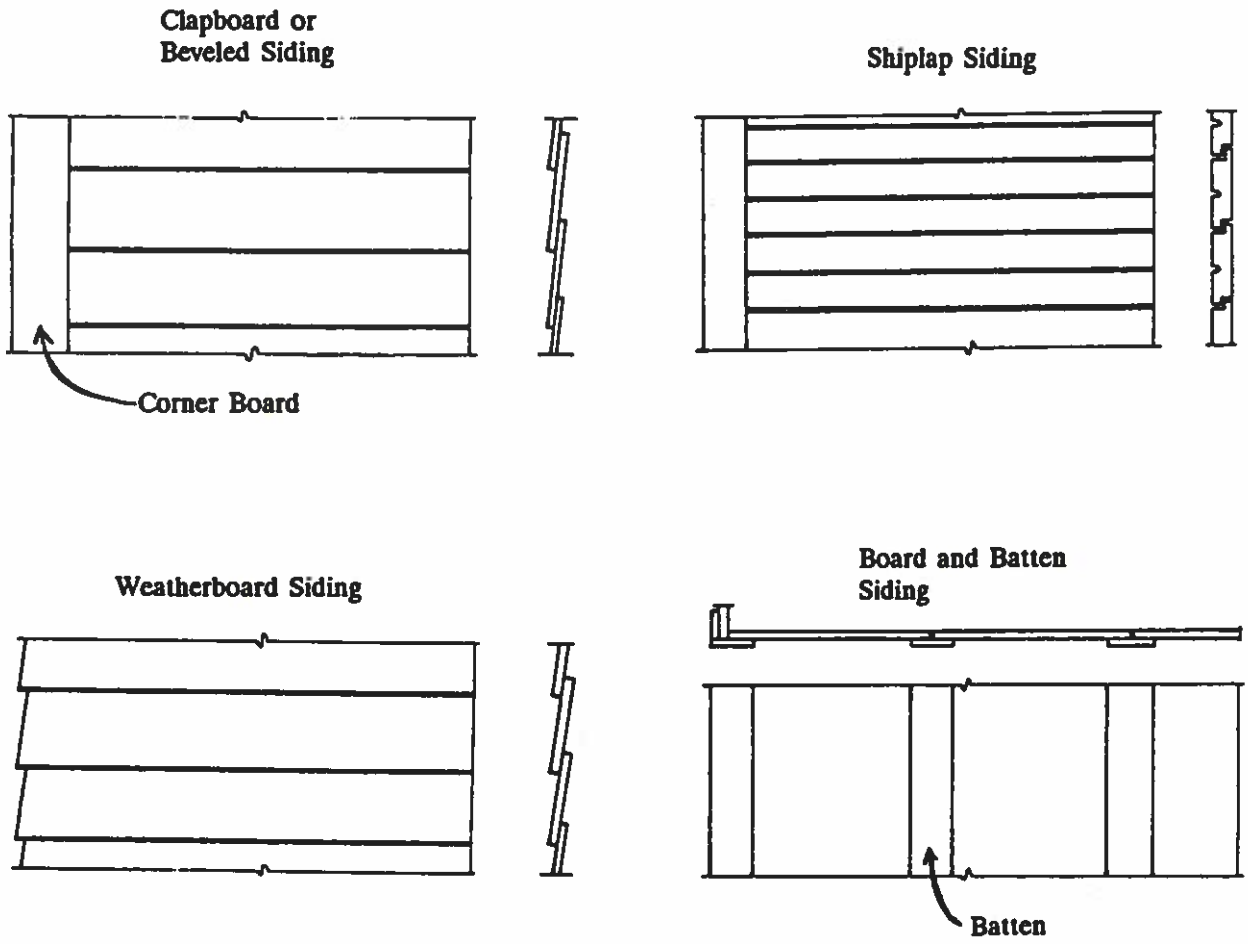
Horizontal wood siding, commonly referred to as clapboards, are available in three different types: bevel siding, weatherboards, and drop siding. Bevel siding, also commonly referred to as clapboards, is a lap siding. It is applied over sheathing, and when viewed from the end grain is in the shape of an elongated triangle. Weatherboard is similar to bevel siding, but when viewed from the end grain it is rectangular in shape. Sometimes the exposed edge will have a bead. Drop siding or novelty siding is applied flat against the studs and does not require sheathing. The edges are matched with either a shiplap or a tongue and groove edge. Eastern White Pine, Hemlock, and Spruce are common tree species used in the northeast; Poplar, Cypress, and Pine are used in the southeast; and in the west, Pine and Western Red Cedar are commonly used materials for siding. Clapboards are nailed to the wall with a weatherproof, thin shanked 6d wire box nails. They can be attached to the sheathing by either nailing through two courses, a single course or through a blind nailing. They are best nailed from the bottom up.

Brief History

In areas where trees are part of the natural vegetation, wood has been used as a traditional building material. From the 17th to the early 19th centuries, beveled siding was hand "rived" from logs no longer than 4 feet in length. "Riving" is the process of radially splitting a log by hand in wedges. After boards were dried, they were hand planed to a smooth surface. Machine made siding was not developed until the 19th century when rough lumber boards were resawn diagonally, producing two pieces of beveled siding. The optimum would be to have quartersawn boards that were resawn into beveled siding; however, during the late 1800s, riftsawn beveled siding was developed. Riftsawn siding is similar to the original hand

split rived siding, except it is machine made. Although this type is more expensive, it produces more siding from a log than any other process.

Types of Wood Siding



Adapted from an illustration in
Old-Building Owner's Manual

Deterioration and Repair

Wood can be a long lasting material with proper maintenance. Decay, however, is a natural phenomenon and preventative measures must be followed rigorously. The most common causes of decay are due to moisture and fungi. The ground contact area is often the critical point of the decay process, and special attention must be made to any preventative measures that are used in this area.

Prevention of decay involves the elimination of at least one of four elements which fungi need to survive: oxygen, moisture, food, and moderate temperatures. Of these, moisture and food are the most controllable. Wood itself acts as food for the fungus. If a wood preservative such as pentachlorophenol is applied as a preservative, it will kill fungus. To further reduce damage, keep all dead and rotted wood away from the building. In addition provide light and air circulation to all areas of wood construction and dehumidify by ventilation if possible all damp basements and crawl spaces.

Moisture problems generally come from four possible sources: ground water, precipitation, plumbing leaks, and condensation. Sound watertight construction is obviously imperative, as well as good water-shedding details such as sloped sills and drip edges. A separation of eight inches between the ground and wood siding is a minimum recommendation. Vapor barriers on the inner side of an insulated wall and on the ground in a crawl space can help prevent condensation problems. In addition, exterior surfaces should be painted following proper techniques.

If surfaces have not been correctly painted, it may be necessary to remove the paint to expose the surface of the wood. There are several methods of paint removal depending on construction techniques and the seriousness of deterioration. These include water, hand scraping, mechanical, chemical, and thermal processes. Do not use a blow torch or sand blasting. These two processes may scar and expose the wood grain. For minor deterioration it may be necessary to hand sand or scrape the area down to the next sound layer of paint. For more advanced levels of deterioration, thermal processes such as heat plates, heat guns, or chemical methods may be used. Before using a heat plate or gun, it is advised that any open joints be sealed to avoid problems.

Decayed wood can either be repaired or replaced depending on the extent of decay. The key is selective repair work and replacement of only those boards that are severely deteriorated. Remove only those pieces that are deteriorated and save selective pieces to use as patches. The replacement piece should match the existing as closely as possible.

Repair should be done for the following conditions: cracks and splits, small imperfections, gouges and holes, and small areas of deterioration. For cracks and splits, gently open the crack; clean out the debris; coat both edges with a waterproof wood glue; squeeze the split closed with a block along the lower edge and nail the block; and wipe off any excess glue. For any imperfections in the surface fill them with an exterior wood filler. Fillers should only be applied in small areas; moisture could get behind larger areas. For large gouges or holes, drill out the area and insert a plug

with its grain running the same way as the grain of the board. The plug can be made from salvaged boards that have been replaced. If a small section of a board has been damaged, locate adjacent studs on either side of the area. Using a hacksaw, cut through the board and carefully remove the damaged piece. Be sure to remove the nails and siding underneath the top piece of siding. Cut and fit the new piece of siding into the old space. New siding should match existing siding as closely as possible. Before inserting the new piece, waterproof the end grain and seal any exposed knots with a commercial sealer.

After repairing or replacing a piece of siding, a proper painting sequence is recommended. As a general rule, it is best to use the same type of paint for the new coat as the one that is being covered. Do not put latex over oil. When covering an old water-based calcimine paint, it is best to wash off the chalky surface and then cover it with an oil-based primer, followed by a compatible oil-based finish coat. Repainting over glossy surfaces necessitates light sanding beforehand in order to get better adhesion. When painting wood which has been left exposed for several years and has become very porous, it is a good idea to recondition the wood prior to painting, using a solution of two parts boiled linseed oil and one part turpentine.

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METALS: CAST IRON

Description

Cast iron is an iron alloy characterized by a high carbon content (at least 1.7% and usually averaging 3.0 to 3.7%). It is grayish in color and somewhat grainy in texture, especially along broken edges. It is easily poured into molds while molten; however, as cast iron cools, it becomes brittle and hard, discouraging shaping by rolling, pressing, or hammering. Historically, its rigidity and compressive strength made it a popular material for structural columns and storefronts. Cast iron was used in an assemblage-type manner; small pieces were cast separately and then bolted together.

General History

Cast iron as a structural material first began to appear in the United States during the early 1800s in the form of columns. Much stronger than timber and believed at the time to be fireproof, cast iron columns were commonly used with wood or wrought-iron beams to allow for larger open floor spaces within buildings. Columns were originally purchased directly from foundries but later became available through catalogues published by a number of large firms. Cast iron has little tensile strength, and it was not used for horizontal members, such as beams.

In the mid 1800s, cast iron began to gain popularity as both a structural and decorative material for building fronts. Generally found only on street facades, cast iron was used for individual elements, street level storefronts, and in some cases, entire facades. The superior compressive strength of cast iron allowed for thin columns and large window openings. In the mid to late 1800s, cast iron also began to replace structural timber in the construction of domes and cupolas, especially in civic buildings and churches. Cast iron also gained widespread use as a decorative medium; staircases and railings are prime examples. They were non-combustible and their repetitive designs could be massed produced and then pieced together.

By the end of the 19th century, other materials began to replace cast

iron. Today it plays only a minor role in new construction, mainly in plumbing fixtures and waste piping; however, efforts to preserve historic buildings are reviving its use.

Deterioration and Repair

Great care must be taken to keep cast iron from coming into direct contact with moisture. Not only does moisture corrode the metal, it can also cause cracking due to freeze-thaw cycles. Loss of caulking and putty is often responsible for starting corrosion and cracking problems.

The application of a moisture-resistant protective coating is the single most effective means of preserving cast iron. Before a coating can be applied, the surface must be thoroughly cleaned. Methods of cleaning will depend on the severity of the corrosion, the type and amount of architectural detailing involved, the type of new protective coating to be applied, and available finances. The most common methods of preparation include flame cleaning, iron phosphate immersion, pickling(in either phosphoric acid or sulfuric acid), rust removers applied by brush or spraying, grit blasting, solvent cleaning, and wire brushing. It is important to understand the implications of the method chosen in each situation before proceeding. This also holds true for the selection of a paint or other coating to be applied. Paints to be used should be of the rust preventative type, such as red lead (where not prohibited), zinc chromate, or zinc rich paints. Paints used on old metal should be oil based. Whenever possible, the primer, undercoat, and finish coat should all be purchased from the same company to ensure compatibility. Paint should be applied only when the temperature is above 50°F and the relative humidity is below 80°F.

When repairing broken and damaged cast iron pieces, clean the metal thoroughly; caulk all joints and connections, including bolts and screws; and paint or cover with some other type of protective coating in order to prevent corrosion. Pitting and rust holes can be patched with plumbing epoxy or auto body putty, although this does not provide structural reinforcement. Cast iron pieces that have cracked or broken can be rejoined with epoxy resin cements or bolted together using a hidden plate to splice the fragments together. Brazing or welding cast iron is possible where no tensile stresses will be applied, but considerable skill is required. Should it become necessary to disassemble an element, extreme care must be taken to prevent further damage since cast iron is so brittle, especially in cold weather.

In cases where entire pieces or sections need to be replaced, recasting of new pieces may be necessary. It is important to note that cast iron

shrinks as it cools, approximately 3/16" per foot. Thus, it is not always feasible to use an existing piece to create the mold. Usually, it is necessary to carve a new pattern from wood which is 1 1/2% larger than the original.

In some cases it may be desirable to use other materials as replacements for cast iron, such as aluminum or fiberglass. When using aluminum, it is necessary to isolate the cast iron in order to prevent galvanic corrosion . Whatever replacement material is to be used, the shrinkage properties of that material should be known beforehand in order to adjust the size of the pattern correctly.

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235 East 87th Street, Room 6C
New York, NY 10028

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METALS: COPPER

Description

Copper is one of the more corrosion-resistant metals used in buildings. Exposure to the atmosphere causes the natural formation of a protective surface patina, turning the copper from a bright reddish-brown color to brown to black to green over a period of about eight to ten years. Copper is non-magnetic, ductile, malleable, and is easily soldered or brazed. It can be cast, drawn, extruded, spun, hammered, or punched. Copper can be worked hot or cold.

Brief History

Historically, the most frequent use of copper was as a roofing material. Rolled into sheets and cut into sections approximately 24" x 48" , it was lighter than slate, tile, or lead, and even lighter than wood shingles. Because of its malleability it could be easily folded into watertight seams and shaped to fit the curvatures of domes and cupolas. Were it not for its high initial cost, copper roofs would have been more widely used. Decoratively, copper was used in weathervanes and finials, cornice details, sheathing for oriel and bay windows, running moldings, and occasionally for statues. Due to its high cost, copper is now used primarily for utilitarian purposes such as electrical and telephone wiring, plumbing, flashing, and gutters.

Deterioration and Repair

Although copper is highly resistant to atmospheric and saltwater corrosion, it is susceptible to the deteriorating effects of sulfuric acid. Alkalis, which may be found in adjoining features containing lime mortars or portland cement, may wash down over the surface and cause streaking. In addition, contact with bituminous roofing materials will cause corrosion as will acid rain, moss, lichen, algae, and red cedar or oak shingles. Galvanic corrosion of copper is not very common. Copper, however, will

become stained due to galvanic corrosion of metals such as iron or steel, with which it comes in contact.

Mechanical breakdown can occur due to the softness and thermal characteristics of copper sheets. If the sheets are not fastened in a manner which allows free movement during thermal expansion, cracks and splits can result, and the roof will no longer be watertight. Abrasive agents such as surface granules from roofing shingles can, over the years, lead to corrosive failure, especially in roof valleys and at flashing locations. Impact from objects such as hail or falling branches can also damage copper sheets.

Copper requires very little maintenance, because the patina which forms naturally on the surface provides excellent protection. Copper can be painted for aesthetic reasons, although it can be difficult to obtain a good bond between paint and copper. To ensure a good bond, it is necessary to thoroughly clean the surface with a solution made of four ounces copper sulfate to 1/2 gallon lukewarm water with 1/8 ounce nitric acid. After rinsing and drying, apply three coats of an alkyd resin paint with an appropriate primer. Or, instead of painting, a coating of clear lacquer may be applied, which will allow the natural color of the copper to show. An optimal thickness of three coats should be applied, after cleaning the surface of all flux, dirt, and oxide. Lacquer coatings last approximately three to five years, and like paint, require regular programs of reapplication.

In cases of physical damage or severe deterioration, an expert should be called in to advise on repair. If the element cannot be salvaged, it should be replaced with new copper of the same weight (thickness) and configuration. Connections should allow for movement during thermal expansion and contraction, using copper clips for fasteners, with copper nails or brass screws. Maximum length of replacement copper sheets should be eight feet. Solder should not be used to repair cracks or structural failures; it has a different coefficient of expansion than the copper, and its structural capabilities are weak. Any solder used as a sealer in copper work should be composed of 50% pig lead and 50% block tin, and should be applied using a noncorrosive resin flux.

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Organizations

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405 Lexington Avenue
New York, NY 10017

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METALS: ZINC

Description

One of the more brittle metals used in architecture, zinc is bluish-white in color and nonmagnetic. Although not very malleable, zinc can be hot-rolled, formed, extruded, spun, punched, cast, machined, riveted, soldered, and welded. It resists corrosion by forming a protective surface coating of zinc carbonate. Zinc is widely used as a protective coating for steel and iron. This coating is applied in a process known as galvanizing. Galvanized metal is readily identified by its spangled silver appearance. Zinc is also alloyed with copper to make brass.

Brief History

In the United States, the zinc industry did not get underway until the late 1830s. Zinc sheets were used as roofing material, and to a limited extent began to replace tin and lead, which were more expensive. In the late 1830s the process of galvanizing was developed. By dipping sheet iron in zinc, both structural qualities of iron and the inexpensive corrosion resistant qualities of zinc could be combined. Galvanized corrugated sheet iron, available in the mid 1850s, became a common roofing material, especially for industrial structures, farms, and temporary buildings. Zinc was frequently used for statues, monuments, and architectural elements such as brackets, scrolls, column capitals, and finials. It can be readily cast, and was much cheaper than some of the more traditional materials, such as stone. Zinc was often painted to imitate more expensive materials. The period from 1880 to 1920 saw the greatest decorative use of zinc.

Currently zinc's use in architecture is greatly diminished. Galvanized corrugated metal is still used widely for agricultural and industrial buildings. Galvanized nails and sheet metal ducts for HVAC systems are still common.

Deterioration and Repair

As a corrosion-inhibiting material, zinc can offer only limited protection from acids found in an urban atmosphere. Initial exposure causes the formation of a carbonate layer on the surface, but this layer is not strong enough to resist the effects of further exposure. Zinc coating on galvanized metal is very brittle, and can peel or flake if the metal is bent. It can also be worn away by air or water borne particles, especially in roof valley areas. Any break in the protective zinc coating, whether from abrasion, impact, cutting, drilling, bending, acid-induced corrosion, peeling or flaking, will expose the underlying iron or steel to corrosion.

There are many agents which have a deteriorating effect on zinc. Especially damaging are sulfur acids found in industrial and urban pollution; acids found in redwood, cedar, oak, and sweet chestnut; and the chlorides and sulfates found in plasters and cements. Contact with copper and pure iron will lead to damaging galvanic corrosion in the presence of water. Also, zinc is susceptible to a type of corrosion known as "white stain" which is initiated when sheets of zinc are stacked very closely together in humid, extreme weather.

Galvanized zinc's ability to deter corrosion is dependent upon the application of paint coatings on both sides. If zinc is going to come into contact with redwood, oak, cedar, or sweet chestnut, it should be coated with a bituminous paint. Before painting, the surface should be allowed to weather for about 6 months, then wiped clean with a cloth and mineral spirits. The primer coat should be specially formulated for galvanized iron and finish coats should be of a compatible oil-based paint. If an old galvanized surface has begun to rust, it should be cleaned of all rust and then primed with zinc oxide and flaky aluminum coats. Finish coats should be of a paint containing flaky aluminum and flaky micaceous iron-ore pigments. Zinc-rich paints can also inhibit rusting. If deterioration is extremely severe or pieces have been lost, it may be necessary to reproduce elements, either with similar galvanized metal, or a suitable replacement material such as fiberglass or vacuum-formed plastic. Code restrictions, however, may limit the use of such materials.

When installing or reinstalling zinc or galvanized steel or iron, it is important to design connections and expansion joints which allow for thermal expansion and contraction, yet provide secure anchorage to prevent wind damage.

Sources for Additional Information

Organizations

Zinc Institute, Inc.
292 Madison Avenue
New York, NY 10017

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METALS: BRASS

Description

Brass is an alloy of copper and zinc. Its color depends on the amount of zinc in the alloy; the more zinc, the more yellow the color. Color is also affected by corrosion. Although brass does not rust, it does corrode to form a natural patina, or tarnish, which turns the brass surface dark. Brass is generally cast, although it can be extruded, and it can be worked hot as well.

Brief History

Prior to the Civil War, most brass hardware was imported from England. In colonial America, brass was widely used for such items as door knobs, hinges, door knockers, fireplace andirons and chandeliers.

With the close of the 19th century came an expanded use of brass in commercial buildings. The gleam and beauty of brass made it a favorite for handrails on stairs and in elevators, for lobby furniture, entrance doors, bulletin boards, mail boxes, and building directories. Although its use diminished somewhat in the mid 1920s, use has increased in the traditional applications of hardware, plumbing fixtures, doors, windows, and elevators. Today many "brass" elements are not solid brass, but rather cast iron with a brass plating.

Deterioration and Repair

Brass can corrode due to exposure to moisture, acids from air pollutants or newly cut woods, chlorides, acetates, ammonia, guano, and animal excrement. Brass with a zinc content greater than 15% is susceptible to loss of zinc content by acidic solutions, which can leave the brass pitted, porous, and weakened. Like copper, brass forms a natural patina, but this patina may not be as protective as the patina formed on copper. A patina

which covers the surface uniformly and completely, with good adhesion and impermeability, will generally inhibit further corrosion.

There are several methods of cleaning brass which are acceptable, but none should be carried out without the understanding that any method of cleaning will remove some surface metal and patina. Before cleaning, it is important to establish whether the piece is solid brass or brass plated iron and steel. A magnet can be used to detect a brass-plated object; solid brass is non-magnetic. An object which is solid brass can withstand harsher cleaning methods than the brass-plated steel or iron, as the plating can wear through.

Chemical compounds acceptable for cleaning either solid brass or brass-plating include rottonstone, oil whiting and ammonia, and precipitated chalk and ammonia. These compounds are applied by rubbing with a clean soft cloth. For more severe cases of tarnishing of solid brass, hexamita phosphate and water or dilute sulfuric acid and water can be used by a competent professional to restore the brass but loss of zinc content caused by improperly controlled acid cleaning can severely damage the brass. After any chemical solution is used to clean brass, the object should be rinsed thoroughly with water, then wiped dry with a soft clean cloth to prevent water spotting.

For extreme cases of tarnishing, more abrasive methods may be used, but with caution. Sandblasting should never be used as a cleaning method for brass. Mechanical buffing may be used, but it should be done only by an experienced professional who has the proper equipment. Ornate details and edges can easily be worn away by a bad buffing job or by buffing too frequently, thus defacing the object.

Once the object is cleaned, it can either be sealed, repatinated, or left alone. Sealing will help to delay or prevent tarnishing and preserve the polished shine. Wax, silicone, tung oil, or clear lacquer can be used to seal the brass and protect it from the weather. All of these sealers require a regular program of reapplication after removing the existing to prevent buildup. Repatination, using applied chemicals, can be carried out to change the color of the brass to match the surrounding pieces or to restore a previous color. After cleaning, rinsing, and drying, the surface should be prepared with a fine pumice in water and then swabbed with highly diluted yellow sodium or ammonium polysulfide to obtain the desired patina. Repatination generally removes a slight amount of surface metal. There are a variety of patina colors which are available commercially. The fumes from these chemicals are hazardous and repatination should be carried out only in well-ventilated spaces by an experienced professional. The polished surface may also be left untreated, allowing natural patination to occur.

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ROOFING MATERIALS: WOOD SHINGLES

Description

Wood shingles provide a durable, exterior covering if properly maintained. Shingles are machine sawn into lengths of 16", 18" and 24" with a 3/8" butt thickness. They are available in four different grades: No. 1 Blue Label, No. 2 Red Label, No. 3 Black Label, and No. 4 Undercoursing. No. 1 shingles are 100% heartwood, (no sapwood) clear, edgegrained and are preferred for residential use. No. 2 shingles are flat and have a limited amount of sapwood. No. 3 and 4 are used for economy applications and secondary buildings. Different types of fire retardants can be applied, giving the materials a Class C to a Class A rating. In some colder climates, shingles with fire retardants may become brittle, resulting in a shortened life expectancy.

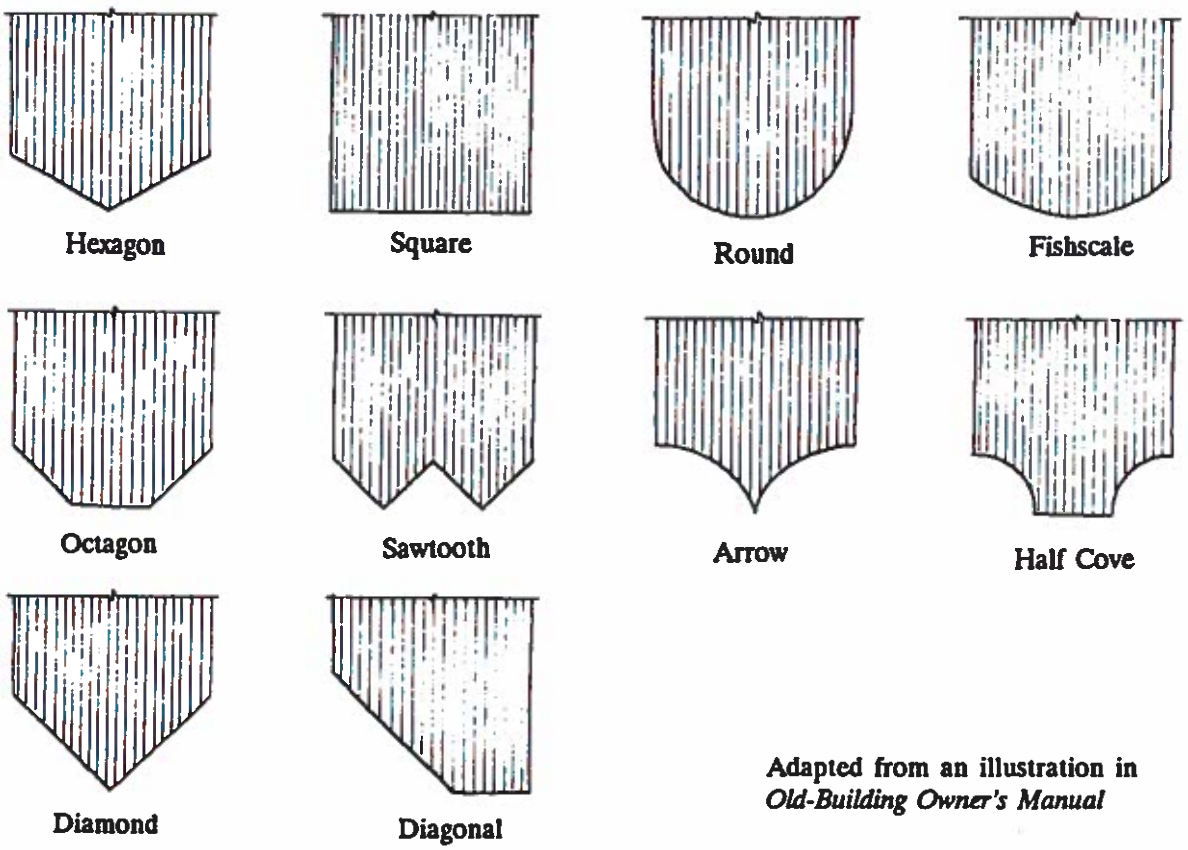
Brief History

Wood shingles have been a popular roofing and siding material throughout the country in all periods of American architectural history. Use of the material depended upon the region, local craftsmanship, and the species of woods which were available. In the southern United States, cypress and oak were used until the availability of cypress decreased and costs became prohibitive. It has been a common misconception that historic wood shingles were very rough and laid irregularly, when in actuality they had a well crafted appearance.

Prior to the 1850s, wooden shingles were split by hand, but with the advent of shingle machines, they could be massed produced with regular dimensions. This resulted in their being used for wider applications, such as decorative siding as seen in the Late Gothic Revival, Queen Anne, Stick, and Folk Victorian styles. These styles often utilized specially cut shingles to form geometric patterns within the siding. Cut shingles, known as fancy butt shingles, could either be round, diagonal, hexagon, halfcove, square, sawtooth, fish scale, arrow, diamond and octagon. Moving into the twentieth century, wood shingles continued to be used for the Colonial Revival styles.

It was during this period that other types of roofing manufacturers began to replace the wooden shingle because of fire hazards and the inconsistent weathering associated with wooden shingles. New shingles were manufactured in terra cotta, concrete, asphalt and asbestos.

Types of Wood Shingles



Adapted from an illustration in *Old-Building Owner's Manual*

Deterioration and Repair

Control of the natural processes which lead to the deterioration of wood shingles is rather impractical and difficult. The best insurance is to use a wood which is naturally more decay resistant, such as red cedar, redwood, or cypress, sometimes dipped in water repellents to extend the life cycle.

Plant growths, especially moss, are a source of problems for wood shingle roofs. Moss thrives in shaded damp areas. It is most likely to be found on low pitched, north facing slopes, and on roofs shaded by

overhanging trees, which can entrap moisture causing further deterioration. Over time the moss will grow and force the shingles apart causing water leakage problems. In addition, moss will serve to retain water, which will soften the wood and speed up the decay process, making the roof especially susceptible to wind and wind driven rain. Freeze-thaw damage is also amplified in saturated conditions.

Efficient run-off of rain water is of primary importance in the preservation of the wood shingle roof. For this reason it is recommended that wood shingles not be used in roof pitches of less than 3" rise to a 12" run. In addition, the Red Cedar Shingle and Handsplit Shake Bureau has made recommendations regarding shingle exposure, depending on the total length of the shingle and the pitch of the roof. These recommendations are available when the product is purchased.

Proper maintenance is extremely important to the longevity of a roof. Allowing debris such as leaves and pine needles to collect can serve to retain moisture, leading to the formation of moss and fungus, ultimately causing premature deterioration of the roofing. In extreme cases, debris can cause the ponding of water on the roof, increasing the chances of leakage problems. To alleviate these problems the roof should be cleaned periodically with a broom or garden hose. It is especially important to clean the keyways between individual shingles; however, special care should be taken not to damage the shingles when walking on them or cleaning them. In addition, using high pressure water may drive water under the shingle. Wood preservatives and chemical fungicides may be applied to help maintain the roof but are not extremely necessary or vital. Chemical applications should be carried out under controlled conditions due to the potentially toxic nature of those chemicals.

As wood shingles grow old, they may begin to curl and split, leading to leakage problems. Generally, if more than 10-15% of the shingles are in such need of replacement, it is probably time to replace the whole roof, a job which requires experienced professionals; however, replacement of just a few deteriorated shingles is certainly within the capabilities of the average owner. First remove the damaged shingle by splitting it into pieces that can be removed. Then cut off heads of the remaining nails with a hacksaw blade or a slate ripper. The replacement shingle can be held in place with a sheet metal tab which is nailed down before the shingle is slipped in, and then bent over the butt of the shingle. Do not use copper tabs because the tannic acid in the cedar can corrode copper. It can also be positioned by slipping it into place about 3/4" shy of being even with the other shingles, then nailing it near the butt of the shingle above, and finally driving it up even with the other shingles, thereby bending the heads of the nails and covering them under the shingle above. Temporary repairs for split shingles

can be made by slipping an adequately sized piece of sheet metal underneath.

In selecting replacement shingles, the grain, butt thickness, finish and exposure length should match the existing shingles. One should be careful in matching hand split shingles, commonly referred to as shakes. There are two ways of manufacturing shakes, handsplit and taper split. In taper split shingles, a froe is used to cut wood from alternating ends after each split. In handsplit, blocks are split into boards of desired thickness, then passed through a bandsaw to form two shakes, each with split face and a sawn face. The grain should be perpendicular to the surface in order to resist water penetration. The shingles should be nailed with zinc coated 3d or 4d for machine split shingles and 6d for handsplit shingles.

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ROOFING MATERIALS: CLAY TILE

Description

Clay tile is one of the most durable and maintenance-free of roofing materials. Current warranties guarantee a lifetime of at least fifty years with more realistic expectations of at least one hundred. Tiles are produced from mined clay or clay and shale compositions, shaped by either extrusion or pressing processes, and finally fired to an acceptable hardness. Clay tiles have been produced to accommodate different styles, including Georgian and Spanish. There are a number of earth colors available which generally do not fade. Color is dependent upon the clay or glazing. An extremely durable roofing material, clay tile is both heavy and expensive. Like slate, clay tile is brittle and subject to damage from impact.

Brief History

Tile roofs have been a part of American architecture since the first settlement in Jamestown, Virginia. Materials and methods of construction were brought over from Europe. The fire resistant properties of tile roofs helped boost their popularity, especially in cities such as Boston. In the mid-18th century, Moravian settlements in Pennsylvania commonly used flat tiles 14"-15" long and 6"-7" wide, with curved butts. In the southwest, the semi-circular mission tiles that are so common now were first manufactured around 1780 at the Mission San Antonio de Padua in California. The most common dimension of the plain or flat tiles used from the 17th century through the early 19th century was 10" x 6" x 1/2 " with two holes at one end for nail or peg fasteners. By the mid-19th century, tile roofs were often replaced with sheet metal which was lighter, less expensive, and easier to install. With the rise of Romanesque Revival and Mission style buildings at the turn of the century, tile roofs rode a new wave of popularity. Tiles were sometimes made to look like other materials, such as wood shingles and shakes. Currently, they are not used extensively in new construction due mainly to their initial high cost.

Deterioration Problems and Restoration

A roof of good tile, correctly installed, should not encounter many deterioration or maintenance problems. Other than the glazing that is applied at the time of manufacturing, no coatings are ever required, and cleaning is not usually necessary. Generally, the only maintenance needed is the routine cleaning of leaves and debris associated with any roof.

Deterioration problems generally take one of two forms, either failure of the tiles or failure of the fasteners. If the clay is not fired to an acceptable hardness when the tiles are manufactured, tiles may be susceptible to spalling and crazing problems resulting from freeze-thaw cycles. Tiles are very brittle and can be easily broken due to impact from such things as tree branches or from being walked on improperly. Clay tile is incapable of supporting much weight. Copper nails are the most acceptable means of fastening tiles to a roof; if the fasteners have begun to fail, it probably means they are not copper.

If only a few clay tiles are in need of replacement, then only limited repair work should be required. If, however, more than 10% of the tiles are failing, replacement of the entire roof may soon be necessary, especially if the cause of the failure is deteriorating fasteners. Replacement of individual tiles is done in a manner very similar to slate replacement. First, remnants of the damaged tile are removed. Then a slate ripper or a hacksaw blade is used to remove nails. The new tile is slipped into place and fastened, using a copper tab which is double thick and bent upward at the end to hold the bottom edge of the replacement tile.

If the decision is made to replace a tile roof, there are substitute materials available which maintain the unique appearance of the original tile, yet are less expensive, at least initially. Both galvanized steel and solid copper sheets have been used successfully by pressing them into the various tile shapes and then painting them to prevent corrosion and to match the original tile color. Concrete tiles have been used since the 1920s as a substitute and viable alternative for clay. Concrete is cheaper than clay and lasts almost as long, but the color is not quite as durable and tends to fade over time. Of course, the preferred replacement material is clay tile which matches the appearance of the original roof.

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ROOFING MATERIALS: SLATE

Description

Slate is a quarried stone, found in the United States in veins that run through Virginia, Pennsylvania, New York, and Vermont. A medium-hard stone, slate is very strong, of low porosity, and of very fine grain. Due to a composition of stable and insoluble minerals, slate becomes harder and tougher upon exposure. Quality slate commonly lasts upwards of 100 years.

Slate is available in many colors. While some slates permanently retain their original color, others weather, changing with age. Some slates contain ribbons or narrow bands of rock of a different color and chemical composition than the rest of the stone. In addition to color, slate is also categorized by grade, which describes the surface, straightness, condition of the corners, and thickness.

Brief History

Slate roofs in the United States can be found in buildings dating back to the mid-17th century colonies. Roofing techniques were brought over from Europe; however, due to the expense and time required for shipment, slate roofs were not extremely common. Although there were known sources in the United States, slate was primarily imported until the 1850s. Slate was quarried in Maryland and Pennsylvania as far back as the 1730s, but economical inland transportation was unavailable. As a result, the use of slate was quite localized. With the development of railway and canals, American slate became more accessible and economical, and as a result, more popular. This popularity continued into the 1920s when less expensive materials, such as metal, became in more demand. Currently, there are only a handful of roofing slate quarries in the United States.

Deterioration Problems and Restoration

Slate is one of the most durable and maintenance-free roofing materials. Depending on the quality of the slate and, more importantly, the quality of the installation, slate roofs can last anywhere from fifty to several hundred years. Virtually maintenance-free, slate requires no coatings or maintenance other than the occasional repair of damaged slates. Although lesser grades may eventually start to spall due to freeze-thaw cycles, slate in general is better at resisting thermal damage than other roofing materials. Slate is susceptible to damage from impact, and care must be taken when working on a slate roof. Using carpet-padded boards or some other kind of pad on the roof to spread the weight of the workman will reduce the risk of breakage. A recommended technique is to work from a padded ladder with a ridge hook laid over the roof. Slate roofs can also fail due to nails that have corroded, causing the slates to fall.

Initially it is better to replace occasional broken slates rather than the entire roof; however, if a majority of the slates are spalling or breaking away, it may be that the roof has simply exhausted its useful life. Replacing an entire roof is a job that generally requires professional skills. Replacement of individual slates, however, is a job that can be done without a great deal of special skill and expertise. When replacing a broken slate, it is important to match the color as closely as possible. The most effective way to do this is to return to the quarry where the original slate was selected. To achieve a color match, use the unexposed side or a broken edge for comparison. The fading characteristics should also be matched. If more than just a few slates must be replaced in a given area, it may help to take some old slates from elsewhere on the roof and mix them in with the new slates so that the patched area will not be quite so noticeable.

To replace a broken slate, first remove the remnants of the broken slate and cut the nails with a special slater's tool called a ripper. Insert the new slate, and nail it down with a single copper slater's nail, located in the vertical joint between the shingles above, about 5 inches from the head of the slate. Only copper nails should be used, as other nails will corrode and lead to premature roof failure. Drive the nails in far enough so that they do not protrude and cause the slates above to lay unevenly, but not so tightly that they cause the slate to crack. Slate shingles are intended to hang loosely on the nails. Once the nail is in, cover it with a piece of copper approximately 3 inches wide and 8 inches long, slipped up between the vertical joint and over the nail head to about 2 inches beyond the succeeding course above. An alternative fastening method is to hang the replacement slate on a copper tab bent up to hold the bottom edge of the shingle. The application of bituminous patching compounds will not result in an

acceptable repair. The temporary nature of the material will lead to continuing deterioration and may necessitate the premature replacement of the entire roof.

In cases where the entire roof needs to be replaced and the use of slate is not economically feasible, mineral fiber or other imitation slate shingles may be acceptable substitute materials. They are cheaper than slate, not as heavy, durable, and produce a similar visual effect. They are recommended, however, only for entire roof replacements, and not for patch work jobs on real slate roofs.

Diagram 1

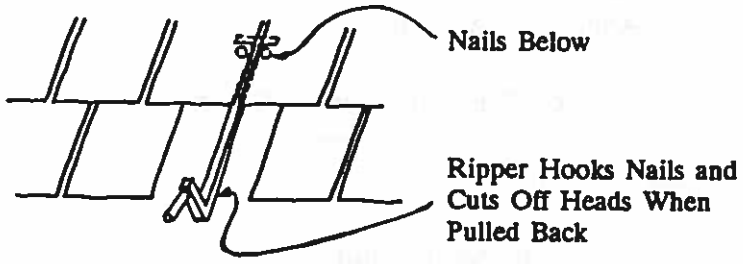


Diagram 2

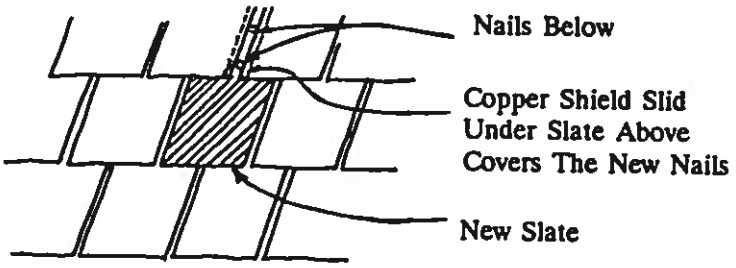
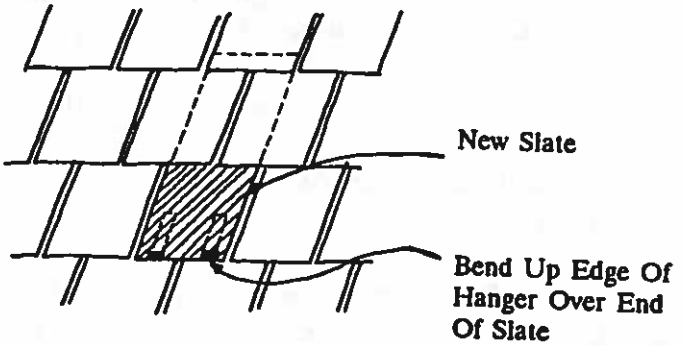


Diagram 3



Sources for Additional Information

Organizations

Expanded Shale, Clay, and Slate Institute
7401 Wisconsin Avenue
Suite 414
Bethesda, MD 20014

Institute of Roofing and Weatherproofing Consultants
1800 North Argyle Avenue
Suite 301
Los Angeles, CA 90028

National Roofing Contractors Association
1515 North Harlen Avenue
Oak Park, IL 60302

National Slate Association
445 W. 23rd Street
New York, NY 10011

Publications

Labine, Clem R. "Repairing Slate Roofs." *The Old House Journal*, December 1975, pp. 6-7.

Pierpont, Robert. "Slate Roofing." *APT Bulletin*, 1987, No. 2, pp. 10-23.

Poore, Patricia. "Substitute Roofings, Credible Standins for Clay Tile, Slate, & Wood." *The Old House Journal*, April 1983, pp. 61-63.

"Slate Roofs." *The Old House Journal*, May 1980, pp. 49, 51-55.

Slate Roofs. National Slate Association, 1926. (Reprinted by Vermont Structural Slate Company, 1977.)

Sweetser, Sarah M. *Preservation Brief #4: Roofing for Historic Buildings*, Washington, D.C.: U. S. Department of Interior, 1979.

ROOFING MATERIALS: TIN

Description

Pure tin is non-magnetic and fairly resistant to corrosion. It is soft, ductile, and malleable. Tin has been used widely as a protective coating on iron and steel sheets and plates. A pure tin coating, which is a bright bluish-white is called "tinplate" while "terneplate" is a mixture of 10% - 25% tin and 75% - 90% lead and has a somewhat duller finish.

Brief History

Historically, tin has been used most widely as a roofing material in the form of tinplate or terneplate. Tin did not begin to gain popularity as a building material in the American Colonies until the late 1760s. Although it was in common use in Canada during the 18th century, the rolling mills necessary for fabrication were slower to arrive in the United States. Thomas Jefferson was one of the first notable American architects to realize the low-cost, light weight, and low maintenance potential of the material. Others followed quickly to make tinplate and terneplate the most common choices for roofing materials of the time. Often tinplate and terneplate were painted to simulate more expensive copper roofs, or they were embossed with decorative designs to imitate tile or wood shingles. In addition to roofing, tin-plated metal was also used for decorative elements such as window hoods, cresting, finials, and balusters. Today, tinplate roofs are not common. Although the life cycle cost of metal roofing is competitive, the initial cost is higher than more conventional materials such as asphalt shingles and built-up coverings.

Deterioration Problems and Repair

Tin is a corrosion-resistant material, lasting upwards of 100 years if well maintained. As long as tin or terneplating maintains its integrity, it will provide protection, but as soon as the steel beneath is exposed to the

atmosphere, deterioration will begin. This will be accelerated by the galvanic action between tin and the steel or iron. Contact with copper also causes galvanic corrosion. Deterioration can also be induced by contact with asphaltic and bituminous roofing compounds and building papers, and by paints containing acids, bitumen, asphalt, or aluminum.

Repairs can be necessitated due to corrosion, failure of joints, and physical fatigue. Fundamental to the preservation of the tinplate is a complete covering of paint on both sides. A shop coat of iron oxide primer is recommended (preferably two coats) and a preinstallation coat of a compatible oil-based high gloss finish paint as well, especially on the underside. Immediately after the tinplate roof is installed, a finish coat containing iron oxide should be applied followed by a similar, final coat two weeks later. A graphite base or asphaltic base paint should never be used on tinplate or terneplate, because they will induce, rather than retard, corrosion.

For small punctures and failures of seams, it is possible to use solder for patching. The area around the repair must first be cleaned of rust, paint, and any other coatings, using chemical strippers and controlled hand methods such as scraping and sanding. Resoldering should be done using a solder of 50% pig lead and 50% block tin applied with a resin flux. It is possible to replate a deteriorated sheet of tinplate, but this is usually not done in the field.

If a section of the tinplate roof is seriously damaged or corroded, it should generally be replaced. Replacement should be carried out with tinplate of the same composition, configuration, and construction to avoid problems of galvanic corrosion or uneven thermal expansion. Nails and cleats used to fasten the tinplate should be made of either tinplate or galvanized steel or iron. Copper alloy cleats and nails should not be used as they induce galvanic corrosion of the tinplate. If it is decided that the entire roof needs to be replaced, then it may be appropriate to use a material other than tinplate. Lead-coated copper and terne-coated stainless steel are acceptable alternatives. Although more expensive, they require less maintenance and last longer. Whenever an entire roof needs to be replaced, care should be taken to restore the original color, configuration and details.

Sources of Additional Information

Gayle, Margot; Looke, David W.; and Waite, John G. *Metals in America's Historic Buildings*. Washington D.C.: U. S. Department of Interior, 1979.

Geerling, Gerald K. *Metal Crafts in Architecture*. New York: Bonanza Books, 1957.

Guedes, Pedro. *Encyclopedia of Architectural Technology*. New York: McGraw-Hill Book Company, 1979.

"Roof Rust." *The Old House Journal*, April 1987, p. 14.

"Stamped Metal Ornament." *The Old House Journal*, October 1975, p. 12.

"Turning Aside Roofing Deterioration ... With Terne Coated Steel." *Technology and Conservation*, Spring 1980, pp. 5-7.

Waite, John G. "Tinplate and Terneplate Roofing, Preservation and Repair." *The Old House Journal*, March 1981, pp. 53, 68-69.

BUILDING INTERIORS

The following material is an excerpt from *Preservation Brief #18: Rehabilitating Interiors in Historic Buildings*, written by H. Ward Jandl, Preservation Assistance Division, National Park Service, U.S. Department of the Interior. A number of case studies have not been included since they deal primarily with non-residential building types:

While the exterior of a building may be its most prominent visible aspect, or its "public face," its interior can be even more important in conveying the building's history and development over time. Rehabilitation within the context of the Secretary of the Interior's *Standards for Rehabilitation* calls for the preservation of exterior and interior portions or features of the building that are significant to its historic, architectural and cultural values.

Interior components worthy of preservation may include the building's plan (sequence of spaces and circulation patterns), the building's spaces (rooms and volumes), individual architectural features, and the various finishes and materials that make up the walls, floors, and ceilings. Individual rooms may contain notable features such as plaster cornices, millwork, parquet wood floors, and hardware. Paints, wall coverings, and finishing techniques such as graining, may provide color, texture, and patterns which add to a building's unique character.

Virtually all rehabilitations of historic buildings involve some degree of interior alterations, even if the buildings are to be used for their original purpose. Interior rehabilitation proposals may range from preservation of existing features and spaces to total reconfigurations. In some cases, depending on the building,

restoration may be warranted to preserve historic character adequately; in other cases, extensive alterations may be perfectly acceptable.

Identifying and Evaluating the Importance of Interior Elements Prior to Rehabilitation

Before determining what uses might be appropriate and before drawing up plans, a thorough professional assessment should be undertaken to identify those tangible architectural components that, prior to rehabilitation, convey the building's sense of time and place -- that is, its historic character. Such an assessment, accomplished by walking through and taking account of each element that makes up the interior, can help ensure that a truly compatible use for the building, one that requires minimal alteration to the building, is selected.

Researching the Building's History

A review of the building's history will reveal why and when the building achieved significance or how it contributes to the significance of the district. This information helps to evaluate whether a particular rehabilitation treatment will be appropriate to the building and whether it will preserve those tangible components of the building that convey its significance for association with specific events or persons along with its architectural importance. In this regard, National Register files may prove useful in explaining why and for what period of time the building is significant. In some cases, research may show that later alterations are significant to the building; in other cases, the alterations may be without historical or architectural merit, and may be removed in the rehabilitation.

Identifying Interior Elements

Interiors of buildings can be seen as a series of primary and secondary spaces. The goal of the assessment is to identify which elements contribute to the building's character and which do not. Sometimes it will be the sequence and flow of spaces, and not just the individual rooms themselves, that contribute to the building's character. This is particularly evident in buildings that have strong central axes or those that are consciously asymmetrical in design. In other cases, it may be the size or shape of the space that is distinctive. The importance of some interiors may not be readily apparent based on a visual inspection; sometimes rooms that

do not appear to be architecturally distinguished are associated with important persons and events that occurred within the building.

Primary Spaces are found in all buildings, both monumental and modest. Examples may include foyers, corridors, stairhalls, and parlors. Often they are the places in the building that the public uses and sees; sometimes they are the most architecturally detailed spaces in the building, carefully proportioned and finished with costly materials. They may be functionally and architecturally related to the building's external appearance. In a simpler building, a primary space may be distinguishable only by its location, size, proportions, or use. Primary spaces are always important to the character of the building and should be preserved.

Secondary Spaces are generally more utilitarian in appearance and size than primary spaces. They may include areas and rooms that service the building, such as bathrooms, and kitchens. Secondary spaces tend to be of less importance to the building and may accept greater change in the course of work without compromising the building's historic character.

Spaces are often designed to interrelate both visually and functionally. The **sequence of spaces**, such as vestibule-hall-parlor can define and express the building's historic function and unique character. Important sequences of spaces should be identified and retained in the rehabilitation project.

Floor plans may also be distinctive and characteristic of a style of architecture or a region. Examples include Greek Revival and shotgun houses. Floor plans may also reflect social, educational, and medical theories of the period. Many 19th century psychiatric institutions, for example, had plans based on the ideas of Thomas Kirkbride, a Philadelphia doctor who authored a book on asylum design.

In addition to evaluating the relative importance of the various spaces, the assessment should identify architectural features and finishes that are part of the interior's history and character. Marble or wood wainscoting in corridors, elevator cabs, crown molding, baseboards, mantels, ceiling medallions, window and door trim, tile and parquet floors, and staircases are among those features that can be found in historic buildings. Architectural finishes of note may include grained woodwork, marbleized columns, and plastered walls. Those features that are characteristic of the building's style and period of construction should, again, be retained in the rehabilitation.

Features and finishes, even if machine-made and not exhibiting particularly fine craftsmanship, may be character-defining; these would include pressed metal ceilings and millwork around windows and doors. The interior of a plain, simple detailed worker's house of the 19th century may

be as important historically as a richly ornamented, high-style townhouse of the same period. Both resources, if equally intact, convey important information about the early inhabitants and deserve the same careful attention to detail in the preservation process.

The location and condition of the building's existing heating, plumbing, and electrical systems also need to be noted in the assessment. The visible features of historic systems–radiators, grilles, light fixtures, switchplates, bathtubs, etc.–can contribute to the overall character of the building, even if the systems themselves need upgrading.

Assessing Alterations and Deterioration

In assessing a building's interior, it is important to ascertain the extent of alteration and deterioration that may have taken place over the years; these factors help determine what degree of change is appropriate in the project. Close examination of existing fabric and original floorplans, where available, can reveal which alterations have been additive, such as new partitions inserted for functional or structural reasons and historic features covered up rather than destroyed. It can also reveal which have been subtractive, such as key walls removed and architectural features destroyed. If an interior has been modified by additive changes and if these changes have not acquired significance, it may be relatively easy to remove the alterations and return the interior to its historic appearance. If an interior has been greatly altered through subtractive changes, there may be more latitude in making further alterations in the process of rehabilitation because the integrity of the interior has been compromised. At the same time, if the interior had been exceptionally significant, and solid documentation on its historic condition is available, reconstruction of the missing features may be the preferred option.

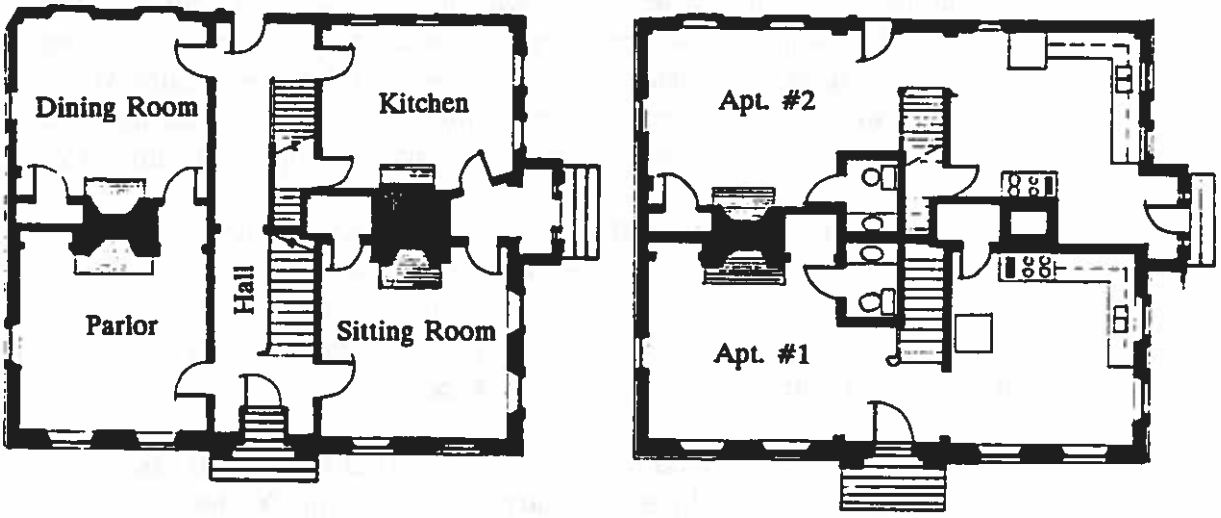
It is always a recommended practice to photograph interior spaces and features thoroughly prior to rehabilitation. Measured floor plans showing the existing conditions are extremely useful. This documentation is invaluable in drawing up rehabilitation plans and specifications and in assessing the impact of changes to the property for historic preservation certification purposes.

Drawing Up Plans and Executing Work

If the historic building is to be rehabilitated, it is critical that the new use not require substantial alteration of distinctive spaces or removal of

character-defining architectural features or finishes. If an interior loses the physical vestiges of its past as well as its historic function, the sense of time and place associated both with the building and the district in which it is located is lost.

The floor plan in the following illustration is characteristic of many 19th century Greek Revival houses, with large rooms flanking a central hall. In the process of rehabilitation, the plan was drastically altered to accommodate two duplex apartments. The open stair was replaced with one that is enclosed, two fireplaces were eliminated, and Greek Revival trim around windows and doors was removed. The symmetry of the rooms themselves was destroyed with the insertion of bathrooms and kitchens. Few vestiges of the 19th century interior survived the rehabilitation.



Adapted from an illustration in *Preservation Brief #18: Rehabilitating Interiors in Historic Buildings*

The recommended approaches that follow address common problems associated with the rehabilitation of historic interiors and have been adapted from the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings. Adherence to these suggestions can help ensure that character-defining interior elements are preserved in the process of rehabilitation. The checklist covers a range of situations and is not intended to be all-inclusive. Readers are strongly encouraged to review the full set of guidelines before undertaking any rehabilitation project.

Recommended Approaches for Rehabilitating Historic Interiors

1. Retain and preserve floor plans and interior spaces that are important in defining the overall historic character of the building. This includes the size, configuration, proportion, and relationship of rooms and corridors; the relationship of features to spaces; and the spaces themselves such as lobbies, reception halls, entrance halls and double parlors. Put service functions required by the building's new use, such as bathrooms, and mechanical equipment in secondary spaces.

2. Avoid subdividing spaces that are characteristic of a building type or style or that are directly associated with specific persons or patterns of events. Space may be subdivided both vertically through the insertion of new partitions or horizontally through insertion of new floors or mezzanines. The insertion of new additional floors should be considered only when they will not damage or destroy the structural system or obscure, damage, or destroy character-defining spaces, features, or finishes. If rooms have already been subdivided through an earlier insensitive renovation, consider removing the partitions and restoring the room to its original proportions and size.

3. Avoid making new cuts in floors and ceilings where such cuts would change character-defining spaces and the historic configuration of such spaces. Inserting of a new atrium or a lightwell is appropriate only in very limited situations where the existing interiors are not historically or architecturally distinguished.

4. Avoid installing dropped ceilings below ornamental ceilings or in rooms where high ceilings are part of the building's character. In addition to obscuring or destroying significant details, such treatments will also change the space's proportions. If dropped ceilings are installed in buildings that lack character-defining spaces, such as mills and factories, they should be well set back from the windows so they are not visible from the exterior.

5. Retain and preserve interior features and finishes that are important in defining the overall historic character of the building. This might include columns, doors, cornices, baseboards, fireplaces and mantels, paneling, light fixtures, elevator cabs, hardware, and flooring; and wallpaper, plaster, paint, and finishes such as stenciling, marbleizing, and graining; and other decorative materials that accent interior features and provide color, texture, and patterning to walls, floors, and ceilings.

6. Retain stairs in their historic configuration and location. If a second means of egress is required, consider constructing new stairs in secondary spaces. (For guidance on designing compatible new additions, see Preservation Brief 14, "New Exterior Additions to Historic Buildings.") The application of fire-retardant coatings, such as intumescent paints; the installation of fire suppression systems, such as sprinklers; and the construction of glass enclosures can in many cases permit retention of stairs and other character-defining features.

7. Retain and preserve visible features of early mechanical systems that are important in defining the overall historic character of the building, such as radiators, vents, fans, grilles, plumbing fixtures,switchplates, and lights. If new heating, air conditioning, lighting and plumbing systems are installed, they should be done in a way that does not destroy character-defining spaces, features and finishes. Ducts, pipes, and wiring should be installed as inconspicuously as possible: in secondary spaces, in the attic or basement if possible, or in closets.

8. Avoid "Furring out" perimeter walls for insulation purposes. This requires unnecessary removal of window trim and can change a room's proportions. Consider alternative means of improving thermal performance, such as installing insulation in attics and basements and adding storm windows.

9. Avoid removing paint and plaster from traditionally finished surfaces, to expose masonry and wood. Conversely, avoid painting previously unpainted millwork. Repairing deteriorated plaster-work is encouraged. If the plaster is too deteriorated to save, and the walls and ceilings are not highly ornamented, gypsum board may be an acceptable replacement material. The use of paint colors appropriate to the period of the building's construction is encouraged.

10. Avoid using destructive methods--propane and butane torches or sandblasting--to remove paint or other coatings from historic features. Avoid harsh cleaning agents that can change the appearance of wood. (For more information regarding appropriate cleaning methods, consult *Preservation Brief #6: Dangers of Abrasive Cleaning to Historic Buildings*.)

Meeting Building, Life Safety and Fire Codes

Buildings undergoing rehabilitation must comply with existing building, life safety and fire codes. The application of codes to specific projects varies

from building to building, and town to town. Code requirements may make some reuse proposals impractical; in other cases, only minor changes may be needed to bring the project into compliance. In some situations, it may be possible to obtain a code variance to preserve distinctive interior features. A thorough understanding of the applicable regulations and close coordination with code officials, building inspectors, and fire marshals can prevent the alteration of significant historic interiors.

Sources of Assistance

Rehabilitation and restoration work should be undertaken by professionals who have an established reputation in the field.

Given the wide range of interior work items, from ornamental plaster repair to marble cleaning and the application of graining it is possible that a number of specialists and subcontractors will need to be brought in to bring the project to completion. The State Historic Preservation Office and local preservation organizations may be a useful source of information in this regard. Good sources of information on appropriate preservation techniques for specific interior features and finishes include the *Bulletin* of the Association for Preservation Technology and *The Old-House Journal*; other useful publications are listed in the bibliography.

Protecting Interior Elements During Rehabilitation

Architectural features and finishes to be preserved in the process of rehabilitation should be clearly marked on plans and at the site. This step, along with careful supervision of the interior demolition work and protection against arson and vandalism, can prevent the unintended destruction of architectural elements that contribute to the building's historic character.

Protective coverings should be installed around architectural features and finishes to avoid damage in the course of construction work and to protect workers. Staircases and floors, in particular, are subjected to dirt and heavy wear, and the risk exists of incurring costly or irreparable damage. In most cases, the best, and least costly, preservation approach is to design and construct a protective system that enables stairs and floors to be used yet protects them from damage. Other architectural features such as mantels, doors, wainscotting, and decorative finishes may be protected by using heavy canvas or plastic sheets.

Summary

In many cases, the interior of a historic building is as important as its exterior. The careful identification and evaluation of interior architectural elements, after undertaking research on the building's history and use, is critically important before changes to the building are contemplated. Only after this evaluation should new uses be decided and plans be drawn up. The best rehabilitation is one that preserves and protects those rooms, sequences of spaces, features and finishes that define and shape the overall historic character of the building.

Sources of Additional Information

The following list is an excerpt from *Historic Building Interiors*, an annotated bibliography compiled by Anne Grimmer of the U.S. Department of the Interior, National Park Service, Preservation Assistance Division, 1989.

Antiquity Reprints. A series of 19th-century American building studies. Published by *Yesterday's Home*, c/o Antiquity Reprints, Box 370, Rockville Centre, New York 11571.

This series includes a number of reprints of late 19th-century house books, such as "Shoppell's Modern Houses, 1887", and "Suburban & Country Homes, 1883." In addition to containing a variety of original house designs and floor plans, most of the reprints also include special sections on plumbing, heating and ventilation, as well as decorating advice. These books could be especially useful to researchers wishing to identify original floor plans, and interior trim and design details.

Downing, A(ndrew) J(ackson). *The Architecture of Country Houses*. New York: Dover Publications, Inc., 1969.

This is a reprint of Downing's important work published in 1850, and also includes "Designs for Cottages, and Farm-Houses, and Villas, with remarks on Interiors, Furniture, and the best Modes of Warming and Ventilating." As a tastemaker, Downing popularized this romanticized country architecture using many designs of famous contemporary architects, including Alexander Jackson Davis, Richard Upjohn, and Gervase Wheeler. In addition, and like many of the "style books" of the period, this includes essays on exterior and interior design, decorative details and furnishings, color, design of farm

buildings, and a section on heating emphasizing the importance of ventilation.

Eastlake, Charles L. *Hints on Household Taste*. Reprint of the 4th revised edition published in 1878, with a new introduction by John Gloag, FSA. Dover Publications, Inc., 1969.

One of the most important books in the history of 19th-century domestic design, *Hints on Households Taste* and its author had tremendous influence on late 19th-century interior design. While it does discuss furnishings, the book devotes much space to carpet and tile motifs, and wall treatments, and is copiously illustrated with sketches by the author, as well as reproductions of wallpaper and floor tiles.

Garrett, Elisabeth Donaghy. "The Bedchamber." *The Magazine Antiques*. Vol. CXXIII, No. 3 (March 1983), pp. 612-625.

The specialized, upstairs bedroom of modern times evolved from a ground floor room which often served multiple functions, as, for example, a storage room. The types and arrangements of bedroom furniture, and the appropriate bed linens and curtains for various periods are discussed.

Garrett, Elisabeth Donaghy. "The Dining Room." *The Magazine Antiques*. Vol. CXXVI, No. 4 (October 1984), pp. 910-922.

The author recounts dining room design practices from Colonial times through the 19th-century and describes how the use and location of the space was transformed as the room became more specialized. Also discussed is the type and disposition of dining furniture for various stylistic periods.

Garrett, Elisabeth Donaghy. "The quest for comfort: Housekeeping practices and living arrangements the year round." *The Magazine Antiques*. Vol. CXXVIII, No. 6 (December 1985), pp. 1210-1223.

In reconstructing a historic interior it is essential to consider regional climate, temperature variations and insert factors which often dictated the appearance of historic interiors. By stressing the seasonal cleaning rotation of furnishings, the author provides examples of interior fittings, furniture and heating and cooling devices which made life more comfortable in extremes of heat, cold and insect annoyance.

Homes And Interiors of the 1920's: A Restoration Design Guide. Originally published as "Building with Assurance," 2nd edition, by the Morgan Woodwork Organization, Chicago, Illinois. Ottawa, Ontario: Lee Valley Tools, Ltd., 1987. (Trade distribution in North America by Firefly Books, Ltd., 3520 Pharmacy Avenue, Scarborough, Ontario M1W 2T8.)

This reprint of a catalogue published by Morgan Woodwork Organization in 1923, includes house plans, standard prefabricated bathroom and kitchen fixtures, architectural elements, as well as furniture, and decorating advice. Handsomely reprinted, this book should be of incomparable use to anyone interested in, or restoring old houses built between the First and Second World Wars.

Interiors Handbook for Historic Buildings. Washington, DC: Co-published by the National Park Service and Historic Education Foundation, 1988.

Prepared for a national conference on appropriate interior treatments for historic buildings, this handbook includes nearly 400 pages of technical papers as well as guidance for architects, developers, building managers, curators and property owners. The contents address both rehabilitation and restoration issues, including inspection, evaluation and planning, architectural features and materials, systems and fixtures, space utilization and adaptive use, finishes and decorative accessories, and fire protection and building codes. (Available from Historic Preservation Education Foundation, P.O. Box 27080, Central Station, Washington, DC 20038.)

Jennings, Jan, and Herbert Gottfried. *American Vernacular Interior Architecture 1870-1940*. New York: Van Nostrand Reinhold Company, 1988.

This is the second book by these authors, whose first book *American Vernacular Design 1870-1940* covered the same subject on the exterior. This second book analyzes the role manufactured materials, standardized and readily available, played in creating the interiors of vernacular buildings. The book is comprised of four sections: elements (interior features); systems (including heating); the popular decorative styles of the period; and a survey of some vernacular building types, including residential, commercial and religious. The book has a primarily rural and regional (Midwest) emphasis.

"The Kitchen Question." *The Old-House Journal*. Vol. XV, No. 4 (July-August 1987), pp. 22-41.

This issue features a special section on how to sensitively incorporate a working kitchen into an old house. Included are articles on the following: "The Pre-1840 Kitchen," "The Modern Approach," a selection of different kitchen styles that have been used in several old houses, "Countertop Options," and "The Craftsman Kitchen."

Labine, Clem, and Carolyn Flaherty (editors). *The Old-House Journal Compendium*. Woodstock, NY: The Overlook Press, 1980.

Many of the articles compiled here from the first 8 years of *The Old-House Journal* will be useful in various aspects of interior rehabilitation, including: energy efficiency and insulation, wiring, heating and plumbing, plaster repair, floor and stair repair and refinishing, painting, restoring mantels and fireplaces, and repairing woodwork. The Compendium also includes numerous articles on 19th and early-20th century interior decorative styles, bathrooms, and kitchens, and craft techniques such as stenciling and graining.

Late Victorian Architectural Details. An abridged facsimile of "Combined book of Sash, Doors, Blinds, Moldings, Stair work, Mantels, and all kinds of Interior and Exterior Finish," a pattern book first published in 1871 and enlarged through many editions to this facsimile of 1898. Watkins Glen, NY: American Life Foundation Study Institute, Library of Victorian Culture, 1978.

The contents are clearly explained by the original title and the book will prove useful to those seeking to identify many interior decorative features to be found in residential and commercial buildings of the last quarter of the 19th century. Some of the catalogue entries include measurements and original prices.

Mayhew, Edgar de N., and Minor Myers, Jr. *A Documentary History of American Interiors From the Colonial Era to 1915*. New York: Charles Scribner's Sons, 1980.

This volume surveys changing taste in American interiors from the 16th to the early-20th century. Information is provided on furnishings, lighting, textiles, wall decoration and color schemes favored by the wealthy, as well as the less affluent, and the text is well-illustrated with photographs and line drawings.

Monnich, Joni. "Bathrooms with Character." *The Old-House Journal.* Vol. X, No. 6 (June 1982), pp. 127-129.

This article provides a brief survey with text and photographs of American bathrooms from the 1880's up to the 1920's.

The Old-House Journal Catalog. Compiled by the Editors of The Old-House Journal. Brooklyn, NY: The Old-House Journal Corporation, 1988.

Updated annually, this is probably one of the most complete sourcebooks available in the United States today for salvaged original and reproduction products for historic buildings. Indexes provide guides to products and services by type, by manufacturer or advertisers' names, as well as by geographical location.

A Primer: Preservation for the Property Owner. Albany, NY: Preservation League of New York State, 1978.

This guide provides general advice on a variety of aspects of the preservation and maintenance of old buildings. Specifically related to interiors are short chapters on painting, floor coverings, and mechanical systems, and suggestions for planning and historic research before beginning work are also included.

Seale, William. *Recreating the Historic House Interior.* 2nd edition. Nashville, TN: American Association for State and Local History, 1980.

This book stresses the importance of proper research for accurate restoration of historic interiors. The author explains how to research the subject, how to make architectural decisions and collections lists, and based on these, how to put together and furnish a period house.

Winkler, Gail Caskey, and Roger W. Moss. *Victorian Interior Decoration: American Interiors 1830-1900.* New York: Henry Holt and Company, 1986.

This excellent book divides the subject into four periods: 1830-1850; 1850-1870; 1870-1890; and the 1890's. Each period is addressed similarly according to wall treatments, floor treatments, and windows and window treatments. A very good bibliography is included.

WOOD AND PAINT

Most rehabilitation projects involve substantial cleaning or refinishing of historic interior wooden features. These features may have had either natural or painted finishes. You should decide at the start of your rehabilitation project which materials will be retained and preserved and which ones will require replacement. Paint removal and floor refinishing should be supervised by someone with experience in the field. Careful planning and coordination with your architect/contractor is also important to ensure that all character defining features and finishes are not removed during any pre-rehabilitation demolition.

Interior wooden features are important in defining the historic character of your house. Their rentention, protection, and repair should be a primary consideration in the preliminary stages of your rehabilitation project. Elements such as interior decorative columns and pilasters, paneling, cornices, baseboards, fireplace mantles, flooring, wainscotting, interior doors, and door and window trim are just a few of the many interior wooden features that should be preserved. They can be maintained and protected through appropriate cleaning, limited paint removal, and reapplication of protective coating systems. Every effort should be made to incorporate these important character defining elements into your rehabilitation.

During rehabilitation, preserve original finishes and the trim and ornament of a room. Your plans may include removal of non-historic later alterations. Missing original features, if historically documented, should be replaced to original design and appearance. New additions should not damage or obscure original features or finishes.

Repairing Wood

Rotted wood must be either repaired or replaced. Replacing rotted wood with new to match is generally the approach taken, but the use of epoxy fillers and consolidents to repair existing elements may be the best approach when faced with rotted decorative elements that might be hard to replace. Epoxies are of the most use when repairing column bases and capitals, balustrades and railings, window trim and sill plates, doors, trim, moldings and other decorative elements. The following considerations should be taken into account when deciding whether to use an epoxy:

- If the wooden element is severely deteriorated, consolidating and patching may be a waste of time and material.
- Epoxies can usually take compression, but if the member will be in tension, reinforcement with a new one is most practical.
- Generally, epoxies should only be used on surfaces to be painted.

Epoxy repair is usually a two step process that requires an average of up to twelve hours to dry. First, the deteriorated area should be consolidated with a quality penetrating epoxy. After this has been applied, the voids in the wood member should be filled with an epoxy patching compound. After the filler has cured, remove the excess. Chisels, planes, or sandpaper can be used depending on individual circumstances. A water repellent coat should then be applied and the surface painted.

Refinishing Wood

Refinishing wood makes a dramatic improvement in the appearance of historic interiors. The process of refinishing interior features is an involved one and should be carefully planned. Refinishing and stripping woodwork is messy, and usually accompanied by unpleasant fumes and sometimes piercing noises. All methods should be understood, and the option which best fits your situation used.

Manual stripping of wood involves the most physical work and is usually the most time consuming. This option may be the most feasible if there are problems with proper ventilation for chemical strippers or if there are numerous health constraints.

Chemical stripping is another alternative. This process involves the application of layers of chemicals to remove the build up of layers of dirt and old finishes. After the chemical stripper has been applied, wide bladed putty knives can be used to scrape off the old finish. Again, this process is messy and has unpleasant fumes.

Once wood has been stripped, a new film finish such as varnish or shellac, or a new oil based finish such as linseed oil or tung oil can be applied. Both types should be applied using thin coats. Thin coats dry faster and harder than thick ones. Always work with the grain of the wood and allow up to 24 hours between each application.

Interior Paints

The rehabilitation of a historic house often includes the removal and application of paint. Determining the color that was originally applied in a room can be very helpful in a restoration project. If an accurate historical account of paint colors is desired, an in-depth paint analysis can be conducted. Some homeowners, armed with proper information, may attempt paint analysis; others may prefer to hire a consultant.

When starting a rehabilitation project that includes paint research, one should always consider the various designs and styles that were popular during the time of the building's construction. In some instances, various architectural elements were highlighted with different paint colors. Graining and decorative wall painting were also popular at various times. Graining was a method for disguising domestic wood to resemble a more expensive, elegant wood type. Also, marbling, the method of painting either wood or stone to resemble a more expensive polished stone, was common practice. These are just a few of the varied painting practices that were used historically in residential homes.

The basic steps in paint preparation are very much the same as preparing wood surfaces to be refinished. First, loose and deteriorated paint must be removed. Paint can be loosened with a putty knife and wire brush and then patched over with wood putty and sanded to a smooth finish. Mechanical methods of paint removal are usually too abrasive for interior painted features. Large sanders and rotary drill sanders will scar wood grain. Methods such as sandblasting should never be used to remove paint from wood; this causes erosion of decorative details, raises the wood grain, and causes excessive damage. Use a chemical stripper, electric paint remover, or manually strip off excess paint that is blistering or flaking. After the excess paint has been removed, water may be used to clean the wood,

but wood then should be allowed to dry for at least 24 hours. A historic house could also contain one or more layers of lead based paint. Paint removal can be a health hazard, especially when working on the interior. If older paint contains lead, this could be especially dangerous for younger children or pregnant women. When sanding, cleaning, or just working with woodwork, you should always wear a dust mask and clean up thoroughly afterward. Proper ventilation is a must with most chemical strippers because vapors can be harmful if inhaled over long periods of time.

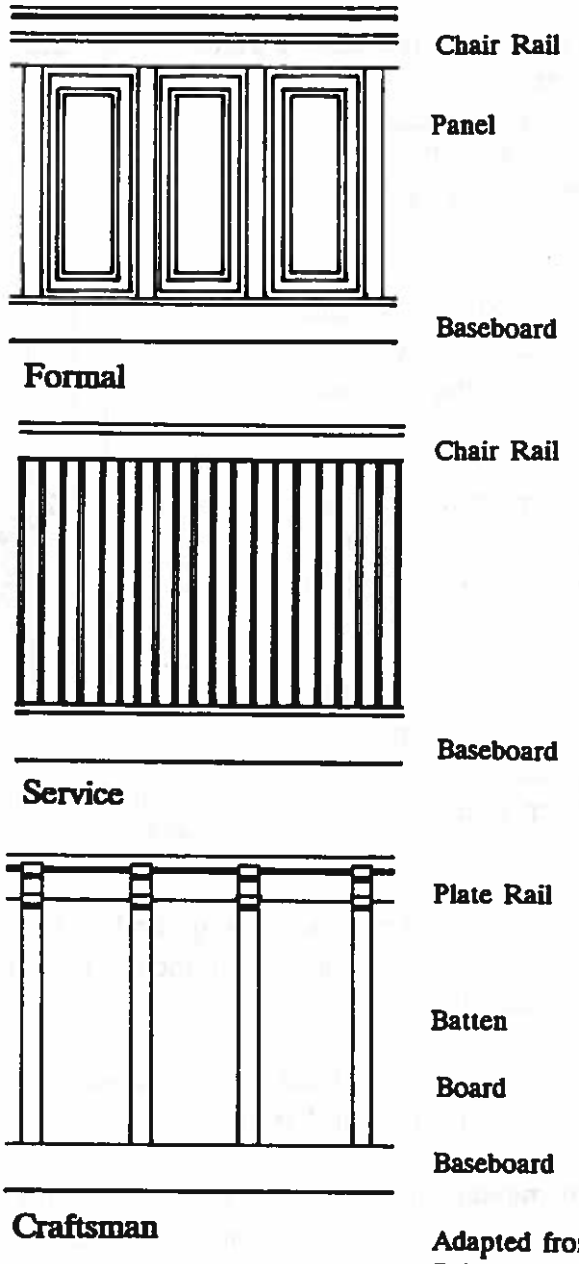
There are two basic types of paint: latex and oil based. Most have specific purposes and should be used if certain qualities of paint are desired. Paint should be chosen carefully before work begins, and used for the purpose for which it is intended. Usually, interior spaces should use latex type paint, but in areas where wood receives heavy wear, such as stair rails, an oil based or alkyd type paint should be used. If an oil based paint is already in place, the new paint should be oil based. If a latex paint is already in place, a latex should be used. The key to a good paint job is proper wood preparation. By applying paint only after wood has been properly cleaned, repaired, and primed, will you have a successful paint job.

Interior Wooden Features

It is also important to retain and preserve the various individual wooden features that help define the overall character of your house. These wooden elements were designed specifically for your house and should be a vital part of its rehabilitation. Architectural features such as interior paneling, wainscotting, doors, hardware, and flooring should be recognized.

Paneling and Wainscotting

Wainscotting is the three to four foot high wooden base around the perimeter of a room. It has been designed to give proportion and scale to the walls. Wood paneling and wainscotting should be repaired and cleaned. Historically, there are three general types of wainscotting: a very formal type, a more service type and a craftsman type which varies according to the design of the builder. If wainscotting has never been painted, it should remain unpainted. Replace in in-kind if parts are missing.



Adapted from an illustration in *Rehab Right*

Doors and Hardware

Historic interior doors are definitely character defining elements and should be retained rather than replaced. Doors usually match the architectural features of the historic rooms. The moldings, proportion of panels, and design all match the other architectural features of the room. The door is a vital part of the overall composition and should be repaired. Placement of modern doors in a historic house is often inappropriate. If a historic door is beyond repair, the door should be replaced with a similar

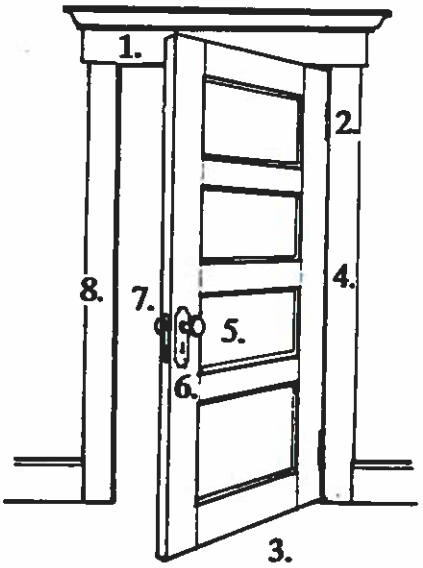
one. If the door needs repair, a few simple guidelines should help in solving some common problems.

1. Edges may swell causing the door to stick. Plane the sides affected, other than the latch side.

2. Hinges may stick. If this happens add shims, remount screws, or set the mortises deeper.

3. The bottom of the door may bind. If this occurs, reset screws or deepen mortise at top hinge.

4. The door jamb may shift due to house settlement. If this happens, work on the door rather than the door jamb.



Adapted from an illustration in *Rehab Right*

5. The original door knob is missing and the replacement is inappropriate. A new door knob should be found that is in character with the original.

6. The escutcheon, hinges, knobs, and plates may be tarnished. Remove old paint, dirt and polish.

7. The latch mechanism is malfunctioning. If this occurs, clean and oil the latch; if this fails, consult a locksmith.

8. The strike plate is out of alignment with the latch. The mortise needs to be enlarged enough to enable the strike plate to move up or down.

Flooring

The wood floors of your historic house have received an enormous amount of wear and tear over the years and probably need attention during rehabilitation. In many instances the only action needed is a thorough cleaning. It may be a simple task of removing old wax buildup and gently

scrubbing the floors with a fine brush or steel wool brush. Commercial floor cleaners can also be used to clean hardwood floors. If cleaning fails to do the job, selective sanding may be the next best alternative. Sanding will help remove scratches, raised grain, and other problem spots on the floor. After sanding you may need to do a complete refinishing. The refinishing process will involve sanding to assume a smooth surface, applying a stain if appropriate; and then applying a coating to protect the wood from wear. Hardwood, as well as softwood floors, should be repaired and refinished to retain the natural beauty of historic flooring.

Sources for Additional Information

The following list is an excerpt from *Historic Building Interiors*, an annotated bibliography compiled by Anne Grimmer of the U.S. Department of the Interior, National Park Service, Preservation Assistance Division, 1989.

Wood

Ball, Norman R. "Reproducing Historic Wooden Moldings." *Association for Preservation Technology Bulletin*. Vol. X, No. 4 (1978), pp. 101-103.

This short article outlines the basic considerations for choosing replacement wood moldings. Such aspects as thickness of historic molding profile, appropriate wood, and shrinkage allowances are discussed.

Johnson, Ed. *Old House Woodwork Restoration. How to Restore Doors, Windows, Walls, Stairs and Decorative Trim to Their Original Beauty*. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1983.

This book addresses interior and exterior wood trim and siding. It provides some historical perspective on styles and decorative treatments, as well as "how-to" information.

McNulty, George F. "Henry C. Mercer and Dating By Moldings." *Association for Preservation Technology Bulletin*. Vol. X, No. 4 (1978), pp.3-19.

The author discusses the relative dating of wood molding profiles which are either the product of hand craftsmanship or are composites of machine-made components. Reacting to a previous study of the subject, the author suggests that the study sample was too small for regional conclusions about moldings. He offers a general approach for inspecting moldings for clues which indicate either a hand-made or machine-made technology.

O'Donnell, Bill. "Reconditioning Floors." *The Old-House Journal*. Vol. XIII, No. 10 (December 1984), pp. 201, 218-219.

How-to guidance for "gently" reviving a floor finish. First the floor is cleaned, lightly hand-sanded in selected areas, and then a new varnish finish is applied, and finally waxed. This is a practicle approach when the floor still retains some of its original finish.

Poore, Jonathan. "Woodwork Repairs." *The Old-House Journal*. Vol. XV, No.3 (May-June 1987), pp. 32-37.

The author describes how to remedy problems often encountered after stripping old woodwork to prepare for a clear finish. Problems discussed include open joints, cracks and checks, warping, damaged veneer, mismatched and missing pieces, scratches, gouges and dents, and stains and discolorations.

Weil, Martin E. "Interior Details in 18th Century Architecture Books," *Association for Preservation Technology Bulletin*. Vol X, No. 4 (1978), pp. 47-66.

This article reviews the use of architectural books by 18th-century craftsmen, and the canons of Classical proportioning which often governed their design and placement of such details as moldings and pilasters. Conformity to these principles may be conveyed in these features and therefore may indicate a certain level of professional knowledge or access to building guides. This article has a useful appendix of historic architectural books concerning the designs of interior details.

Paint

Alderson, C. "Recreating a Nineteenth Century Paint Palette." *Association for Preservation Technology Bulletin*. VOL. XVI, No. 1, (1984) pp. 47-56.

The author presents a methodology for mixing period paints and includes several sample recipes in the second article in an issue devoted to historic finishes.

"A Glossary of Painted Finishes." *The Old-House Journal*. Vol. XVI, No. 1 (January-February 1988), pp. 34-37.

Twenty-two terms used to describe traditional and modern decorative painted finishes are defined here. The terms range from "antiquing," to

"marbleizing" and "stenciling" (among other), and the glossary concludes with "trompe l'oeil."

Hodkinson, Ian. "Conservation and Transfer of an Early 19th Century Painted Room." *Association for Preservation Technology Bulletin*. Vol. XIV, No. 1(1982), pp. 17-35.

The author presents methodology for consolidation, removal, construction of a new support system, varnish removal and restoration of an early 19th-century painted room in Nova Scotia. The reasons for choosing a transfer and restoration procedure, rather than in-situ conservation are discussed.

LeBlanc, Raymond. *Gold-Leaf Techniques*. Cincinnati: Signs of the Times Publishing Co., 1986.

This is an excellent book on gilding of all types with emphasis on glass gilding and signage such as house numbers on transom windows. It also contains a Troubleshooting Guide, Buyer's Guide, and Supplier's Guide.

Lichtbau, Julia (with Darla M. Olson). "Uncovering Decorative Painting." *The Old-House Journal*. Vol. XIV, No. 4 (May 1986), pp. 180-185

While this article briefly explains various types of decorative painting techniques, it primarily concentrates on how to proceed with the restoration of decorative painting from the initial research necessary to uncover remnants of existing painted designs, to cleaning and touch-up "in-painting."

Miller, Kevin H. (compiler). *Paint Color Research and Restoration of Historic Paint*. Association for Preservation Technology - Publication Supplement 1977.

This Publication Supplement includes five articles previously published by APT, most notably an extensive Paint Bibliography prepared in 1975 by John Volz, with a new supplement, plus other articles on historic paint research and a methodology for exposing architectural graining that has been painted over without destroying the historic graining.

The Old-House Journal Technical Staff. "Commercial Paint Stripping: Sub-contracting Interior Jobs." *The Old-House Journal*. Vol. XVI, No. 4 (July-August 1988), pp. 29-33.

This article is addressed to the architect or general contractor and describes methods and materials used by paint stripping contractors on interior work. The article emphasizes the importance of preparing specifications, discusses costs, and provides a comparison of two chemical paint removal system, one

a commercially available caustic dry powder product, and a chemicals manufacturer who also trains and licenses the contractors who provide the stripping service.

Painting and Decorating Craftsman's Manual and Textbook. 5th edition. Falls Church, VA; Painting and Decorating Contractors of America, 1975.

This is the basic handbook prepared and used by the painting and decorating industry, and as such includes practical information on paints and coatings, tools and equipment for painters, safety procedures, color, reasons for paint failure and remedies, decorative paint finishes, wall coverings and their application, and drywall finishing. The handbook contains a useful dictionary of trade terms on the subjects of painting and decorating, wall coverings and drywall installation.

Phillips, Morgan W. "Problems in the Restoration and Preservation of Old House Paints." *Preservation and Conservation: Principles and Practices*. Proceedings of the North American International Regional Conference, Williamsburg, VA, and Philadelphia, PA, September 10-16, 1972. Washington, DC: The Preservation Press, 1976, pp. 273-285.

The author discusses problems encountered in the conservation of early-American oil-based paints based on his experiences with several old buildings in New England, and in particular with the first Harrison Gray Otis House (1795-96), new headquarters of the Society for the Preservation of New England Antiquities in Boston.

Poore, Patricia. "The Basics of Stripping Paint (from Just About Anything)." *The Old-House Journal*. Vol. XVI, No. 1 (January-February 1988), pp. 38-43.

This provides a basic introduction to the subject of removing paint from wood, metal, marble, and even glass, brick and plaster. It discusses whether to strip or not to strip and includes pros and cons of each.

PLASTER

Plaster is probably one of the most common wall surfaces in a historic building. It can receive all types of treatments including wallpaper, paint and stenciling. It can be applied over brick, stone, timber, or frame construction. Cracks, holes, major areas of spoiling or sugaring are common problems associated with plaster. As with any historic materials, plaster should be repaired rather than replaced. Covering problems with fabric or some other material will only conceal the problem, not correct it.

Plaster is a three coat process of applying a wet lime or gypsum based mortar which can be trowelled over wood lath strips. The first two coats usually contain sand and animal hair and the final coat is thinner and contains no aggregate or binder.

Cracks in plaster are always present in historic buildings. They can be an indication of structural failure or they can be seasonal, opening up in the winter and closing in the summer as a result of normal expansion and contraction.

In addition to movement, water is the other primary source of plaster deterioration. Leaky gutters or downspouts, faulty flashing, and plumbing leaks should be checked prior to plaster repair.

Cracks in Plaster

Cracks

Several cracks running through a wall may create an unsightly appearance. Some may be fairly large; others may be hairline. Building movement may cause plaster to crack in order to relieve stresses in a wall. Structural failure may also be a cause and must be analyzed and repaired before plaster is patched. In order to repair cracked plaster, the following steps should be taken:

1. Check along the line of the crack. If there are signs that it has been patched before, and normal expansion and contraction is the cause, then more than filling the crack with joint compound is required. The patched crack must be able to "give" with the movement of the wall.

2. Clean the crack of all loose debris and plaster.

3. Fill the crack with a joint compound and spread it to approximately 3" to either side of the crack.

4. To bridge the crack, use reinforcing tape (an open weave mesh-like tape), or paper tape if the cloth cannot be found or if patching a corner. Force the tape into the bed of the joint compound until the bottom of the tape is fully covered. Wipe off any excess. Cover the tape completely with a thin layer of compound. Allow about 24 hours to dry.

5. After drying, smooth out any ridges by rubbing them lightly with a damp sponge or lightly sanding them by hand with fine sandpaper. (The damp sponge will produce far less dust.)

6. Apply a second, thin coat, feathering the edges l" beyond the previous layer. Let it dry thoroughly and then sand.

7. Apply a third and final coat as smoothly as possible so that there will be minimal final sanding. Any cracks that were caused by settling can be repaired by the same method.

8. If there are hairline cracks that have never been patched before, these can be filled in with the same method.

Reappearing Cracks

Despite cloth tape and careful application, some cracks reappear. The part of the wall that continues to crack is subject to greater stresses. Check to make sure that structural failure is not the cause. To repair the reappearing crack, apply a commercial patching system. Such systems use a glass reinforcing tape with a pliable adhesive to give the patch more flexibility and strength. Follow manufacturer's instructions.

Map Cracks

Numerous cracks of varying sizes are referred to as map cracks. Uneven surfaces due to past repairs or improper installation is the cause. The plaster is basically sound; it just looks like a road map. Normal building movement and age is generally the cause. To repair map cracks, follow these steps:

1. Rather than try to patch each individual crack, apply a skim coat of joint compound to affected walls. Applying drywall over the plaster is not recommended because the reveals around the doors, trim and windows will be lost.

2. Carefully prepare surfaces. Scrape the entire surface, making sure all loose plaster and paint is removed. Patch any large cracks as described above. Wash the walls to remove any dirt or chalky paste residue.

3. Use 6" to 12" taping knife to apply a joint compound. Begin with horizontal applications starting at the top of the wall. Apply a thin (1/16") coat of compound putting pressure on the lower (dry) edge of the knife as you move across the wall keeping the knife blade almost parallel to the wall. This method will reduce ridges caused by overlapping each successive row.

4. A second coat should be applied after the first has set, perpendicular to the first coat, again bearing down slightly on the dry side of the ribbon of the joint compound.

5. Lightly sand any ridges, prime and repaint the wall.

Holes in Plaster

The impact of a door knob or door which lacks a proper stop may cause holes in plaster. Holes may also be caused by electricians making repairs. If this happens, you need to repair the plaster by following these steps:

1. Remove all loose plaster and debris. Plaster was most likely applied directly to the brick or to the lath.

2. If the finish coat has failed, be extremely careful to remove only that coat. It is much easier to apply a single finish coat to a sound substrate than it is to redo all three coats.

3. Carefully chisel an outline around the area that is to be removed so that excessive amounts of sound plaster are chipped away in the process. Use plaster washers to anchor sound plaster before removing damaged material.

4. Remove deteriorated plaster. Reattach any loose wood lath. Cut a piece of wire lath the exact size of the hole, and wire it to the wood lath. Secure wire lath to studs with l" drywall screws.

5. If the original lath was metal, inspect and replace any rusted or damaged areas before patching the wall.

6. For scratch and brown coats (the first and second coats), use a perlite gypsum plaster product. Apply the brown coat to the same thickness as the original, about l/8" to l/4" thick. As the coat begins to set, scratch the surface to provide a key for the brown coat.

7. Apply the brown coat after the scratch coat has set, about 48 hours. Apply it about l/8" below the original brown coat. Again, scratch the surface as it begins to set to prepare to receive the finish coat. Allow the brown coat to set for 48 hours.

8. For the finish coat, gauging plaster mixed with a double-hydrated finish lime, is recommended. Double-hydrated lime can be moved to the site and used immediately. A single hydrated lime will also work, but it must be slaked before it can be used, a 24 hour process. Allow this coat to cure one week then check for shrinkage away from the original plaster. It may be necessary to tape and patch cracks at this joint.

Loose Plaster

Plaster may have pulled loose from the lath. If this happens, reattach the plaster by using plaster washers, also called repair discs or ceiling buttons. They are used in conjunction with flat headed wood screws or drywall screws to attach plaster to lath to studs. Washers are then skimmed over with joint compound.

Loose Decorative Plaster

If decorative plaster has become unkeyed from the lath, it needs to be repaired by a special method called "injected adhesive bonding". This method was developed by Morgan Phillips and Andy Ladygo at the Society for the Preservation of New England Antiquities. The following steps should repair the damaged plaster:

1. Clean out the space between the lath and the plaster. This can be done by carefully breaking open the bottom of the bulge and using a vacuum cleaner to clean out debris.

2. Drill 1/4" injection holes through the lath to the plaster, using a drill bit gage to keep from drilling into plaster. If you cannot get access from the back of the plaster, drill through the front to the lath. Holes should be positioned 3" to 6" apart.

3. A specially mixed acrylic adhesive is injected between the plaster and the lath through specially drilled holes. Most adhesives come in standard caulking-gun cartridges. Trim the tip slightly larger so that it makes a tighter fit with the plaster.

4. Carefully judge the amount of adhesive used. It will need to be enough to float between the lath and the plaster. Move quickly between holes.

5. The plaster is then pressed back in place with a sheet of plywood until the adhesive sets. Place wax paper over the plywood before it is used, and press the plaster back to the lath. Use several braces to secure the plywood to the area.

6. When set, remove the plywood and carefully fill the injection holes.

Water Stained Plaster

If plaster has been stained by water, it should be sealed with shellac or shellac based primer. If the plaster has lost its integrity, it is probably unsalvageable and should be removed.

Sources for Additional Information

The following list is an excerpt from *Historic Building Interiors*, an annotated bibliography compiled by Anne Grimmer of the U.S. Department of the Interior, National Park Service, Preservation Assistant Division, 1989.

Architectural Record. "Ornamental Plaster for Restoration and Modern Designs Available Through Special Process." Mid-October 1979, pp. 15-17.

This is a brief article describing the professional services available for the repair and recasting of decorative plasterwork.

Garrison, John Mark. "Running Plaster Moldings." *The Old House Journal*. Vol. XII, No. 10 (December 1984), pp. 213-219.

Garrison, John Mark. "Casting Decorative Plaster." *The Old-House Journal*. Vol. XIII, No. 9 (November 1985), pp. 186-189.

These three articles describe in detail the repair and reproduction of decorative plaster. The first article describes making run ornament which involves forming a profile by pushing a template over wet plaster, and making "bench work" in which the molding is run on a flat surface and later applied to the wall. The second article explains the most complicated process of how to make plaster cornices in place, and the third article describes the quite different technique of casting decorative plaster.

Ladygo, Andrew. "New Techniques for Restoring Decorative Plasterwork." *The Construction Specifier*. Vol. 41, No. 7 (July 1988), pp. 104-112.

This article describes in detail the author's experiments with, and subsequent development of historic plaster repair techniques. First discussed is the repair of Akoustolith Plaster, based on a 1925 patent and used, for example, in the Nebraska State Capitol. Also described in depth are various adhesion systems used to stabilize plaster that has separated from its lath, in particular acrylic resin and

epoxy consolidants used by the Society for the Preservation of New England Antiquities (SPNEA) at its property Brantwood in St. Johnsbury, Vermont.

Leeke, John. "Saving Irreplaceable Plaster." *The Old House Journal*. Vol. XV, No. 6 (November-December 1987), pp. 51-55.

This article deals specifically with the problem of resecuring and repairing bulging plaster beneath decorative surfaces by using adhesives available in standard caulking gun cartridges. These methods have been adapted for less sophisticated users from a similar, but more costly technique of plaster repair with injected adhesive bonding that was developed over a 12 year period by the Society for the Preservation of New England Antiquities (SPNEA).

Poore, Patricia. "The Basics of Plaster Repair." *The Old House Journal*. Vol. XVI, No. 2 (March-April 1988), pp. 29-35.

This article reviews different methods of repairing (covering) cracks, and patching larger holes for the non-professional plasterer. The article is not extremely detailed but provides adequate guidance for fairly simple repairs, and includes "A Plastering Glossary," and also discusses finish coat failure, and problems caused by moisture.

Stagg, W.D., and B.F. Pegg. *Plastering: A Craftsman's Encyclopedia*. London: Granada Publishing, 1976.

The book is somewhat awkward to use since it is laid out in glossary form, but it contains a wealth of information including sections on how to make columns, cornices, domes, decorative casting, and sections on many obsolete practices.

Van Den Branden, F., and Thomas L. Hartsell. *Plastering Skills*. Alsip, IL: American Technical Publishers, Inc., and The Old-House Journal, 1984.

A reprint of a plastering textbook originally published in 1953, this book contains useful information on a wide variety of plastering techniques seldom practiced today such as running a decorative cornice, forming elliptical panels, running niches, as well as basic plastering methods.

WALLCOVERINGS, FLOORCOVERINGS AND TEXTILES

Interior features and finishes sometimes go unnoticed during a major rehabilitation. Interior decorative finishes are an important aspect of the historic house and should be part of the project. Finishes such as stenciling, marbling, graining, wallpaper and carpeting provide your historic house with accent colors, textures, and patterns that are very much part of its design. Interior textiles such as window curtains, hangings, upholstery, and linens, are another layer of detailing. These elements should be included in your planning and carefully implemented during the various stages of rehabilitation.

Wallcoverings

For many historic houses, the most popular decorative finish for plaster walls has been wallpaper. Graining, also a form of decoration, involved painting inexpensive softwood to imitate more fashionable and costly woods such as cedar, mahogany, or oak. For the most part, however, a historic house probably had some type of wallpaper for its primary decorative finish. In rare instances, some historic houses contain their original wallpaper. A house has usually been redecorated to keep up with current fashions; however, the original wallpaper may be under layer upon layer of more recent finishes. Wallcoverings should be examined early in the rehabilitation process to determine if any original wallpaper exists. If you wish to replicate certain wallpaper samples, an experienced preservation consultant would be a good resource. Searching for a historically appropriate wallpaper is usually a very involved process and can be rather expensive. Some companies still manufacture reproductions of

designs used during the 19th century, but time must be spent finding the right manufacturer. Decorative wall finishes are a part of the history of your house and should be considered during rehabilitation.

Floorcoverings and Textiles

Historically, floorcoverings have for the most part been luxury items. Before the late 1700s, almost all were imported, primarily from England. Floorcoverings generally include all types of carpets, rugs, oilcloths and tiles; they provide the color, texture, and patterning for the flooring of your historic house and should be chosen carefully. Almost all rugs and carpets are not original to the house due to wear and tear over the years, new historically appropriate floorcoverings can be chosen. An experienced preservation architect/interior designer should be consulted for specific designs.

Painted floorcloths and matting were prominent floorcoverings until the mid 1800s, when carpeting became more widely used. Floorcloths were usually made from canvas-cotton, linen, hemp or wool. The various layers were painted several times on each side and cured. Carpets were generally divided into two types: flatwoven (flat weave without piles) and pile carpets (formed from cut loops of yarn). The most popular type was, by far, the pile carpet. Linoleum is another floorcovering which is no longer widely used, yet was once popular. Many times the various layers of linoleum can be found on your floors. New vinyl patterns can usually be found that closely resemble old linoleum.

Sources of Additional Information

This bibliography is an excerpt from *Historic Building Interiors*, an annotated bibliography compiled by Anne Grimmer of the U.S. Department of the Interior, National Park Service, Preservation Assistance Division, 1989.

Wallcoverings

Bradbury, Bruce. "A Layman's Guide to Historic Wallpaper Reproduction." *Association for Preservation Technology Bulletin*. Vol. XVI, No. 1 (1984) pp. 57-58.

This article offers a brief overview of the history of wallpaper, related terminology and stylistic categories for dating wallpapers in an issue devoted to historic finishes.

Entwisle, E.A. *A Literary History of Wallpaper*. London: B.T. Batsford Ltd., 1960.

This important work consists of a listing of all known literary references to the use of wallpaper beginning with 1509, which the author states is the date of the earliest known wallpaper. The references continue up to 1960, and include interesting literary references as well as important milestones in the development of wallpaper.

Kahn, Eve (compiler). "Painted Window Shades." *The Old-House Journal*. Vol. XV, No. 5 (September-October 1987), pp. 46-49.

Painted shades were popular from the 1820s until the end of the 19th-century, and their designs ranged from picturesque "Hudson River School" landscapes to simple, but elegant borders intended to blend in with the room decor. The article, which was compiled from a master's thesis written by William Jedlick, concludes with instructions on how to paint window shades.

Lynn (Frangiamore), Catherine. "The Story Wallpapers Tell." *Historic Preservation*. Vol. 27, No. 4 (October-December 1975), pp. 27-34.

The author explains how wallpaper layers and their sequence can provide important clues to the history of a house and its changing interior decor over the years. The article advises caution in the removal and examination of old wallpaper fragments even if restoration is not the objective, as it is not unusual to find paper as old as the house at the bottom of as many as 6-16 layers of wallpaper.

Lynn, (Frangiamore), Catherine. *Wallpapers in Historic Preservation*. 1st published Washington, DC: Technical Preservation Services Branch, National Park Service, U.S. Department of the Interior, 1977. (Reprinted by the American Association for State and Local History, Nashville, TN, 1989).

This book is well-illustrated in black and white with examples of historic wallpapers. It begins with a history of wallpaper technology from hand-made to machine-made paper, painted papers, stenciled and printed papers, a history of wallpaper styles and their use, hanging techniques, and advice for planning a restoration project involving wallpaper. The appendices include a short list of historic wallpaper reference collections, and a list of firms that reproduce historic wallpapers.

Nylander, Richard C. *Wallpapers for Historic Buildings*. Washington, DC: The Preservation Press, 1983.

This is a guide to more than 350 reproduction wallpapers available today, organized by historical periods from 1750 to 1900. Reproduction wallpapers are listed according to manufacturers, and a useful bibliography is also included. The handbook is part of the series which includes fabrics, floorcoverings, and lighting, published by The Preservation Press.

Phillips, Morgan W., and Andrew L. Ladygo. "A Method for Reproducing Lincrusta Papers By Hand." *Association for Preservation Technology Bulletin*. Vol. XII, No. 2 (1980), pp. 64-79

Missing segments of a lincrusta ceiling are reproduced from existing decorative relief. A polyester resin mixture provided the needed flexibility for recasting delicate, shallow relief which would otherwise crack with traditional plaster materials.

Floor Coverings

Black, David (editor). *The Macmillan Atlas of Rugs and Carpets: A Comprehensive Guide for the Buyer and Collector*. New York: Macmillan Publishing Company, 1985.

This book contains 200 full color illustrations and 150 black and white photographs and line drawings. Included is a useful section on the care of carpets - cleaning, repairs, display and storage, and a glossary that describes designs, dyes, and types of weaves, as well as a selected bibliography dealing mostly with oriental rugs.

Cotton, J. Randall. "The Bare Facts About Early Floors." *The Old-House Journal*. Vol. XVI, No. 2 (March-April 1988), pp. 36-41.

This article discusses the history of wood flooring in the U.S. from the 17th to the late 19th century, and includes the regional differences in wood floor types, as well as different ways of sawing and laying the floor boards. In addition, the article describes various decorative painted floor treatments, and floor coverings, including painted floorcloths, matting, carpets and rugs.

Fulton, Kathy, and Gordon Bock. "Repairing Antique Floors." *The Old-House Journal*. Vol. XVI, No. 2 (March-April 1988), pp. 43-45.

This "how-to" article is based on the experience of a skilled craftsman. It discusses how to find replacement lumber, and how to match it to the

existing floor, the importance of seasoning to remove excess moisture, how to remove damaged areas and the installation of replacements. Also included is a brief column on "Dutchman Patching for Small Repairs."

Kahn, Eve. "Post-Victorian Houses: Finding Linoleum." *The Old-House Journal*. Vol. XIV, No. 10 (December 1986), pp. 478-481.

Although linoleum is no longer manufactured in the U.S., some vinyl patterns closely resemble the old linoleum patterns. The article also provides a listing of sources for these, as well as suppliers in the U.S. that distribute linoleum that is still made in Europe.

Monnich, Joni. "Carpets and Rugs...Unravelling Their Differences." *The Old-House Journal*. Vol. XI, No. 7 (August-September 1983), pp. 142-146.

This article explains different types of floor coverings used from 1750 up to the 20th-century. Also included is a list of sources available today for these materials.

Poore, Patricia. "Restoring a Parquet Floor." *The Old-House Journal*. Vol. XII, No. 1 (January-February 1984), pp. 28-29.

The author suggests how to locate suitable replacement pieces for missing pieces, cutting and installing new pieces and how to make general repairs.

Poore, Patricia, and The Old-House Journal Technical Staff. "Fixing Old Floors - A Three-Part Series." *The Old-House Journal*. Vol. IX, No. 1 (January 1981), pp. 7-10; Vol. IX, No. 2 (February 1981), pp. 48-50; Vol. IX, No. 3 (March 1981), pp. 61-63.

This series consists of three articles with practical information on: "How to Deal with Sagging, Sloping, Squeaking Old Floors," "Construction Types and Sub-Floor Repairs," and "Repairing and Replacing Floorboards."

"Reproducing Embossed Tile." *The Old-House Journal*. Vol. XIV, No. 10 (December 1986), pp. 476-477.

This article describes a method of reproducing missing or broken Victorian embossed tile that can be done by an experienced ceramicist. The technique involves making a mold from an original tile, and if well-glazed, can result in satisfactory, if not perfect, replacements.

Von Rosenstiel, Helene, and Gail Caskey Winkler. *Floor Coverings for Historic Buildings: A Guide to Selecting Reproductions*. Washington, DC: The Preservation Press, 1988.

This book is prefaced with an informative introduction that defines the terms used in the text, explains the different types of carpeting and their manufacture, discusses the various restoration approaches of how to document original floor coverings and the correct installation of period reproductions. Five chapters cover the years from 1750 to 1930, and comprise the catalogue of reproduction floor coverings, including wood and brick flooring, matting, floorcloths, handmade rugs and flat woven and pile carpets, and Oriental rugs. The Appendix includes the list of suppliers of the reproductions materials, a glossary of terms, a selected bibliography, and additional sources of information.

Textiles

Fikioris, Margaret A. "Textile Conservation for Period Room Settings in Museums and Historic House." *Preservation of Paper and Textiles of Historic and Artistic Value II*, edited by John C. Williams. Advances in Chemistry Series 193. Washington, DC: American Chemical Society, 1981, pp. 253-74.

This paper gives an overview of the variety of problems encountered in a museum with period room settings and solutions used in the past and the present.

Harpers Ferry Regional Textile Group. *Textiles and Museum Lighting*. Washington, DC: Anderson House Museum, 1980.

This is an excellent document which discusses the effect of light on textiles and the use of light, past and present, within museums and historic houses.

Johnson, E. Verner, and Joanne C. Horgan. *Museum Collection Storage*. Protection of the Cultural Heritage, Technical Handbooks for Museums and Monuments 2. Paris: UNESCO, 1979.

This handbook includes an excellent compilation of storage designs and methods for all decorative arts objects, particularly textiles, rugs, and costumes. Of special interest are the discussions of fixed rolled storage units, the mobile handing storage units, storage for rolled textiles, the mobile handing storage for flat textiles and large rugs, and the high-density mobile storage system. Other important topics covered are records, security and environment.

Montgomery, Florence M. *Textiles in America 1650-1870*. New York: W.W. Norton & Company, 1984.

This book consists of an extensive dictionary of textiles compiled from original documents, prints and paintings, commercial records, American merchants' papers, shopkeepers', advertisements, and pattern books with original cloth swatches. Prefacing the over 200 page dictionary are chapters on furnishing practices in England and America, bed hangings, window curtains, and upholstery and textiles for the period room in America. The preface discusses the changing "fashions" in decorating the period museum room in the 20th-century. The dictionary is accompanied by over 100 color plates showing historic fabric swatches.

Nylander, Jane C. *Fabrics for Historic Buildings: A Guide to Selecting Reproduction Fabrics*. 3rd edition. Washington, DC: The Preservation Press, 1983.

This book includes 95 photographs, and offers a catalogue of 550 available reproduction fabrics. Particularly useful is a glossary of fabric terms, a list of manufacturers of reproduction fabrics, and suggestions for additional sources of information.

HEATING, VENTILATION AND AIR CONDITIONING

Owners of historic houses should be aware that under normal conditions, most mechanical systems must be replaced every 25 to 40 years. The impact of installation upon historic building material should be a primary concern in any rehabilitation project. Any plan to install a new HVAC system should be planned so that it causes the least alteration and damage possible to the house's floor plan, exterior elevations, and important interior features, finishes and materials. At the same time, historic mechanical systems may be character defining features of your house and should be retained and repaired, whenever possible. Plans to partially or totally remove a historic HVAC system should be evaluated early in the project planning.

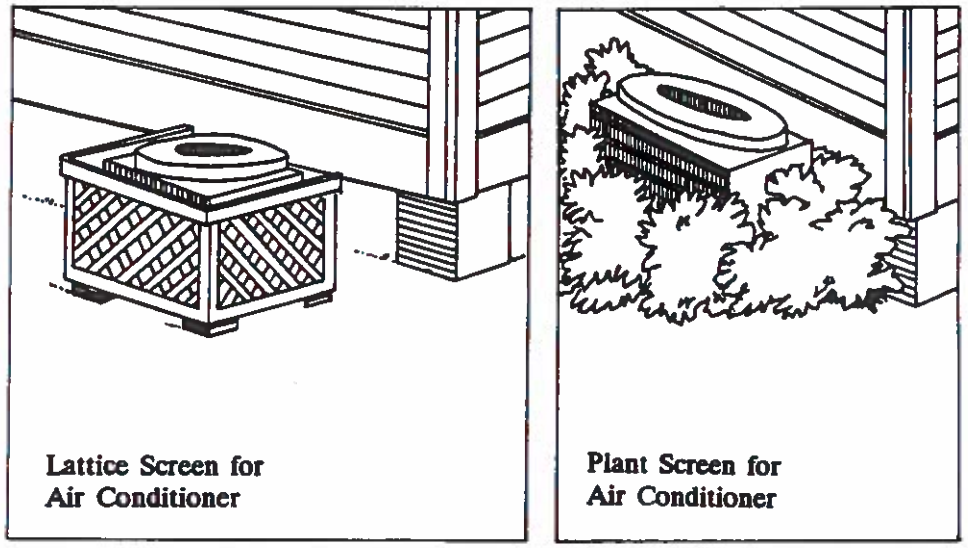
Types

There are two main types of central heating systems. The first is indirect or warm-air heating; the second is by steam or hot water. The two types of warm-air systems include the gravity warm-air system, which was the original type in many old buildings, and the forced system. The latter system is an improvement over the gravity type because it employs a blower to force air to circulate between furnace and registers and does not depend on natural convection. Besides making warm air distribution more equitable, this system minimizes the difference between warm air entering and cold air leaving rooms. With a forced warm-air system, it is possible to send heat only to those rooms that require it.

Electric systems are a type of forced warm-air system. The heat pump is a special type of an electrical heating system. It extracts heat from outside air and transfers it indoors during the winter; during the summer it reverses the cycle, absorbing heat indoors, then removing it.

There are also two types of hot-water systems: gravity and forced. The gravity system works on the principle that when water is heated, it expands, becomes lighter, and rises. Water rises through pipes to radiators, its place being taken by cooler and heavier water in the return pipes. Steam heating works on the same principle. The forced hot-water system is a gravity system with a circulating pump driving water through pipes and radiators.

There are two types of central air conditioning systems: the single-package unit and the split system. With the single-package unit, the cooling coil, the condenser, and compressor are located together, generally outside the building. In the split system, the cooling coil is located inside the building with the condenser and compressor located outside. Outside package units should be hidden from view by landscaping or brick/lattice screens.



Lattice Screen for Air Conditioner

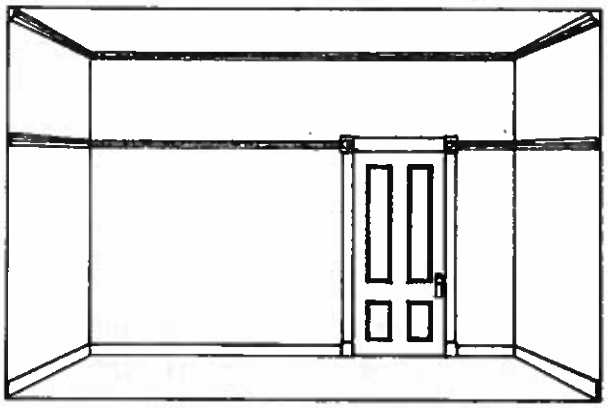
Plant Screen for Air Conditioner

Adapted from an illustration in
Savannah Victorian District Design Guidelines

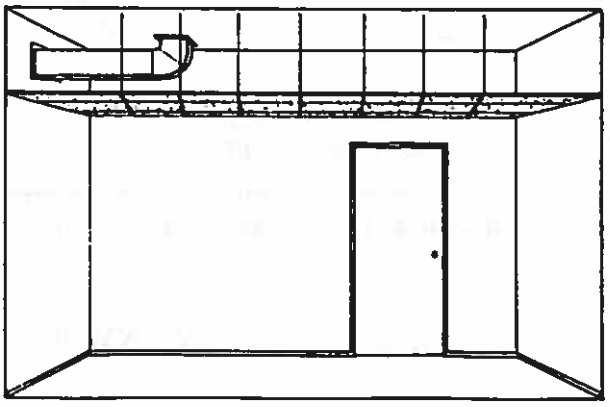
Visibility

Usually the only parts of a heating and air conditioning system visible in a room are registers in buildings with warm-air systems and radiators in buildings with hot-water systems. Ductwork, though, may also be visible depending upon the size, shape, and location. Of course, keeping ductwork and registers out of view should be the goal. When feasible, ducts should be located in the crawl space and/or the attic. If the system you have chosen exposes the ductwork, boxes it in, or requires dropping the ceiling to hide it, then you probably have chosen the wrong system.

An HVAC system should be picked that will not destroy the architectural character of the building. If a building has solid masonry walls forming both the exterior and interior walls, decorative ceilings, and no crawl space, you will not want to pick a warm-air heating system. That ductwork could only be accommodated by dropping ceilings or exposing the ducts; either would detract from the character of the interior spaces. In this instance, a hot-water heating system would probably be the best choice with individual radiators being the only portion visible.



Preferred - Original ceiling and wall treatment or sheet-rock ceiling with molding replaced.



Objectionable - Lowered ceiling with holes or heavy texture on the surface of the panels. Decorative elements and proportions of the room are disregarded.

Adapted from an illustration in *Rehab Right*

For frame buildings, where a warm-air heating system would work well, the number, type, size, and location of the particular system may all be variables to be determined once significant interior features are recognized. For example, several small electric forced warm-air units that could be fitted into closets may be a better approach than using one central system where ductwork would have to be exposed.

Heat Pumps have attracted much attention because of their thermal and cost efficiency; however, they have the same problems with large ductwork as other forced warm-air systems. One special type of heat pump that avoids large ducts is the high velocity type. These ducts can usually be snaked through closets, partitions, and attics quite easily. In addition, large registers are replaced with small, round terminator plates that are almost invisible.

Registers should always be placed in the least conspicuous locations. This can be accomplished quite easily in floor areas by placing them behind furniture. When registers are put in a ceiling, they should be as small as possible, located so as not to destroy decorative material, and painted to match the ceiling.

For air-conditioning systems, the location of the outside unit can be important. A location that does not intrude upon any of the primary views, and that can be easily screened with vegetation, should be selected.

Sources of Information

The following is an excerpt from *Historic Building Interiors*, an annotated bibliography compiled by Anne Grimmer of the U.S. Department of the Interior, National Park Service, Preservation Assistance Division, 1989.

Biallis, Randall J., AIA. "Building Automation System at Iolani Palace - Honolulu, Hawaii." *Association for Preservation Technology Bulletin*. Vol. XIII, No. 1 (1981), pp. 7-15.

The article describes in detail the complex digital computer-controlled electronic communications system to monitor climate control, fire detection, security and electric systems that were installed in the Iolani Palace when it was restored in the 1970s.

Cotton, J. Randall. "Ceiling Fans." *The Old-House Journal*. Vol. XV, No. 4 (July-August 1987), pp. 42-46.

This article discusses the popularity of the ceiling fan in the early 20th-century, as well as refurbishing old fans, and sources for reproduction and reconditioned old fans.

DelSordo, Stephen. "Radiators." *The Old-House Journal*. Vol. XVI, No. 5 (September-October 1988), pp. 28-35.

This article discusses a variety of methods that can be used for stripping old paint-encrusted radiators, and suggestions for repainting using traditional paints and color combinations. Also included is a brief pictorial survey of historic radiator types, radiator covers, and list of sources for radiator replacements and painting supplies.

Eroque, Justin. "Heating and Cooling Robie House." *Association for Preservation Technology Bulletin*. Vol. XIX, No. 2 (1987), pp. 38-51.

A thorough analysis and understanding of Wright's design for heating and cooling systems made possible the coordination of modern systems with the original systems. With only minor alterations to the building fabric, it was possible to integrate refrigerated cooling and ventilation with the natural ventilation and heating patterns of the house.

Ferguson, Eugene S. "An Historical Sketch of Central Heating: 1800-1860." *Building Early America*. Proceedings of the Symposium held at Philadelphia to celebrate the 250th Birthday of the Carpenters Company of the City and County of Philadelphia. Charles E. Peterson, FAIA, editor. Radnor, PA: Chilton Book Company. 1976, pp. 165-185.

This paper discusses both British and American heating innovations in residential, as well as factory buildings and large public places such as the House of Commons. The author also discusses the theory behind the inventions and culminates in a lengthy essay on the design and installation of the heating systems in the "new" House and Senate wings of the U.S. Capitol designed by Montgomery C. Meigs. It is an interesting historical study.

McGuiness, John J. "Environmental Controls for Historic Properties: The Important Role of Humidity Regulation." *Technology and Conservation*. Vol. 1, No.3 (Winter 1976), pp. 22-25, 32.

Although the title implies the subject is historic properties, the focus is more on the historic, artistic and archival works contained in museums, and environmental requirements necessary to preserve them.

Pilling, Ron. "Restoring the Baltimore Heater." *The Old-House Journal.* Vol. XII, No. 9 (November 1984), pp. 191, 206-209.

The Baltimore Heater or Latrobe Stove which was invented in the mid-19th century, was popular throughout the Victorian period and was still made until World War II. The Baltimore Stove was the inspiration or precursor of the first whole-house furnace. So many of these stoves were manufactured that many that are repairable still exist in late 19th-century houses.

Walbert, III, Benjamin L. "The Infancy of Central Heating in the United States: 1803-1845." *Association for Preservation Technology Bulletin.* Vol. III, No. 4 (1971), pp. 76-88.

The rapid increase in institutional and mill buildings prompted a search for more efficient heating systems during this time frame. This article reviews period literature giving accounts of early attempts to disperse heat with steam air apparatus and other methods. Also included is a list of Central Heating Manufacturing Prior to 1845.

LIGHTING, ELECTRICAL WIRING AND SECURITY SYSTEMS

Historic electric wiring generally will need to be completely replaced; electrical codes will usually require this. Although wiring and service panels must be updated, this does not necessarily mean that decorative aspects of the old system must also be removed.

Original or historically significant light fixtures in your house should be retained and reused in their original location if possible. When adding new fixtures or replacing incompatible ones, fluorescent lights are not recommended. Fluorescent lighting is a relatively new lighting source and is inappropriate for historic residential buildings.

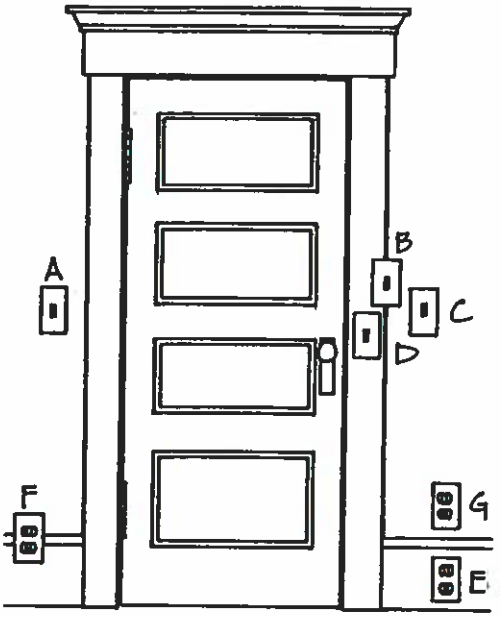
Many original or significant lighting and electrical systems utilized decorative or high quality switch plates. When these exist, they should be reused. New switches can be installed in original push button switch plates. When new receptacles or switches are installed, plates should be as inconspicuous as possible. Match the color of the adjacent surface and place the plates so as not to damage historic building material. *(See illustration on the following page.)*

Whenever feasible, an existing historic light fixture should be retained and re-used. Although the original fixture may not be the primary light source, new fixtures can be put in place or installed to supplement the original. While modern lights are usually required to replace non-historic fixtures or supplement the originals, the new fixtures should be contemporary yet compatible and follow these general guidelines:

- The light's function should be determined. If a light source for an entire room is needed, then an appropriate fixture should be chosen. If the fixture is to serve only as a supplemental light source, then another type should be selected.

- The fixture's design should be simple, without elaborate decorative features. A simple form without ornamentation is most appropriate. Form will follow function.

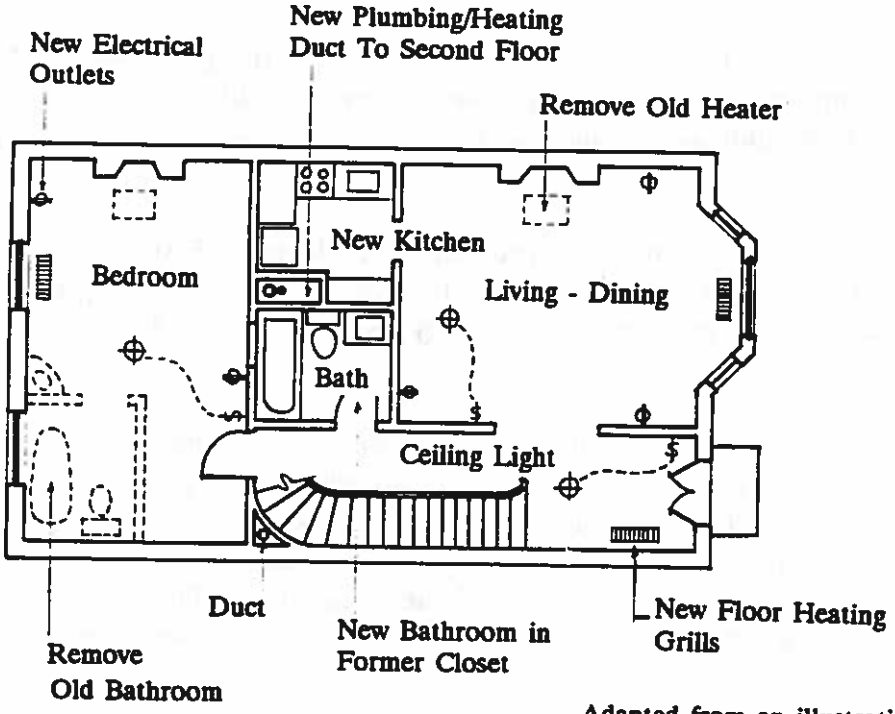
- The fixture's scale should be appropriate for the size of the room. If the room has a very high ceiling, bring down the fixture to provide proper light. Do not install a large oversized fixture that dominates the room.



A. Switch on wrong side of door.
B. Destroys door trim.
C. Good socket location.
D. Destroys door trim.
E. Preferred socket location.
F. Socket destroys base molding.
G. Acceptable socket location.

Adapted from an illustration in *Rehab Right*

Security and fire detection systems, because of their inherent function, are very hard to adapt to your historic house. Generally, these systems cannot be hidden totally, but can be incorporated into your rehabilitation planning. As much as possible, any conduit installation and location should be carefully concealed to avoid damaging historic building materials. The least intrusive methods should be implemented, such as hiding conduits in furred out walls and painting to match existing conditions. The installation of these systems should be carefully coordinated with your contractor and architect to insure sensitive treatment. The following illustration shows a floor plan which has incorporated many of these suggestions.



Adapted from an illustration in *A Primer: Preservation for the Property Owner*

Sources of Additional Information

The following list is an excerpt from *Historic Building Interiors*, an annotated bibliography compiled by Anne Grimmer of the U.S. Department of the Interior, National Park Service, Preservation Assistance Division, 1989.

Cook, Melissa, and Ferro, Maximilian. "Electric Lighting and Wiring in Historic American Buildings." *Technology and Conservation*. Vol. 8, No. 3 (Spring 1983), pp. 28-48.

Lighting sources in historic buildings are often inadequate for modern needs. In addition, early attempts at retrofitting were often crude and are incompatible with present building codes. The authors explore means of introducing compatible fixtures and updating electrical wiring systems. Categories of period lighting fixtures describe styles, development and documentation procedures.

Fidler, John. "Too Many Sparks." *Traditional Homes*. Vol. 4, No. 8 (May 1988), pp. 102-108.

The first article in a series that examines the impact of the installation, and later changes, to electrical, mechanical and ventilating

services in old buildings. This article discusses the mistakes that have been commonly made in installing new services in old buildings, and suggests alternative approaches that will result in less damage to the building.

Doermann, Elisabeth W. "Restoration of Electrical Systems in the James J. Hill House: Support of Historic Interpretation in an Adaptive-Use Site." *Association for Preservation Technology Bulletin*. Vol. XVIII, No. 3 (1986), pp. 56-64.

This case history of the 1891 mansion in St. Paul describes how the Minnesota Historical Society was able to adapt it for use as a house and art museum. Much of the original wiring still existed, and the restoration saved and supplemented the electrical system as well as returning some of the fixtures to their original duel gas/electrical use. The rehabilitation also involved the sensitive installation of fire and security systems required by the new uses.

Ferro, Maximilian L., AIA, RIBA, and Melissa L. Cook. *Electric Wiring and Lighting in Historic American Building: Guidelines for Restoration and Rehabilitation Projects*. New Bedford, MA: AFC/A Nortek Company, 1984. (Available from: AFC/A Nortek Company, 55 Samuel Barnet Boulevard, New Bedford, MA 02745.)

This is one of the few publications devoted to the subject of historic electric wiring, as well as historic lighting. While perhaps one fourth of the book deals with wiring, wire insulation, types of wiring systems, and a discussion of rewiring historic buildings, the rest of the book is composed of a well-illustrated chronology of fixtures, 1880-1930, from old lighting catalogs. These fixtures are classified as functional, gas/electric, artistic, scientific, and traditional.

Fidler, John. "Power Dressing." *Traditional Homes*. Vol. 4, No. 9 (June 1988), pp. 102-106.

The author discusses some of the problems of inserting modern electrical services, including fire and security alarms into historic buildings. He describes some approaches which have led to successful and unobtrusive installations in National Trust-owned properties, as well as the Brighton Pavilion, and other historic buildings in Britain.

Garrett, Elisabeth Donaghy. "Lighting Devices and Practices." *The Magazine Antiques*. Vol. CXXIII, No. 2 (February 1983), pp. 408-417.

The role of artificial lighting was an important component of interior design, atmosphere and hospitality throughout the 18th and 19th-centuries. This article underscores the importance of lighting, from Colonial candles and oil lamps, to the 19th-century girandole and later Victorian reflective lamps. The integration of firelight, high gloss woodwork and interior lighting devices is explored using historic excerpts and accounts of lighting practices.

Hardingham, Dave. "Detecting Electrical Leakage." *The Old-House Journal*. Vol. XI, No. 1 (January-February 1983), pp. 7-11.

The author provides information on how to test old wiring for dangerous inadequacies, and how to repair electrical wire insulation.

Hayward, Arthur H. *Colonial Lighting*. 1st published 1923, 3rd enlarged edition with a new introduction and supplement "Colonial Chandeliers" by James R. Marsh. New York: Dover Publications, Inc., 1962.

This is one of the earliest books on the history of colonial lighting. It includes lanterns, tin, pewter and brass lamps, candles and candle holders, early glass lamps, and astral and luster lamps.

Martin, Tricia (compiler). "Historical Interior Lighting Reproductions Source list." *Traditional Building*. Vol. 1, No. 2 (November-December 1988), pp. 13-14.

Twenty-five companies are included here listed alphabetically according to period, types and composition of lighting reproductions offered from chandeliers, scores and wall fixtures, hall lights, and lanterns. The list indicates whether a company does custom-work, and whether a catalogue is available.

Moss, Roger W. *Lighting for Historic Buildings: A Guide to Selecting Reproductions*. Washington, D.C.: The Preservation Press, 1988.

This handbook on the history of lighting in America includes illustrations of hundreds of fixtures available today that are suitable for historic buildings from the 17th-century through the 1920s. Appendices include a list of suppliers, a glossary, additional sources of information and

a selected bibliography. This is part of the *Historic Interiors Series* which includes wallpapers, fabrics, floorcoverings published by The Preservation Press.

The Old-House Journal Technical Staff. "Routing Wiring: How to Get From Here to There with Very Little Repair." *The Old-House Journal.* Vol. XIII, No. 9 (October 1985), pp. 161, 168-170.

This article does not explain how to rewire an old house. It does provide helpful hints on ways to get wiring through walls, floors and ceilings with a minimum of disruption to, and loss of, the existing plaster.

Rambusch, Viggo Bech. "Interior Lighting Systems for Historic Churches: Planning to Meet Restoration Goals and Current Needs." *Technology and Conservation.* Vol. 2, No. 4 (Winter 1977), pp.28-32.

Installing new lighting in a religious structure should reflect the requirements of the congregation and maintain the architectural integrity of the interior. The author has determined four lighting levels that need to be considered.

Robinson, Jeremy. "Electrical Capacity: Does Your House Have Enough?" *The Old-House Journal.* Vol. X, No. 6 (June 1982), pp. 115, 124-125.

How to estimate the electrical service needs of a house based on the present service, taking into consideration new services including increased heating and air-conditioning loads, and additional appliances.

Swearingen, David. "Old House Security: Part 2, Locks and Alarms." *The Old-House Journal.* Vol. XIV, No. 10 (December 1986), pp. 472-475.

This is the second of two articles (the first in the November 1986 issue discussed exterior security measures) on this subject. The author, a locksmith, discusses different types of locks, including the repair of old locks, and a variety of interior alarm systems. The addresses of several alarm system manufactures are included.

Synk, J.A. "Art and Artifact Theft: How to Protect the Past." *Technology and Conservation.* Vol. 1, No. 1 (Spring 1976), pp. 20-22.

Written by a security system marketing representative, the article discusses how to select a cost-effective security system for galleries, museums and historic buildings. The author explains various alarm systems including perimeter protection ultrasonic alarms, capacitance alarms, photoelectric alarms, microwave alarms and closed circuit TV monitoring.

PLUMBING

The more significant features of a historic plumbing system may help define the overall character of your house. While the plumbing system itself may have to either be upgraded, augmented, or entirely replaced, many of the actual plumbing fixtures could be retained. Visible portions of plumbing systems such as radiators, sinks and bathtubs are often significant features and their retention should be considered in the early planning stages of the rehabilitation project.

Whether installing new pipes or repairing old ones, care should be taken not to damage historic building materials. Existing holes for pipe connections should be used to keep from damaging walls or floors. Hidden passages, crawl spaces, and existing vents should be used to minimize damage to historic fabric.

Original plumbing fixtures in the bathroom and kitchen should be retained if possible. Porcelain and china sinks, tubs, and toilets can be reglazed and cleaned to appear as new. Large clawfoot tubs can be converted into a combination shower/bath without modifying existing pipes. If original fixtures are missing, new ones should be simple and in character with the historic nature of the house, not imitations or plastic fake marble fixtures.

Sources of Additional Information

The following is an excerpt from *Historic Building Interiors*, an annotated bibliography compiled by Anne Grimmer of the U.S. Department of the Interior, National Park Service, Preservation Assistance Division, 1989.

Cotton, J. Randall. "Sinks." *The Old-House Journal*. Vol. XIV, No. 6 (July-August 1986), pp. 270-278.

The author reviews the evolution of bathroom and kitchen sinks in America, and provides suggestions for use and maintenance of old sinks today. Also included is a list of sources for reproduction and salvaged fixtures.

The Well-Appointed Bath. With an Introduction by Gail Caskey Winkler. (Republication of The J.L. Mott Ironworks 1914 catalog "Modern Plumbing, Number 8," and Standard Sanitary Manufacturing Company's "Planning your Plumbing Wisely: 'Standard' Plumbing Fixtures for the Home.") Washington, DC: The Preservation Press, 1989.

This report contains authentic plans and plumbing fixtures from the early decades of the 20th-century, and like most catalogs includes specific information on prices, measurements, and detailed drawings that will serve as excellent guidance for those interested in restoring bathrooms of that period.

Feuerstein, Gary. "Things You Should Know About Old-House Plumbing." *The Old-House Journal*. Vol. XI, No. 7 (August-September 1983), pp. 133,158-161.

The author explains some of the problems frequently encountered with older plumbing systems. A glossary of plumbing terms is included.

Mott's Illustrated Catalog of Victorian Plumbing Fixtures for Bathrooms and Kitchens. (Reprint of "The J.L. Mott Ironworks, New York Catalog "G" Illustrating the Plumbing and Sanitary Department," 1888.) New York: Dover Publications, Inc., 1987.

STRUCTURAL SYSTEMS

The structural system of your historic house should be examined and evaluated in your project's early planning stages to determine physical condition and overall importance to the building's historic character. The most important consideration is whether members are structurally sound and capable of supporting activities within the house. If there are any doubts, a qualified architect or structural engineer should be consulted.

Structural components are often directly observable only in attics or basements. Elsewhere they are concealed by fixed floor, wall and ceiling material. Common signs of structural problems are sloping or springy floors, wall and ceiling cracks, wall bulges, sticking doors, and windows. Many such problems may be attributed to settlement of the foundations or problems with exterior masonry walls. When failures in structural components occur, they usually involve individual members and rarely result in the failure of the entire structure. Instead, an elastic type adjustment takes place which redistributes stresses to other parts of the house. Other areas of common structural-related problems include the underpinning of foundations, deflection and warping, sagging floors and cracking walls.

Foundations

Many times historic houses were built without proper foundations. Piers or even load-bearing walls within a house were placed directly on or just slightly below ground. The freeze-thaw cycle during winter months may have caused settling or

shifting of support piers. In other cases, more load was placed in certain areas of the house as room functions changed. These circumstances make reinforcement of piers and foundations advisable.

It may be necessary to actually excavate to a point beneath the existing pier or foundation and backfill with concrete. Jacks or other temporary supports should be used to brace the house while this is taking place. New piers and additional concrete footings may be necessary under certain load-bearing interior or exterior walls. If new underpinning material around the building's perimeter is desired, new brick or lattice type material should be recessed approximately 1-2 inches back from the face of the existing pier. This will provide a secure underpinning while maintaining the structural support system.

Deflection, Warping and Associated Problems

Some deflection of wood structural components or assemblies is common in old buildings and can normally be tolerated unless it causes loss of bearing, weakens connections, or opens watertight joints in roofs or other critical locations. Deflection can be halted by the addition of supplemental supports or strengthening members. Once permanently deflected, a wood structural component cannot be straightened.

Warping of individual wood components almost always takes place early in the life of a building and will usually cause only superficial damage, although connections may be loosened and occasionally there may be a loss of bearing.

Other associated structural problems include:

- Loss of bearing in beams and joists over foundation walls, piers or columns, due to movements caused by long term deflection of wood beams or joists, differential movements of foundation elements, localized crushing, or wood decay. Check the bearing and connections of all exposed structural elements that are in contact with the foundation. Look for symptoms of bearing failure where these elements are concealed, such as bowing or sloping in the floor above and cracking or tilting of foundation walls, piers and columns.

- Sagging, sloping or springing of floors, due to foundation settlement, excessive spans, cut or drilled structural elements, overloading or removal of supporting walls or columns on the

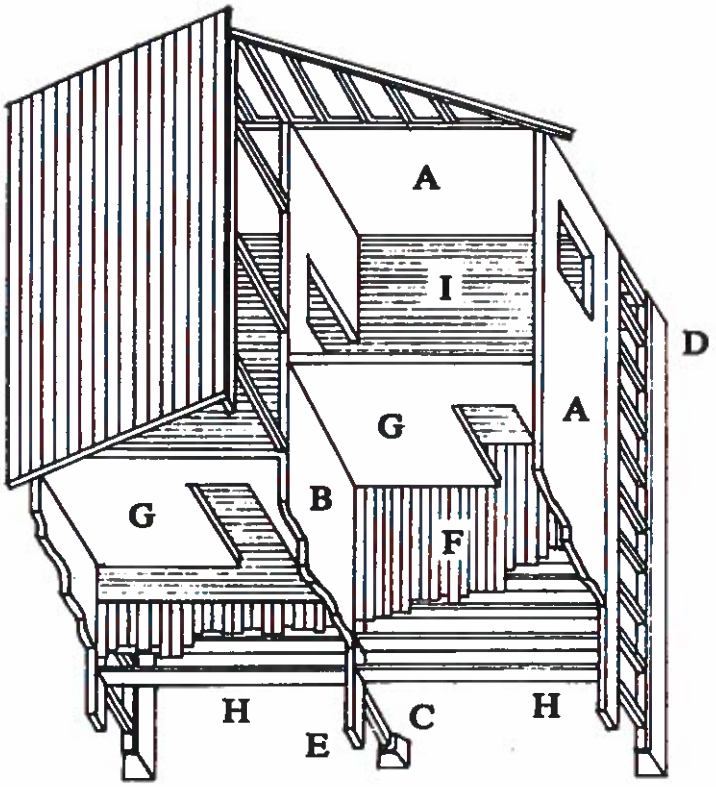
floor above or below. Each case must be diagnosed separately. In old buildings, columns or walls that helped support or stabilize the floor above may have been removed during a previous alteration; conversely, partitions, bathrooms, or similar additions may have been placed on a floor not designed to support such additional loads. Depending on the circumstances, sagging, sloping or springing floors may be anything from an annoyance to an indication of a potentially serious structural problem. Check below the floor for adequate supports, bearing and for sound connections between structural elements. Look for signs of supporting walls that have been removed, missing joist hangars, and inappropriate cuts or holes in joists for plumbing, electric, or HVAC lines or ducts. Also look for signs of insect or fungal attack.

- Floor sagging near stairway openings, due to gradual deflection of unsupported floor framing. This is common in old buildings but usually does not present a structural problem. Correction, if desired, will be difficult since the whole structural assembly surrounding the stair has deformed. Look for signs of a supporting wall that has been removed below the opening. Where this has occurred, structural modification or the addition of a supporting column may be required.

- Floor sagging beneath door jambs, resulting from improper support below the jamb. This is rarely a structural concern, although if need be, additional bracing can be added (with some difficulty if above a finished ceiling) between the joists where the sag occurs.

- Cracking in interior walls around openings, may be caused by inadequate, deflected or warped framing around the openings, differential settlement, interior masonry load-bearing walls, or by problems in the exterior masonry wall. Cracking due to framing problems is usually not serious, although it may be a cosmetic problem that can be repaired only by breaking into the wall.

The structural components of a residential structure are: a) Exterior Load Bearing Walls, b) Interior Load Bearing Walls, c) Interior Foundation Footings, d) Perimeter Foundation, e) Foundation Beam, f) Subfloor, g) Non-Loadbearing Walls, h) Joists, and i) Finish Flooring.



Adapted from an illustration in *Rehab Right*

Sources of Additional Information

The following list is an excerpt from *Historic Building Interiors*, an annotated bibliography compiled by Anne Grimmer of the U.S. Department of the Interior, National Park Service, Preservation Assistance Division, 1989.

Jowers, Walter. "Beam Repair Basics." *The Old-House Journal*. Vol. XII, No. 8 (October 1984), pp. 175-178.

This article discusses how to repair and replace when necessary, load-bearing rafters, headers, girders, and joists in old buildings. It includes well-drawn illustrations and good cautionary advice.

Poore, Jonathan. "The Best Way to Replace a Tread or Riser." *The Old-House Journal*. Vol. XI, No. 2 (March 1983), pp. 40-41.

The emphasis of this short article is that the proper way to replace a tread or riser is from the underside of the stairs so that the nails do not show and the step does not squeak.

Poore, Patricia. "Replacing a Stair at Our Old House." *The Old-House Journal*. Vol. X, No. 2 (February 1982), pp. 27, 44-47.

Poore. Patricia. "Fixing Our Balustrade." *The Old-House Journal*. Vol. X, No. 3 (March 1982), pp. 58-62.

These two articles describe how an 1890 staircase that was shaky and out-of-level with treads pulling out of their housing was repaired by a master stairbuilder, who also replaces the newel and repaired the balustrade.

Feilden, Bernard M. *Conservation of Historic Buildings*. London: Butterworth & Co., Ltd., 1982.

This comprehensive manual covers all aspects of maintenance and conservation of historic buildings. Specifically related to interiors of historic buildings are chapters on internal structural elements, internal temperature control, building inspections, inserting new systems into old buildings, fire and security, and sections on materials repair including woodwork, ironwork, plaster, paint and glass. This is very useful book for anyone who works on old buildings.

Davis, Gerald (editor). *Building Performance: Function, Preservation and Rehabilitation*. ASTM Special Technical Publication 901. Philadelphia: American Society for Testing and Materials, 1986.

This is a compendium of thirteen published papers from a symposium sponsored by the ASTM Committee E-6 on Performance of Building Constructions, held in Bal Harbor, Florida, in October 1983. Six of the papers offer general guidance for diagnosis of building condition and performance, and the rest of the papers are oriented to more specific problems regarding building rehabilitation such as potential hazards of misapplication of energy conservation measures in existing religious buildings, a method to determine strength of wood members, and building diagnosis by non-destructive neutrongramma ray technique.

Hart, David M. *X-Ray Examination of Historic Structures*. Washington, DC: National Park Service, US Department of the Interior, 1975. NTIS order number: PB85-180800.

This report explains a method for nondestructive probing of historic buildings that permits investigation of components normally hidden from view.

Hart, David M. "X-Ray Investigation of Buildings." *Association for Preservation Technology Bulletin*. Vol. 5, No. 1 (1973), pp. 9-21.

The author describes his experiments with X-ray as a means of exploring invisible conditions within historic structures to determine its potential for conducting non-destructive physical research. The fully developed methodology is described in the report in the previous entry.

"Inspection Checklist for Older Buildings." *The Old-House Journal*. Vol. XV, No. 5 (September-October 1987), pp. 40-45.

The editors of *The Old-House Journal* have prepared this basic inspection list to guide potential purchasers of old houses. The list includes exterior as well as interior features to be considered, but the authors emphasize that it is not intended to replace the services of a professional building inspector.

Seaquist, Edgar O., Jr. *Diagnosing and Repairing House Structure Problems*. New York: McGrawHill Book Company, 1980.

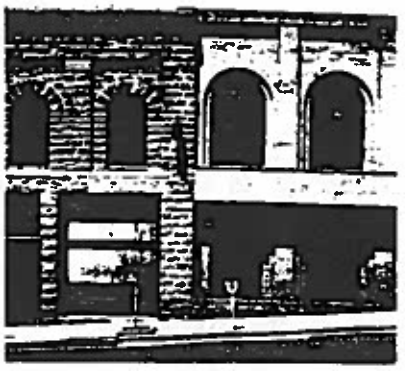
This book offers methods for analyzing and diagnosing possible structural problems in existing houses, and suggests the most sensitive and least destructive ways to repair them. The text covers interior aspects including framing systems, walls, ceilings (including plaster repairs), and flooring, and of course all exterior aspects as well.

NEW ADDITIONS/ENERGY CONSERVATION

Following are *Preservation Brief #14: New Exterior Additions to Historic Buildings* and *Preservation Brief #3: Conserving Energy in Historic Buildings*. Both were prepared by the Preservation Assistance Division, National Park Service, U.S. Department of the Interior.

Although containing some information related to non-residential building types, these publications provide helpful information for the homeowner.

14 PRESERVATION BRIEFS



New Exterior Additions to Historic Buildings: Preservation Concerns

Kay D. Weeks

U.S. Department of the Interior National Park Service
Preservation Assistance Division Technical Preservation Services

Because a new exterior addition to a historic building can damage or destroy significant materials and can change the building's character, an addition should be considered only after it has been determined that the new use cannot be met by altering nonsignificant, or secondary, interior spaces. If the new use cannot be met in this way, then an attached addition may be an acceptable alternative if carefully planned. A new addition should be constructed in a manner that preserves significant materials and features and preserves the historic character. Finally, an addition should be differentiated from the historic building so that the new work is not confused with what is genuinely part of the past.

Change is as inevitable in buildings and neighborhoods as it is in individuals and families. Never static, buildings and neighborhoods grow, diminish, and continue to evolve as each era's technological advances bring conveniences such as heating, street paving, electricity, and air conditioning; as the effects of violent weather, uncontrolled fire, or slow unchecked deterioration destroy vulnerable material; as businesses expand, change hands, become obsolete; as building codes are established to enhance life safety and health; or as additional family living space is alternately needed and abandonded.

Preservationists generally agree that the history of a building, together with its site and setting, includes not only the period of original construction but frequently later alterations and additions. While each change to a building or neighborhood is undeniably part of its history—much like events in human life—not every change is equally important. For example, when a later, clearly nonsignificant addition is removed to reveal the original form, materials, and craftsmanship, there is little complaint about a loss to history.

When the subject of *new* exterior additions is introduced, however, areas of agreement usually tend to diminish. This is understandable because the subject raises some serious questions. Can a historic building be enlarged for a new use without destroying what is historically significant? And just what *is* significant about each particular historic building that should be preserved? Finally, what new construction is appropriate to the old building?

The vast amount of literature on the subject of change to America's built environment reflects widespread interest as well as divergence of opinion. New additions have been discussed by historians within a social and political, framework; by architectural historians in terms of construction technology and style; and by urban planners as successful or unsuccessful contextual design. Within the historic preservation programs of the National Park Service, however, the focus has been and will continue to be the protection of those resources identified as worthy of listing in the National Register of Historic Places.

National Register Listing—Acknowledging Change While Protecting Historical Significance

Entire districts or neighborhoods may be listed in the National Register of Historic Places for their significance to a certain period of American history (e.g., activities in a commercial district between 1870 and 1910). This "framing" of historic districts has led to a concern that listing in the National Register may discourage any physical change beyond a certain historical period—particularly in the form of attached exterior additions. This is not the case. National Register listing does *not* mean that an entire building or district is frozen in time and that no change can be made without compromising the historical significance. It also does not mean that each portion of a historic building is equally significant and must be retained intact and without change. Admittedly, whether an attached new addition is small or large, there will always be *some* loss of material and *some* change in the form of the historic building. There will also generally be some change in the relationship between the buildings and its site, neighborhood or district. Some change is thus anticipated within each rehabilitation of a building for a contemporary use.

Scope of National Park Service Interest in New Exterior Additions

The National Park Service interest in new additions is simply this—a new addition to a historic building has the potential to damage and destroy significant historic material and features and to change its historic character. A new addition also has the potential to change how one perceives what is genuinely historic and thus to diminish those qualities that make the building eligible for listing in the National Register of Historic Places. Once these basic preservation issues have been addressed, all other aspects of designing and constructing a new addition to extend the useful life of the historic building rest with the creative skills of the architect.

The intent of this Brief, then, is to provide guidance to owners and developers planning additions to their historic

buildings. A project involving a new addition to a historic building is considered acceptable within the framework of the National Park Service's standards if it:

1. **Preserves significant historic materials and features; and**
2. **Preserves the historic character; and**
3. **Protects the historical significance by making a visual distinction between old and new.**

Paralleling these key points, the Brief is organized into three sections. Case study examples are provided to point out acceptable and unacceptable preservation approaches where new use requirements were met through construction of an exterior addition. These examples are included to suggest ways that change to historic buildings can be sensitively accomplished, not to provide indepth project analyses, endorse or critique particular architectural design, or offer cost and construction data.

1. Preserving Significant Historic Materials and Features

Connecting a new exterior addition always involves some degree of material loss to an external wall of a historic building and, although this is to be expected, it can be minimized. On the other hand, damage or destruction of *significant* materials and craftsmanship such as pressed brick, decorative marble, cast stone, terra-cotta, or architectural metal should be avoided, when possible.

Generally speaking, preservation of historic buildings is enhanced by avoiding all but minor changes to primary or "public" elevations. Historically, features that distinguish one building or a row of buildings and can be seen from the streets or sidewalks are most likely to be the significant ones. This can include window patterns, window hoods, or shutters; porticoes, entrances, and doorways; roof shapes, cornices, and decorative moldings; or commercial storefronts with their special detailing, signs, and glazing. Beyond a single building, entire blocks of urban or residential structures are often closely related architecturally by their materials, detailing, form, and alignment. Because significant materials and features should be *preserved*, not damaged or hidden, the first place to consider constructing a new addition is where such material loss will be minimized. This will frequently be on a secondary side or rear elevation. For both economic and social reasons, secondary elevations were often constructed of "common" material and were less architecturally ornate or detailed.

In constructing the new addition, one way to minimize overall material loss is simply to reduce the size of the new addition in relationship to the historic building. If a new addition will abut the historic building along one elevation or wrap around a side and rear elevation, the integration of historic and new interiors may result in a high degree of loss—exterior walls as well as significant interior spaces and features. Another way to minimize loss is to limit the size and number of openings between old and new. A particularly successful method to reduce damage is to link the new addition to the historic block by means of a hyphen or connector. In this way, only the connecting passageway penetrates a historic side wall; the new addition can be visually and functionally related while historic materials remain essentially intact and historic exteriors remain uncovered.

Although a general recommendation is to construct a new addition on a secondary elevation, there are several exceptions. First, there may simply be no secondary elevation—some important freestanding buildings have significant materials and features on all sides, making any aboveground addition too destructive to be considered. Second, a structure or group of structures together with their setting (for example, in a National Historic Park) may be of such significance in American history that any new addition would not only damage materials and alter the buildings' relationship to each other and the setting, but seriously diminish the public's ability to appreciate a historic event or place. Finally, there are other cases where an existing side or rear elevation was historically intended to be highly visible, is of special cultural importance to the neighborhood, or possesses associative historical value. Then, too, a secondary elevation should be treated as if it were a primary elevation and a new addition should be avoided.

Photo: Maxwell Mackenzie

Photo: Gary L. Hume

Historic residential structure with new office addition. This approach preserves significant historic materials and features.

Built in 1903 as the private residence of a wealthy mine owner, the 3½ story building utilizes a variety of materials, including granite, limestone, marble, and cast iron. Of special interest is the projecting conservatory on a prominent side elevation. The Walsh-McLean House in Washington, D.C., has been used as the Indonesian Embassy since 1954. When additional administrative space was required for the embassy in 1981, loss of significant exterior materials was minimized by utilizing a narrow hyphen connector that cuts through a side wall behind the distinctive conservatory. Finally, the modestly scaled addition is well set back on the adjoining site, thus preserving the historic character of this individually-listed property.

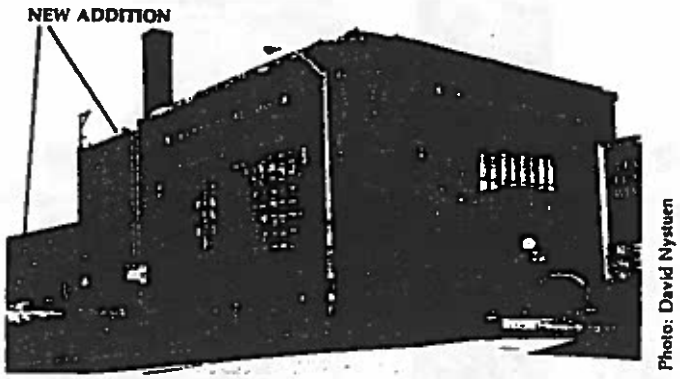
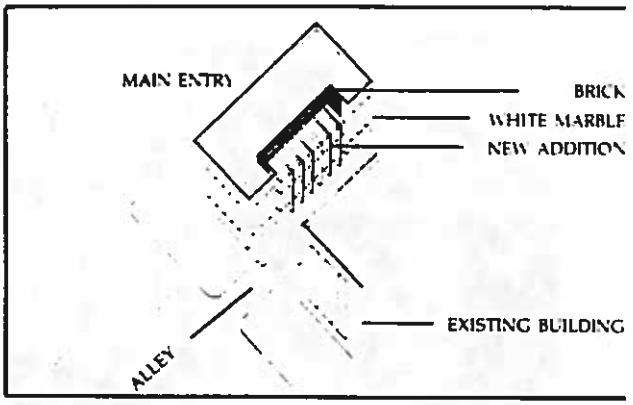


Photo: David Nystuen

Historic bank structure with new drive-in bank addition. This approach preserves significant materials and features.

The bank building in Winona, Minnesota, (Purcell, Feick, and Elmslie, 1911-1912) is a noteworthy example of Prairie School architecture. Of particular significance is the ornamental work in terra-cotta and stained glass. In 1969-70 a brick addition was joined to the historic structure on the unoramented north and east party walls. This responsible approach successfully met additional square footage requirements for bank operations while retaining the historic banking room with its stained glass panels and skylighted space.



Historic library with new reading room addition. This approac preserves significant historic materials and features.

When Washington, D.C.'s Folger Shakespeare Library (Paul P. Cret, 1929) required additional space for a new reading room i 1983, significant exterior materials and interior spaces were respected. This expansion was successfully accomplished by filling-in a nonsignificant, common brick, U-shaped service are on the building's rear elevation, thus permitting almost total sa ings of the historic decorative marble on significant front and side facades. The new reading room addition was sensitively joined to the historic library by a limited number of doorways, further enhancing overall preservation of historic materials.

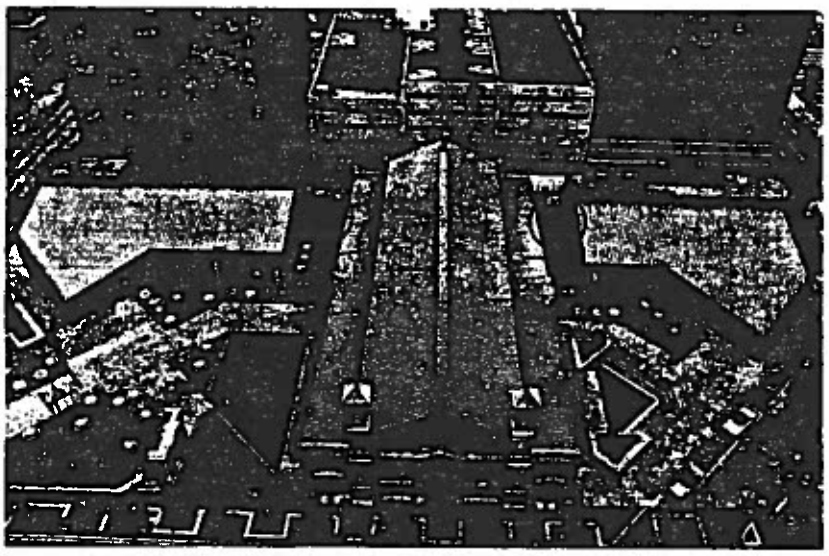


Photo: Alan Conant

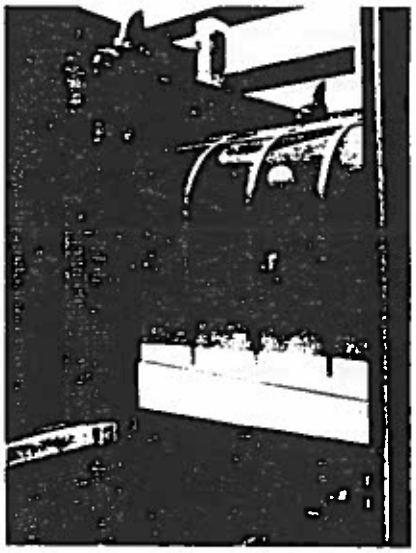


Photo: Jim Vaseff

Historic city market with flanking new retail additions. This approach preserves significant historic materials and features.

An aerial view shows the two-level connectors (circled) between Indianapolis' 1886 City Market and the new retail business wings. Historic openings on both levels at the rear of the building have been utilized for entrance and egress to the new additions, requiring minimal intrusion in the historic fabric of the side walls. A detail photograph shows how the glass and metal connectors parallel the form of the historic round-headed window openings. Finally, because the new additions are essentially detached from the original market building, the external form and the interior plan, with its significant cast-iron roofing system, have been retained and preserved

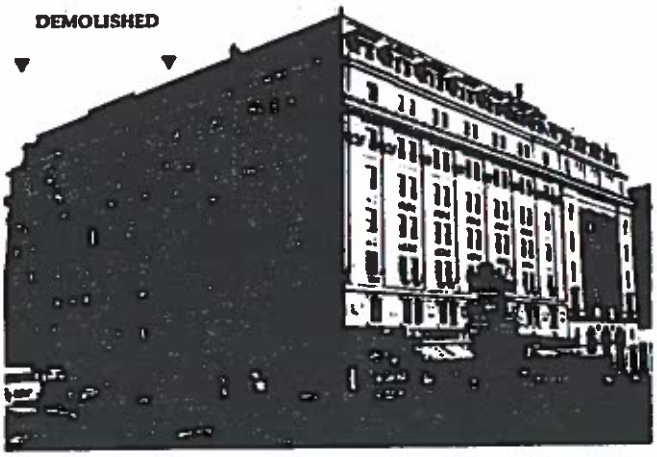


Photo: A. Pierce Bounds

Photo: Michael J. Auer

Historic theater and office building with new office addition. This approach results in the destruction of significant materials and features.

Materials and features comprise the life history of a building from its initial construction to its present configuration; their destruction thus represents an equivalent and unfortunate loss to history. Chase's Theater and Riggs Building were constructed in Washington, D.C. in 1911-1912 as one architectural unit. Originally 11 bays wide, it featured elaborate granite, terra-cotta and marble ornamentation (see "before" above). As part of a plan to increase office space in a prime downtown location, 6 side bays and the significant theater space of the historic structure were demolished to make way for a major new addition (see "after" below).

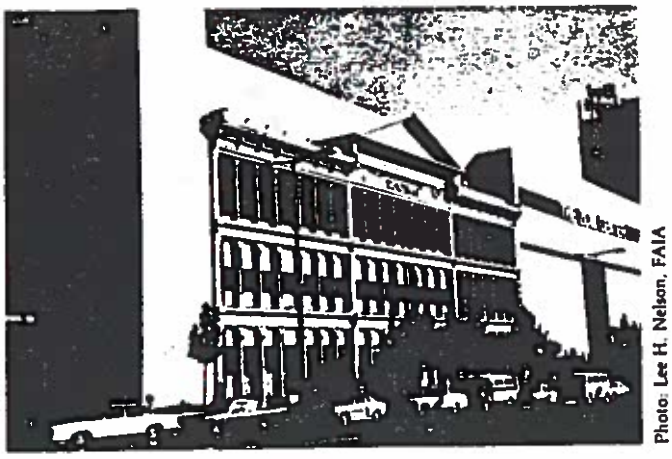


Photo: Lee H. Nelson, FAIA

Historic cast-iron storefront re-installed as facade on modern department store. This approach results in the destruction of significant materials and features.

Where there is need for a substantially larger building, the most destructive approach is to demolish everything but the facade of the historic building. In the example above, the 3-story-cast-iron front was originally the facade of a large, 19th century department store. In the 1970s, when the rest of the building was demolished, the metal facade was dismantled, then re-assembled on a new site where it has become the ornamental entrance to a modern department store.

2. Preserving the Historic Character

The second, equally important, consideration is whether or not the new addition will preserve the resource's historic character. The historic character of each building may differ, but a methodology of establishing it remains the same. Knowing the uses and functions a building has served over time will assist in making what is essentially a physical evaluation. But while written and pictorial documentation can provide a framework for establishing the building's history, *the historic character, to a large extent, is embodied in the physical aspects of the historic building itself—its shape, its materials, its features, its craftsmanship, its window arrangements, its colors, its setting, and its interiors.* It is only after the historic character has been correctly identified that reasonable decisions about the extent—or limitations—of change can be made.

To meet National Park Service preservation standards, a new addition must be "compatible with the size, scale, color, material, and character" of the building to which it is attached or its particular neighborhood or district. A new addition will always change the size or actual bulk of the historic building. But an addition that bears no relationship to the proportions and massing of the historic building—in other words, one that overpowers the historic form and changes the scale will usually compromise the historic character as well. The appropriate size for a new addition varies from building to building; it could never be stated in a tidy square or cubic footage ratio, but the historic building's existing proportions, site, and setting can help set some general parameters for enlargement. To some extent, there is a predictable relationship between the size of the historic resource and the degree of change a new addition will impose.

For example, in the case of relatively low buildings (small-scale residential or commercial structures) it is difficult, if not impossible, to minimize the impact of adding an entire new floor even if the new addition is set back from the plane of the facade. Alteration of the historic proportions and profile will likely change the building's character. On the other hand, a rooftop addition to an eight story building in a historic district of other tall buildings might not affect the historic character simply because the new work would not be visible from major streets. A number of methods have been used to help predict the effect of a proposed rooftop addition on the historic building and district, including pedestrian sight lines, three-dimensional schematics and computer-assisted design (CAD). Sometimes a rough full-size mock up of a section or bay of the proposed addition can be constructed using temporary material; the mock-up can then be photographed and evaluated from critical vantage points.

In the case of freestanding residential structures, the preservation considerations are generally twofold. First, a large addition built out on a highly visible elevation can radically alter the historic form or obscure features such as a decorative cornice or window ornamentation. Second, an addition that fills in a planned void on a highly visible elevation (such as a "U" shaped plan or feature such as a porch) may also alter the historic form and, as a result, change the historic character.

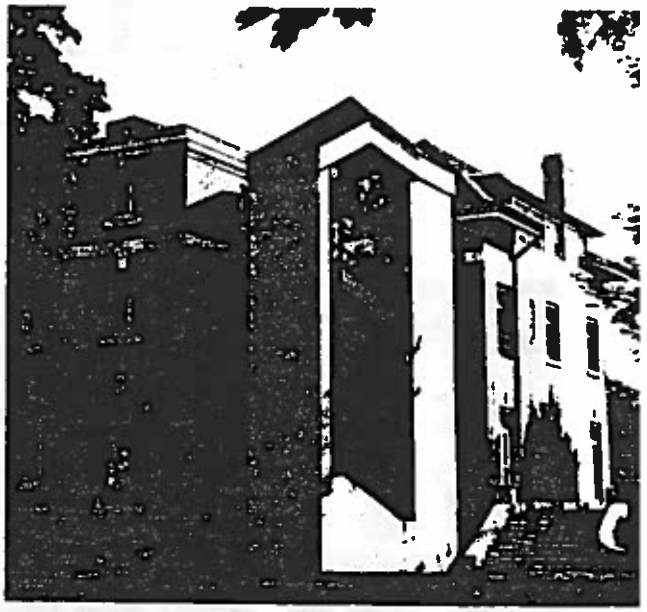
Some historic structures such as government buildings, metropolitan museums, or libraries may be so massive in size that a large-scale addition may not compromise the historic character. Yet similar expansion of smaller buildings would be dramatically out of scale. In summary, where any new addition is proposed, correctly assessing the *relationship* between actual size and relative scale will be a key to preserving the character of the historic building.

Constructing the new addition on a secondary side or rear elevation—in addition to material preservation—will also address preservation of the historic character. Primarily, such placement will help to preserve the building's historic form and relationship to its site and setting. Historic landscape features, including distinctive grade variations, need to be respected; and any new landscape features such as plants and trees kept at a scale and density that would not interfere with appreciation of the historic resource itself.

In highly developed urban areas, locating a new addition on a less visible side or rear elevation may be impossible simply because there is no available space. In this instance, there may be alternative ways to help preserve the historic character. If a new addition is being connected to the adjacent historic building on a primary elevation, the addition may be set back from the front wall plane so the outer edges defining the historic form are still apparent. In still other cases, some variation in material, detailing, and color may provide the degree of differentiation necessary to avoid changing the essential proportions and character of the historic building.

Historic townhouse with compatible new stairtower addition. This approach preserves the historic character.

Creating two separate means of egress from the upper floors m be a fire code requirement in certain types of rehabilitation pro ects. This may involve a second stair within the historic buildi or an exterior fire stair. To meet preservation concerns, an exterior fire stair should always be subordinate to the historic structure in size and scale, and preferably, placed on a seconda side or rear elevation. Finally, as in any other type of addition, the material and color should be compatible with the historic character of the building. Because this modest brick stairtower has been placed on a rear elevation as a subsidiary unit, the form, features and detailing of the historic building have been preserved.



Historic university building with incompatible new stairtower ac dition. This approach changes the historic character.

In contrast, this stairtower has been constructed on a highly visi ble side elevation and, together with its width and height, has obscured the historic form and roofline. The materials and colo of the addition further enhance its prominence.

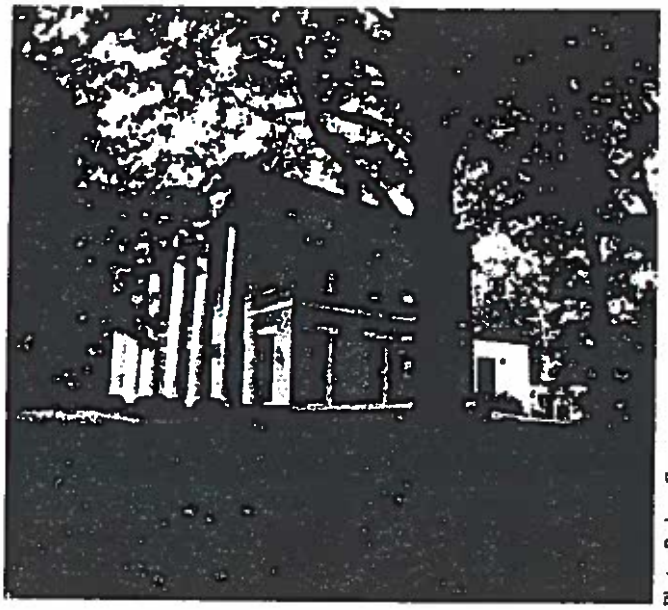
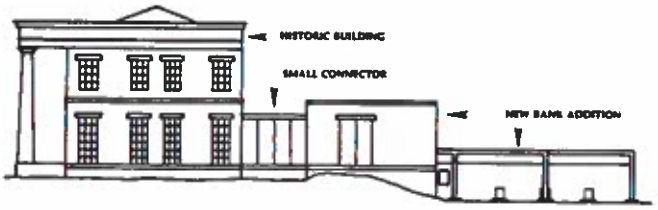


Photo: Rodney Gary

Photo: Rodney Gary

Historic residential structure with new drive-in bank addition. This approach preserves the historic character.

Built in 1847 and individually listed in the National Register in 1973, the Stephen Upson House in Athens, Georgia, is a two-story, five-bay structure featuring a distinctive columned portico. Of particular importance in its successful conversion from residential to commercial use in 1984 was the sensitive utilization of a sloping, tree-shaded historic site consisting of over 6 acres. A low-scale office and drive-in bank addition have been attached by a small glass connector at the rear of the historic building. A drawing, below, shows how the three-unit addition has been stepped down the hill, each unit set further back from the historic structure as it extends horizontally. As a result, the new addition is only partially visible from the historic "approach;" it can, however, be seen at full size from a new service road on the rear elevation (see photos, above).



Drawing: Christina Henry

Photo: Joseph Borysthen Tract.

Historic bank with compatible new bank addition. This approach preserves the historic character.

The overall size of an 1893 bank in Salem, Massachusetts, was nearly doubled in 1974 when a new addition was constructed on an adjacent lot, yet the addition is compatible with the historic character. A deep set-back and similarity in scale permit the historic form to be appreciated; the addition is also compatible in materials and color. Finally, the pattern of arched and rectangular openings of the historic building is suggested in the new work.

Photo: Harry Weese & Associates

Historic library with new addition for "uncommon" and rare books. This approach preserves the historic character.

Designed by architect Henry Ives Cobbs and completed in 1892, the Newberry Library in downtown Chicago extends the length of a city block and features a series of elongated, arch-headed windows. In 1981, when additional space was required with light and humidity control for storage of the rare book collection, a 10-story, windowless brick addition was linked to the historic block on side and rear elevations. Although constituting major expansion, the new wing still reads as a subsidiary unit to the substantially larger historic library complex. Its simple rectangular shape and lack of ornamentation stand in contrast with the highly articulated historic library complex; the rhythm of the historic windows is suggested in the windowless addition through a series of recessed square and arched bands. This is one example of a solution that is considered compatible with the historic character.

Photo: Baird M. Smith, AIA

Historic residential buildings with incompatible three-story rooftop addition. This approach changes the historic character.

The historic character of one building or an entire row of buildings may be radically altered by even one highly visible, inappropriately scaled rooftop addition. This is partly because the proportions or dimensions of a historic building play such a major role in determining its identity. Major expansion at the roofline alters the proportions and profile of the building—a change that is particularly noticeable when seen in outline against the sky. A modest clerestory addition (extending across townhouses to the right) is almost overlooked because the focal point of the row is a three-story, pyramidally-shaped glass and metal addition whose mass, size, and scale overpowers the block's residential character.

Photo: David Kroll

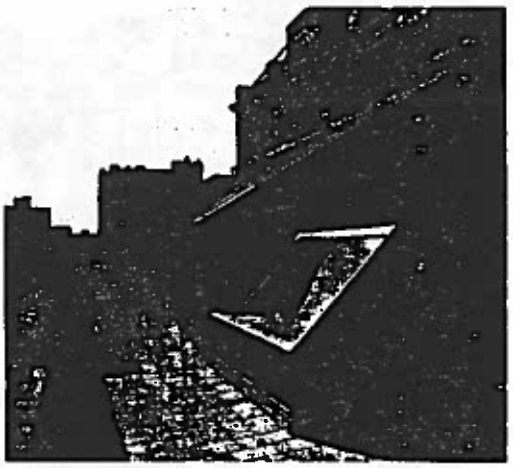


Photo: David Kroll

Historic commercial building with compatible new, one-story rooftop addition. This approach preserves the historic character.

This rooftop addition—sharing a similarity to the example above in its use of glass and metal and an angular shape—has been set back from both the front and side roof edges against a party wall, thus preserving the character of the historic building as well as the district. Although the addition appears to be very small from a street perspective, in actuality it is spacious enough to be used as a business conference room and employee lounge.

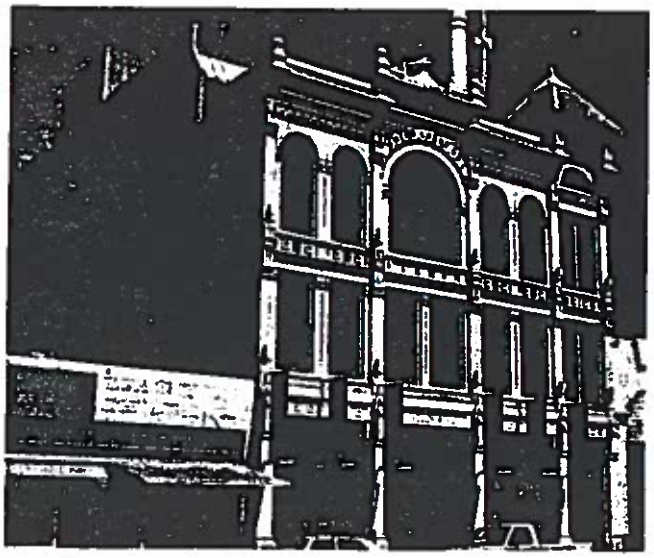


Photo: Noré V. Winter

Historic commercial building with compatible new 2-story rooftop addition. This approach preserves the historic character.

Small-scale residential or commercial buildings are extremely difficult to expand at the roofline. An additional story will usually result in a radical change to the historic building's proportions and profile, even when the addition is set back from the roof edge. In this particular case, however, the prominence of the resource's parapet and corner tower together with the deep setback made it possible to successfully add two new stories to a small-scale historic building.

Photo: Martha I. Werenfels

Private residence with incompatible new office addition. This approach changes the historic character.

Successfully introducing a new addition into a residential neighborhood depends in large measure on the degree of visibility from the streets and sidewalks. In a neighborhood where lots were historically small, but deep, and houses were constructed close together, adding a new room to a secondary elevation may often be undertaken without changing the historic character. The historic character of this late 19th/early 20th century wood-frame residential structure was compromised when a masonry wrap-around addition was constructed on highly visible elevations within the district. Historic features were also destroyed in making changes necessary for office use.

Photo: Michael J. Auer

Historic office building with incompatible new 4-story rooftop addition. This approach changes the historic character.

In this example, the historic character of a similarly-scaled commercial building has been radically changed by the addition of four stories that intentionally repeat the distinctive historic parapet feature at each level. The net effect is to have created a new four-story building atop a four-story historic building.

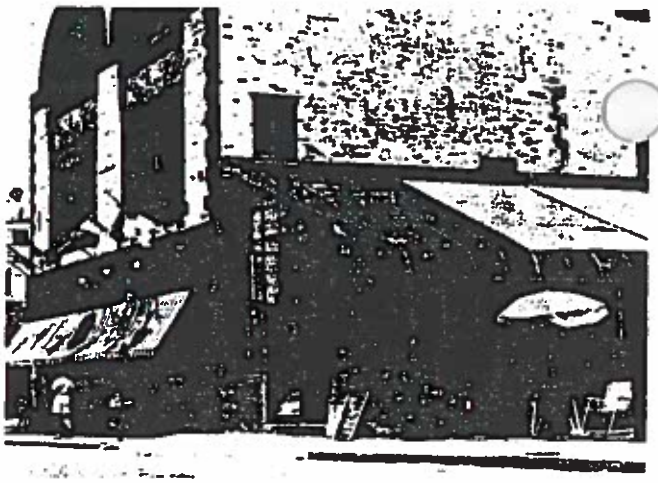


Photo: Martha I. Werenfels

Historic commercial structure with incompatible new greenhouse addition. This approach changes the historic character.

Glass—particularly in conjunction with inappropriate location, scale, and form—can be an exceedingly troublesome material. In theory, glass would seem to be the perfect material for a new addition because the historic building's materials and features can be "read" through the transparent material. But glass is never fully invisible during the day because of its reflective nature; at night, the bright light in a glass addition may become a somewhat disturbing aspect that competes with the historic building. This large greenhouse restaurant addition, constructed on a highly visible side elevation within the district, is also flush with the historic facade. Inappropriate scale and high visibility coupled with the amount of glass used in this particular addition have radically altered the character of a modest freestanding structure and its setting.

3. Protecting the Historical Significance—Making a Visual Distinction Between Old and New

The following statement of approach could be applied equally to the preservation of districts, sites, buildings, structures, and objects of National Register significance: "A conservator works within a conservation ethic so that the integrity of the object as an historic entity is maintained. The concern is not just with the original state of the object, but the way in which it has been changed and used over the centuries. Where a new intervention must be made to save the object, either to stabilize it or to consolidate it, it is generally accepted that those interventions must be *clear, obvious, and reversible*. It is this same attitude to change that is relevant to conservation policies and attitudes to historic towns . . . "[1]

Rather than establishing a clear and obvious difference between old and new, it might seem more in keeping with the historic character simply to repeat the historic form, material, features, and detailing in a new addition. But when the new work is indistinguishable from the old in appearance, then the "real" National Register property may no longer be perceived and appreciated by the public. Thus, the third consideration in planning a new addition is to be sure that it will protect those visual qualities that made the building eligible for listing in the National Register of Historic Places.

A question often asked is what if the historic character is *not* compromised by an addition that appears to have been built in the same period? A small porch or a wing that copied the historic materials and detailing placed on a *rear* elevation might not alter the public perception of the historic form and massing. Therefore, it is conceivable that a modest addition could be replicative without changing the resource's historic character; generally, however, this approach is not recommended because using the same wall plane, roof line, cornice height, materials, siding lap, and window type in an addition can easily make the new work appear to be part of the historic building. If this happens on a visible elevation, it becomes unclear as to which features are historic and which are new, thus confusing the authenticity of the historic resource itself.

The National Park Service policy on new additions, adopted in 1967, is an outgrowth and continuation of a general philosophical approach to change first expressed by John Ruskin in England in the 1850s, formalized by William Morris in the founding of the Society for the Protection of Ancient Buildings in 1877, expanded by the Society in 1924 and, finally, reiterated in the 1964 Venice Charter—a document that continues to be followed by 64 national committees of the International Council on Monuments and Sites (ICOMOS). The 1967 *Administrative Policies for Historical Areas of the National Park System* thus states, " . . . a modern addition should be readily distinguishable from the older work; however, the new work should be harmonious with the old in scale, proportion, materials, and color. Such additions should be as inconspicuous as possible from the public view." Similarly, the Secretary of the Interior's 1977 "Standards for Rehabilitation" call for the new work to be "compatible with the size, scale, color, material, and character of the property, neighborhood, or environment."

Photos: Noré V. Winter

Historic bank with new bank addition. This approach protects the historical significance of the resource by making a visual distinction between what is old and what is new.

Constructed in the early 1890s in Durango, Colorado, the split-faced ashlar bank structure is characterized by its flat roof, rounded form at the main entrance, a series of large arched window and door openings, and heavily textured surfaces. When additional office space was needed in 1978 to serve a commercially revitalized historic district, the new work was respectful of the historic structure through its proportional similarities, and alignment of openings and cornice. While echoing the historic bank's arched and rectangular shapes, the addition features a contrasting, smooth-faced brick that—together with the variation in window size, recessed detailing, and exaggerated verticality of the pilasters—places the new work in a clearly contemporary idiom and also permits the historic building to predominate.

[1] Roy Worskett, RIBA, MRTIP, "Improvemment of Urban Design in Europe and the United States: New Buildings in Old Settings," Background Report (prepared July, 1984) for Seminar at Strasbourg, France, October, 1984.

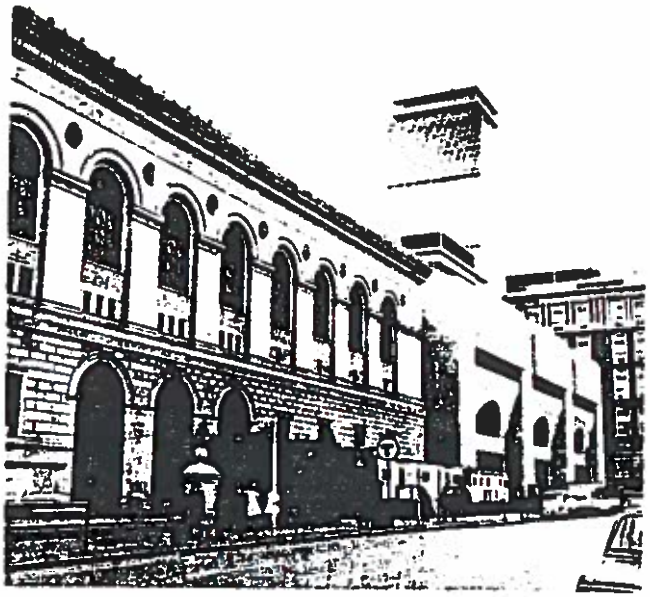
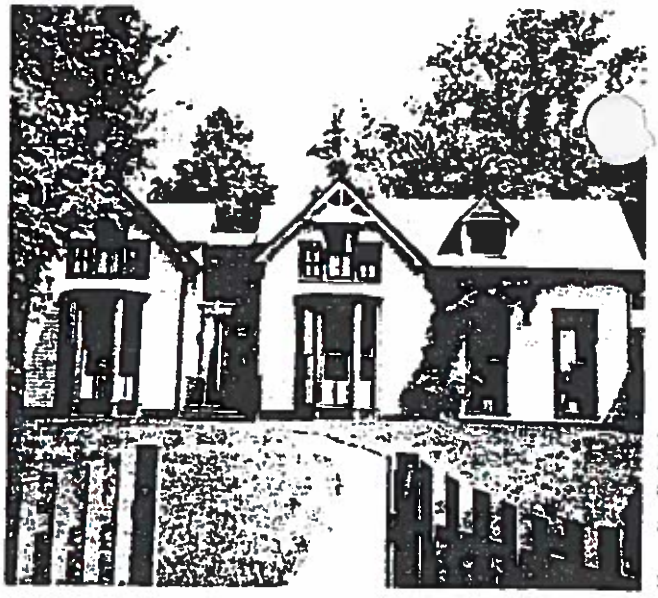


Photo: Carleton Knight, III

Historic library with new library wing. This approach protects the historical significance of the resource by making a visual distinction between what is old and what is new.

Charles Follen McKim's Boston Public Library, a 3 story, granite-faced, rectangular structure built between 1888-1895, was significantly expanded in 1973 by Phillip Johnson's new library addition on highly visible side and rear elevations. While the new addition is closely related to the historic block in its basic proportions, Johnson's bold use of material and detailing—juxtaposed to McKim's delicately patterned facade—provide clear differentiation between old and new and result in an addition that is unequivocally a product of its own time.



Private residence with new addition. This approach does not protect the historical significance of the resource because it fails to make a visual distinction between what is old and what is new.

The most distinctive portion of this c. 1900 wood-frame residence—the decorative gable and three-part window—was repeated in a new addition to the left. As a result of copying the form, features and detailing of the new addition on the front elevation, the historic building and the new addition are virtually indistinguishable.

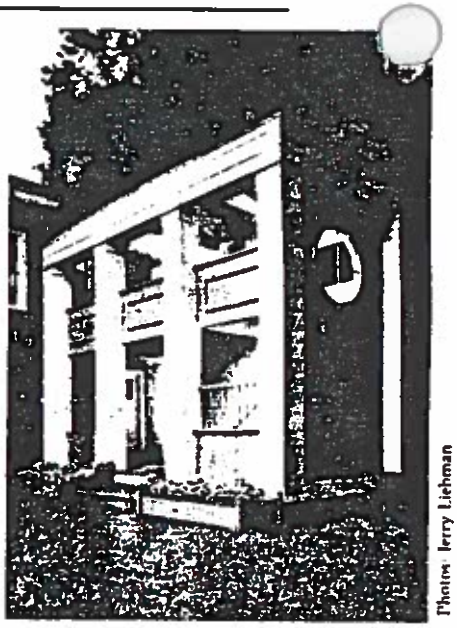


Photo: Jerry Liebman

Historic post office with new commercial entrance addition. This approach protects the historical significance of the resource by making a visual distinction between what is old and what is new.

An 1810 granite and wood structure in Chester, Connecticut has been used over its long history as a post office, a school, and most recently, for two businesses—one downstairs and one upstairs. In 1985, as part of the conversion of the second floor into a graphic arts studio, an extensively deteriorated straight-run wooden stair was replaced by this small new entrance and stairtower addition. Because of the addition's deep set-back and restrained size, the form, features, and detailing of the historic structure continue to dominate both site and streetscape; moreover, the new work has a separate identity and could not be mistaken as part of the historic building.

Drawing: National Register files

Historic city hall with new rooftop office addition. This approach does not protect the historical significance of the resource because it fails to make a visual distinction between what is old and what is new.

The drawing shows a proposed penthouse addition to a former municipal building. Originally a flat-roofed structure with a modestly detailed cornice, the proposed new addition has changed the proportions and profile, creating a verticality and degree of ornamentation that never existed historically. These changes have effectively *re-defined* the historic character. With its highly replicative ornamentation, the addition has become an integral component of the historic design. The result is that a passerby would probably not be able to tell that the rooftop addition is new and not part of the original construction.

NEW EXTERIOR ADDITIONS TO HISTORIC BUILDINGS

Preserve Significant Historic Materials and Features

Avoid constructing an addition on a primary or other character-defining elevation to ensure preservation of significant materials and features.

Minimize loss of historic material comprising external walls and internal partitions and floor plans.

Preserve the Historic Character

Make the size, scale, massing, and proportions of the new addition compatible with the historic building to ensure that the historic form is not expanded or changed to an unacceptable degree.

Place the new addition on an inconspicuous side or rear elevation so that the new work does not result in a radical change to the form and character of the historic building.

Consider setting an infill addition or connector back from the historic building's wall plane so that the form of the historic building—or buildings—can be distinguished from the new work.

Set an additional story well back from the roof edge to ensure that the historic building's proportions and profile are not radically changed.

Protect the Historical Significance—Make a Visual Distinction Between Old and New

Plan the new addition in a manner that provides some differentiation in material, color, and detailing so that the new work does not appear to be part of the historic building. The character of the historic resource should be identifiable after the addition is constructed.

Conclusion

A major goal of our technical assistance program is a heightened awareness of significant materials and the historic character *prior* to construction of a new exterior addition so that essential change may be effected within a responsible preservation context. In summary, then, these are the three important preservation questions to ask when planning a new exterior addition to a historic resource:

1. **Does the proposed addition preserve significant historic materials and features?**
2. **Does the proposed addition preserve the historic character?**
3. **Does the proposed addition protect the historical significance by making a visual distinction between old and new?**

If the answer is YES to all three questions, then the new addition will protect significant historic materials and the historic character and, in doing so, will have satisfactorily addressed those concerns generally held to be fundamental to historic preservation.

Additional Reading

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Brolin, Brent C. *Architecture in Context: Fitting New Buildings with Old*. New York: Van Nostrand Reinhold, 1980.

Good Neighbors: Building Next to History. State Historical Society of Colorado, 1980.

International Council on Monuments and Sites (ICOMOS). *International Charter for the Conservation and Restoration of Monuments and Sites, (Venice Charter)*, 1966.

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Rehab Right: How to Rehabilitate Your Oakland House Without Sacrificing Architectural Assets. City of Oakland Planning Department, Oakland, California, 1978.

Ruskin, John. *The Seven Lamps of Architecture*. London: George Allen and Unwin, Ltd., 1925.

Schmertz, Mildred F., and Architectural Record Editors. *New Life for Old Buildings*. New York, Architectural Record Books, McGraw-Hill, 1980.

The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings. Washington, D.C.: Preservation Assistance Division, National Park Service U.S. Department of the Interior, rev. 1983.

The following historic buildings with new additions are listed in the order in which they appeared in sections 1., 2., and 3. Those approaches to constructing new additions that met all three preservation concerns addressed in Preservation Briefs 14 are in boldface; the date of the new addition is given together with the name of the project architect(s):

1. Preserves Significant Historic Materials and Features

Walsh-McLean House (Indonesian Embassy), Washington, D.C. New addition, 1981, The Architects Collaborative (TAC).

Merchant's National Bank, Winona, Minnesota. New addition, 1969-1970, Dykins and Handford.

City Market, Indianapolis, Indiana. New addition, 1977, James Associates.

Folger Shakespeare Library, Washington, D.C. New addition, 1983, Hartman-Cox.

Chase's Theater and Riggs Building, Washington, D.C.

Historic cast-iron facade on new department store (ZCMI Building), Salt Lake City, Utah.

2. Preserves the Historic Character

Montgomery Street residence, Federal Hill, Baltimore, Maryland. New addition, 1983, James R. Grieves Associates, Inc.

Brown University stairtower addition, Providence, Rhode Island.

Stephen Upson House, Athens, Georgia. New addition, 1978-1979, The Group Five Architects and Designers.

Salem 5¢ Savings Bank, Salem, Massachusetts. New addition, 1974, Padjen Architects.

Historic residential buildings with rooftop addition, Boston, Massachusetts.

Nutz & Grosskopf Building, Indianapolis, Indiana. New addition, 1984, Robert V. Donelson, AIA.

Newberry Library, Chicago, Illinois. New addition, 1981, Harry Weese & Associates.

Historic commercial building with new rooftop addition, Denver, Colorado.

Historic commercial building, with rooftop addition, Washington, D.C.

Private residence with medical office addition, Providence, Rhode Island.

Historic commercial building with new greenhouse addition, Newport, Rhode Island.

3. Protects the Historical Significance by Making a Visual Distinction Between Old and New

Burns National Bank, Durango, Colorado. New addition, 1978, John Pomeroy, Architect.

Boston Public Library, Boston, Massachusetts. New addition, 1973, Johnson/Burgee Architects.

Historic post office with new entrance/stairtower addition, Chester, Connecticut. New addition, 1985, Thomas A. Norton, AIA.

Private residence, Chevy Chase, Maryland.

Historic city hall with proposed new rooftop addition, New Orleans, Louisiana.

First, special thanks go to Ernest A. Connally, Gary L. Hume, and W. Brown Morton, III for their efforts in establishing and refining our preservation and rehabilitation standards over the past 20 years. (The "Secretary of the Interior's Standards for Historic Preservation Projects" constitute the policy framework of this, and every technical publication developed in the Preservation Assistance Division.) H. Ward Jandl, Chief, Technical Preservation Services Branch, is credited with overall supervision of the project. Next, appreciation is extended to the Branch professional staff, the NPS cultural programs regional offices, the Park Historic Architecture Division, and the National Conference of State Historic Preservation Officers for their thoughtful comments. Finally, the following specialists in the field are thanked for their time in reviewing and commenting on the manuscript: Bruce Judd, AIA, Noré V. Winter, John Cullinane, AIA, Ellen Beasley, Vicki Jo Sandstead, Judith Kitchen, Andrea Nadel, Martha L. Werenfels, Diane Pierce, Colden Florance, FAIA, and H. Grant Dehart, AIA. The photograph of Chicago's Newberry Library with the Harry Weese & Associates' 1981 addition was graciously lent to us by David F. Dibner, FAIA, and Amy Dibner-Dunlap, co-authors of *Buildings Additions Design*, McGraw-Hill, 1985. The front page "logo" by Noré Winter is a detail of historic Burns National Bank, Durango, Colorado, with John Pomeroy's 1978 addition.

This publication has been prepared pursuant to the National Historic Preservation Act of 1966, as amended. Preservation Briefs 14 was developed under the editorship of Lee H. Nelson, FAIA, Chief, Preservation Assistance Division, National Park Service, U.S. Department of the Interior, P.O. Box 37127, Washington, D.C. 20013-7217. Comments on the usefulness of this information are welcomed and can be sent to Mr. Nelson at the above address. This publication is not copyrighted and can be reproduced without penalty. Normal procedures for credit to the author and the National Park Service are appreciated.

ISSN:0885-70

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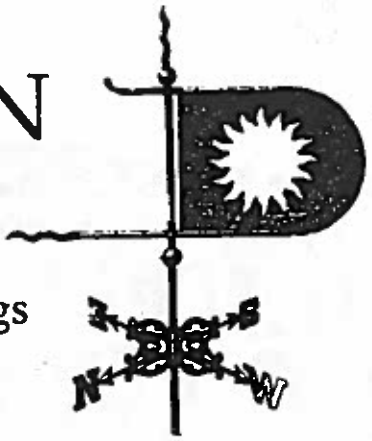
3 PRESERVATION BRIEFS



Conserving Energy in Historic Buildings

Baird M. Smith, AIA

U.S. Department of the Interior National Park Service
Preservation Assistance Division Technical Preservation Services

With the dwindling supply of energy resources and new efficiency demands placed on the existing building stock, many owners of historic buildings and their architects are assessing the ability of these buildings to conserve energy with an eye to improving thermal performance. This brief has been developed to assist those persons attempting energy conservation measures and weatherization improvements such as adding insulation and storm windows or caulking of exterior building joints. In historic buildings, many measures can result in the inappropriate alteration of important architectural features, or, perhaps even worse, cause serious damage to the historic building materials through unwanted chemical reactions or moisture-caused deterioration. This brief recommends measures that will achieve the greatest energy savings with the least alteration to the historic buildings, while using materials that do not cause damage and that represent sound economic investments.

Inherent Energy Saving Characteristics of Historic Buildings

Many historic buildings have energy-saving physical features and devices that contribute to good thermal performance. Studies by the Energy Research and Development Administration (see bibliography) show that the buildings with the poorest energy efficiency are actually those built between 1940 and 1975. Older buildings were found to use less energy for heating and cooling and hence probably require fewer weatherization improvements. They use less energy because they were built with a well-developed sense of physical comfort and because they maximized the natural sources of heating, lighting and ventilation. The historic building owner should understand these inherent energy-saving qualities.

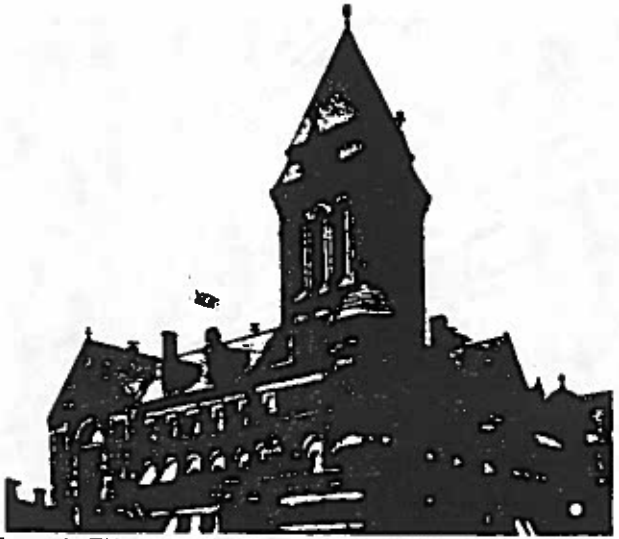


Figure 1. This 1891 Courthouse and Post Office in Rochester, New York, has built-in energy conserving features such as, heavy masonry walls, operable windows, an interior skylighted atrium which provides light and ventilation, and roof-top ventilators which keep the building cooler in the summer. Also note the presence of awnings in this old photograph.

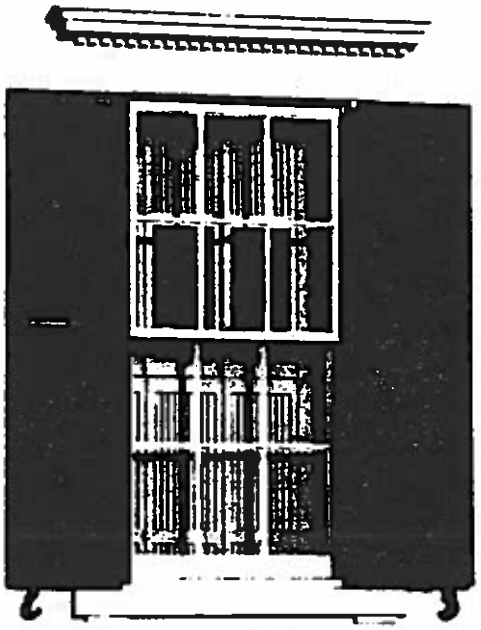


Figure 2. Shutters can be used to minimize the problem of summer heat gain by shading the windows. If operable shutters are in place, their use will help reduce the summer cooling load. (Photo: Baird Smith)

The most obvious (and almost universal) inherent energy saving characteristic was the use of *operable windows* to provide natural ventilation and light. In addition, historic commercial and public buildings often include interior light/ventilation courts, roof-top ventilators, clerestories or skylights (see figure 1). These features provide energy efficient fresh air and light, assuring that energy consuming mechanical devices may be needed only to supplement the natural energy sources. Any time the mechanical heating and air conditioning equipment can be turned off and the windows opened, energy will be saved.

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Figure 3. Southern mansions typify climate conscious design. The wide roof overhangs, exterior porches, shade trees, heavy masonry walls (painted white), and living quarters on the second floor (to catch evening breezes and escape the radiant heat from the earth's surface) all are energy saving characteristics which provide reasonably comfortable living spaces without mechanical air conditioning. (Photo: Marcia Axtmann Smith)

Early builders and architects dealt with the poor thermal properties of windows in two ways. First, the number of windows in a building was kept to only those necessary to provide adequate light and ventilation. This differs from the approach in many modern buildings where the percentage of windows in a wall can be nearly 100%. Historic buildings, where the ratio of glass to wall is often less than 20%, are better energy conservers than most new buildings. Secondly, to minimize the heat gain or loss from windows, historic buildings often include interior or exterior shutters, interior venetian blinds, curtains and drapes, or exterior awnings (see figure 2). Thus, a historic window could remain an energy efficient component of a building.

There are other physical characteristics that enable historic buildings to be energy efficient. For instance, in the warmer climates of the United States, buildings were often built to minimize the heat gain from the summer sun. This was accomplished by introducing exterior balconies, porches, wide roof overhangs, awnings and shade trees. In addition, many of these buildings were designed with the living spaces on the second floor to catch breezes and to escape the radiant heat from the earth's surface. Also, exterior walls were often painted light colors to reflect the hot summer sun, resulting in cooler interior living spaces (see figure 3).

Winter heat loss from buildings in the northern climates was reduced by using heavy masonry walls, minimizing the number and size of windows, and often using dark paint colors for the exterior walls. The heavy masonry walls used so typically in the late 19th century and early 20th century, exhibit characteristics that improve their thermal performance beyond that formerly recognized (see figure 4). It has been determined that walls of large mass and weight (thick brick or stone) have the advantage of *high thermal inertia*, also known as the "M factor." This inertia modifies the thermal resistance (R factor)* of the wall by lengthening the time scale of heat transmission. For instance, a wall with high thermal inertia, subjected to solar radiation for an hour, will absorb the heat at its outside surface, but transfer it to the interior over a period as long as 6 hours. Conversely, a wall having the same R factor, but low thermal inertia, will transfer the heat in perhaps 2 hours. High thermal inertia is the reason many older public and commercial buildings, without modern air conditioning, still feel cool on the inside throughout the summer. The heat from the midday sun does not penetrate the buildings until late afternoon and evening, when it is unoccupied.

*R factor is the measure of the ability of insulation to decrease heat flow. The higher the factor, the better the thermal performance of the material.

Although these characteristics may not typify all historic buildings, the point is that historic buildings often have thermal properties that need little improvement. One must understand the inherent energy-saving qualities of a building, and assure, by re-opening the windows for instance, that the building functions as it was intended.

To reduce heating and cooling expenditures there are two broad courses of action that may be taken. First, begin passive measures to assure that a building and its existing components function as efficiently as possible without the necessity of making alterations or adding new materials. The second course of action is preservation retrofitting, which includes altering the building by making appropriate weatherization measures to improve thermal performance. Undertaking the passive measures and the preservation retrofitting recommended here could result in a 50% decrease in energy expenditures in historic buildings.

Passive Measures

The first passive measures to utilize are operational controls; that is, controlling *how* and *when* a building is used. These controls incorporate programmatic planning and scheduling efforts by the owner to minimize usage of energy-consuming equipment. A building owner should survey and quantify all aspects of energy usage, by evaluating the monies expended for electricity, gas, and fuel oil for a year, and by surveying how and when each room is used. This will identify ways of conserving energy by initiating operational controls such as:

- lowering the thermostat in the winter, raising it in the summer
- controlling the temperature in those rooms actually used
- reducing the level of illumination and number of lights (maximize natural light)
- using operable windows, shutters, awnings and vents as originally intended to control interior environment (maximize fresh air)
- having mechanical equipment serviced regularly to ensure maximum efficiency
- cleaning radiators and forced air registers to ensure proper operation

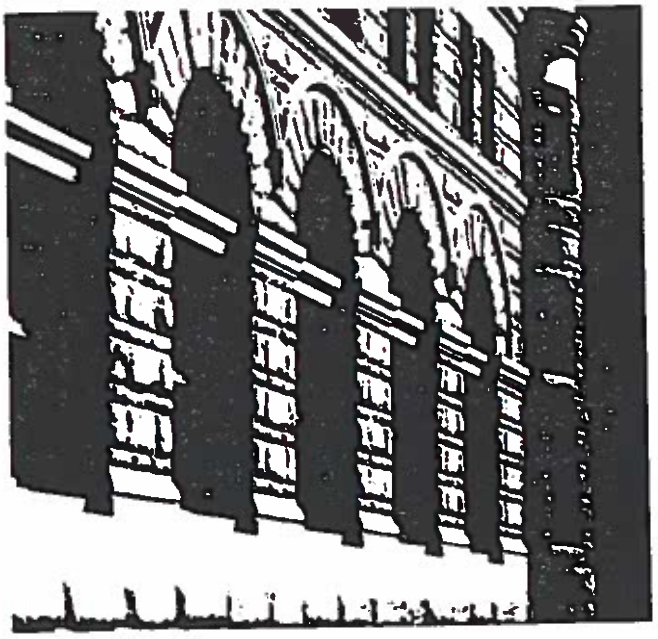
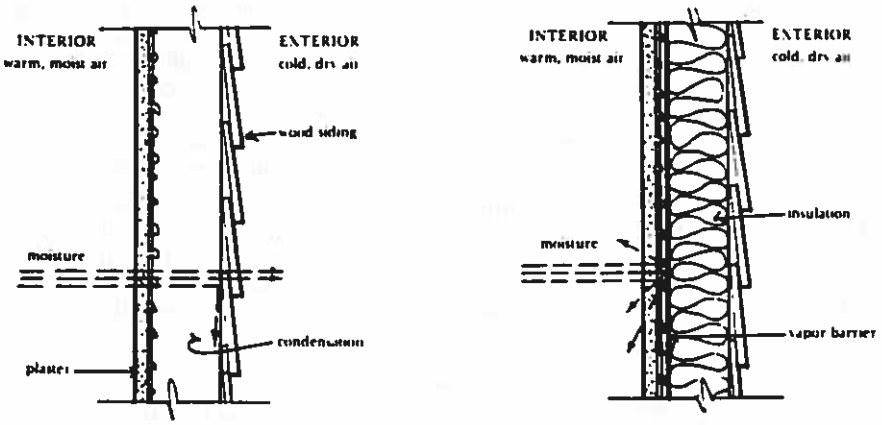


Figure 4. Heavy masonry walls in office buildings dramatically reduce the need for summer cooling because the thermal inertia (M factor) of the massive wall increases its thermal resistance (R factor), thus delaying the heat transfer into the building until late afternoon when the office workers have gone home. (Photo: Baird Smith)

Figure 5. Moisture migration through walls and roofing occurs as a matter of course in northern winter climates. Problems occur if there is no vapor barrier because the moisture may saturate the insulation and greatly reduce its thermal performance, as well as creating the potential for deterioration of the adjacent materials.

a. Typical wood frame wall where moist inside air freely migrates to the outside. Moisture may condense in the wall cavity and be absorbed into the adjacent materials and evaporate as the wall is heated by the sun.

b. Typical wall condition with insulation and a vapor barrier facing in (toward the heated side of the wall). The vapor barrier prevents moisture migration, thus keeping the insulation dry.



The passive measures outlined above can save as much as 30% of the energy used in a building. They should be the first undertakings to save energy in any existing building and are particularly appropriate for historic buildings because they do not necessitate building alterations or the introduction of new materials that may cause damage. Passive measures make energy sense, common sense, and preservation sense!

Preservation Retrofitting

In addition to passive measures, building owners may undertake certain retrofitting measures that will not jeopardize the historic character of the building and can be accomplished at a reasonable cost. Preservation retrofitting improves the thermal performance of the building, resulting in another 20%–30% reduction in energy.

When considering retrofitting measures, historic building owners should keep in mind that there are no permanent solutions. One can only meet the standards being applied today with today's materials and techniques. In the future, it is likely that the standards and the technologies will change and a whole new retrofitting plan may be necessary. Thus, owners of historic buildings should limit retrofitting measures to those that achieve reasonable energy savings, at reasonable costs, with the least intrusion or impact on the character of the building. Overzealous retrofitting, which introduces the risk of damage to historic building materials, should not be undertaken.

The preservation retrofitting measures presented here, were developed to address the three most common problems in historic structures caused by some retrofitting actions. The first problem concerns retrofitting actions that necessitated inappropriate building alterations, such as the wholesale removal of historic windows, or the addition of insulating

The Secretary of the Interior's Standards for Historic Preservation Projects

The Standards for Historic Preservation were developed for the Historic Preservation Fund Grants-in-Aid Program and authorized by the National Historic Preservation Act of 1966. The standards are also used for determining whether a rehabilitation project qualifies as a "certified rehabilitation" pursuant to Section 2124 of the Tax Reform Act of 1976. There are eight "General Standards" (listed below), and additional specific standards and guidelines for the various categories of historic preservation projects.

General Standards

(Those shown in bold print are most applicable to preservation retrofitting.)

1. **Every reasonable effort shall be made to provide a compatible use for a property that requires minimal alteration of the building structure, or site and its environment, or to use a property for its originally intended purpose.**
2. **The distinguishing original qualities or character of a building, structure, or site and its environment shall not be destroyed. The removal or alteration of any historic material or distinctive architectural features should be avoided when possible.**
3. **All buildings, structures, and sites shall be recognized as products of their own time. Alterations, which have no historical basis and which seek to create an earlier appearance, shall be discouraged.**
4. Changes, which may have taken place in the course of time, are evidence of the history and development of a building, structure, or site and its environment. These changes may have acquired significance in their own right, and this significance shall be recognized and respected.
5. **Distinctive stylistic features or examples of skilled craftsmanship, which characterize a building, structure, or site, shall be treated with sensitivity.**
6. **Deteriorated architectural features shall be repaired rather than replaced, wherever possible. In the event replacement is necessary, the new material should match the material being replaced in composition, design, color, texture, and other visual qualities. Repair or replacement of missing architectural features should be based on accurate duplications of features, substantiated by historical, physical, or pictorial evidence rather than on conjectural designs or the availability of different architectural elements from other buildings or structures.**
7. The surface cleaning of structures shall be undertaken with the gentlest means possible. Sandblasting and other cleaning methods that will damage the historic building materials shall not be undertaken.
8. Every reasonable effort shall be made to protect and preserve archeological resources affected by, or adjacent to any acquisition, protection, stabilization, preservation, rehabilitation, restoration, or reconstruction project.

aluminum siding, or installing dropped ceilings in significant interior spaces. To avoid such alterations, refer to the Secretary of the Interior's "Standards for Historic Preservation Projects" which provide the philosophical and practical basis for all preservation retrofitting measures.

The second problem area is to assure that retrofitting measures do not create moisture-related deterioration problems. One must recognize that large quantities of moisture are present on the interior of buildings.

In northern climates, the moisture may be a problem during the winter when it condenses on cold surfaces such as windows. As the moisture passes through the walls and roof it may condense within these materials, creating the potential for deterioration. The problem is avoided if a vapor barrier is added *facing in* (see figure 5).

In southern climates, insulation and vapor barriers are handled quite differently because moisture problems occur in the summer when the moist outside air is migrating to the interior of the building. In these cases, the insulation is installed with the vapor barrier *facing out* (opposite the treatment of northern climates). Expert advice should be sought to avoid moisture-related problems to insulation and building materials in southern climates.

The third problem area involves the avoidance of those materials that are chemically or physically incompatible with existing materials, or that are improperly installed. A serious problem exists with certain cellulose insulations that use ammonium or aluminum sulfate as a fire retardant, rather than boric acid which causes no problems. The sulfates react with moisture in the air forming sulfuric acid which can cause damage to most metals (including plumbing and wiring), building stones, brick and wood. In one instance, a metal building insulated with cellulose of this type collapsed when the sulfuric acid weakened the structural connections! To avoid problems such as these, refer to the recommendations provided here, and consult with local officials, such as a building inspector, the better business bureau, or a consumer protection agency.

Before a building owner or architect can plan retrofitting measures, some of the existing physical conditions of the building should be investigated. The basic building components (attic, roof, walls and basement) should be checked to determine the methods of construction used and the presence of insulation. Check the insulation for full coverage and whether there is a vapor barrier. This inspection will aid in determining the need for additional insulation, what type of insulation to use (batt, blown-in, or poured), and where to install it. In addition, sources of air infiltration should be checked at doors, windows, or where floor and ceiling systems meet the walls. Lastly, it is important to check the condition of the exterior wall materials, such as painted wooden siding or brick, and the condition of the roof, to determine the weather tightness of the building. A building owner must assure that rain and snow are kept out of the building before expending money for weatherization improvements.

Retrofitting Measures

The following listing includes the most common retrofitting measures; some measures are highly recommended for a preservation retrofitting plan, but, as will be explained, others are less beneficial or even harmful to the historic building:

- Air Infiltration
- Attic Insulation
- Storm Windows
- Basement and Crawl Space Insulation
- Duct and Pipe Insulation
- Awnings and Shading Devices
- Doors and Storm Doors
- Vestibules
- Replacement Windows
- Wall Insulation—Wood Frame
- Wall Insulation—Masonry Cavity Walls
- Wall Insulation—Installed on the Inside
- Wall Insulation—Installed on the Outside
- Waterproof Coatings for Masonry

The recommended measures to preservation retrofitting begin with those at the top of the list. The first ones are the simplest, least expensive, and offer the highest potential for saving energy. The remaining measures are not recommended for general use either because of potential technical and preservation problems, or because of the costs outweighing the anticipated energy savings. Specific solutions must be determined based on the facts and circumstances of the particular problem; therefore, advice from professionals experienced in historic preservation, such as, architects, engineers and mechanical contractors should be solicited.

Air Infiltration: Substantial heat loss occurs because cold outside air infiltrates the building through loose windows, doors, and cracks in the outside shell of the building. Adding weatherstripping to doors and windows, and caulking of open cracks and joints will substantially reduce this infiltration. Care should be taken not to reduce infiltration to the point where the building is completely sealed and moisture migration is prevented. Without some infiltration, condensation problems could occur throughout the building. Avoid caulking and weatherstripping materials that, when applied, introduce inappropriate colors or otherwise visually impair the architectural character of the building. Reducing air infiltration should be the first priority of a preservation retrofitting plan. The cost is low, little skill is required, and the benefits are substantial.

Attic Insulation: Heat rising through the attic and roof is a major source of heat loss, and reducing this heat loss should be one of the highest priorities in preservation retrofitting. Adding insulation in accessible attic spaces is very effective in saving energy and is generally accomplished at a reasonable cost, requiring little skill to install. The most common attic insulations include blankets of fiberglass and mineral wool, blown-in cellulose (treated with boric acid only), blowing wool, vermiculite, and blown fiberglass. If the attic is unheated (not used for habitation), then the insulation is placed between the floor joists with the vapor barrier facing down. If flooring is present, or if the attic is heated, the insulation is generally placed between the roof rafters with the vapor barrier facing in. All should be installed according to the manufacturer's recommendations. A weatherization manual entitled, "In the Bank . . . or Up the Chimney" (see the bibliography) provides detailed descriptions about a variety of installation methods used for attic insulation. The manual also recommends the amount of attic insulation used in various parts of the country. If the attic has some insulation, add more (but *without* a vapor barrier) to reach the total depth recommended.

Problems occur if the attic space is not properly ventilated. This lack of ventilation will cause the insulation to become saturated and lose its thermal effectiveness. The attic is adequately ventilated when the net area of ventilation (free area of a louver or vent) equals approximately 1 300 of the attic floor area. With adequate attic ventilation, the addition of attic insulation should be one of the highest priorities of a preservation retrofitting plan.

If the attic floor is inaccessible, or if it is impossible to add insulation along the roof rafters, consider attaching insulation to the ceilings of the rooms immediately below the attic. Some insulations are manufactured specifically for these cases and include a durable surface which becomes the new ceiling. This option should not be considered if it causes irreparable damage to historic or architectural spaces or features; however, in other cases, it could be a recommended measure of a preservation retrofitting plan.

Storm Windows: Windows are a primary source of heat loss because they are both a poor thermal barrier (R factor of only 0.89) and often a source of air infiltration. Adding storm windows greatly improves these poor characteristics. If a building has existing storm windows (either wood or metal framed), they should be retained. Assure they are tight fitting and in good working condition. If they are not in place, it is a recommended measure of a preservation retrofitting plan to add new metal framed windows on the exterior. This will result in a window assembly (historic window plus storm window) with an R factor of 1.79 which outperforms a double paned window assembly (with an air space up to ½") that only has an R factor of 1.72. When installing the storm windows, be careful not to damage the historic window frame. If the metal frames visually impair the appearance of the building, it may be necessary to paint them to match the color of the historic frame (see figure 6).

Triple-track metal storm windows are recommended because they are readily available, in numerous sizes, and at a reasonable cost. If a pre-assembled storm window is not available for a particular window size, and a custom-made storm window is required, the cost can be very high. In this case, compare the cost of manufacture and installation with the expected cost savings resulting from the increased thermal efficiency. Generally, custom-made storm windows, of either wood or metal frames, are not cost effective, and would not be recommended in a preservation retrofitting plan.

Interior storm window installations can be as thermally effective as exterior storm windows; however, there is high potential for damage to the historic window and sill from condensation. With storm windows on the interior, the outer sash (in this case the historic sash) will be cold in the winter, and hence moisture may condense there. This condensation often collects on the flat surface of the sash or window sill causing paint to blister and the wood to begin to deteriorate.

Rigid plastic sheets are used as interior storm windows by attaching them directly to the historic sash. They are not quire as effective as the storm windows described previously because of the possibility of air infiltration around the historic sash. If the rigid plastic sheets are used, assure that they are installed with minimum damage to the historic sash, removed periodically to allow the historic sash to dry, and that the historic frame and sash are completely caulked and weatherstripped.

In most cases, interior storm windows of either metal frames or of plastic sheets are not recommended for preservation retrofitting because of the potential for damage to the historic window. If interior storm windows are in place, the potential for moisture deterioration can be lessened by opening (or removing, depending on the type) the storm windows during the mild months allowing the historic window to dry thoroughly.

Basement and Crawl Space Insulation: Substantial heat is lost through cold basements and crawl spaces. Adding insulation in these locations is an effective preservation retrofitting measure and should be a high priority action. It is complicated, however, because of the excessive moisture that is often present. One must be aware of this and assure that insulation is properly installed for the specific location. For instance, in crawl spaces and certain unheated basements, the insulation is generally placed between the first floor joists (the ceiling of the basement) with the vapor barrier facing up. Do not staple the insulation in place, because the staples often rust away. Use special anchors developed for insulation in moist areas such as these.

In heated basements, or where the basement contains the heating plant (furnace), or where there are exposed water and sewer pipes, insulation should be installed against foundation walls. Begin the insulation within the first floor joists, and proceed down the wall to a point at least 3 feet below the exterior ground level if possible, with the vapor barrier facing in. Use either batt or rigid insulation.

Figure 6. The addition of triple track storm windows, as shown here, greatly improves the thermal performance of existing window assemblies, with a minimal impact on the appearance of the building. (Photo: Baird Smith)

Installing insulation in the basement or crawl space should be a high priority of a preservation retrofitting plan, as long as adequate provision is made to ventilate the unheated space, perhaps even by installing an exhaust fan.

Duct and Pipe Insulation: Wrapping insulation around heating and cooling ducts and hot water pipes, is a recommended preservation retrofitting measure. Use insulation which is intended for this use and install it according to manufacturer's recommendations. Note that air conditioning ducts will be cold in the summer, and hence moisture will condense there. Use insulation with the vapor barrier facing out, away from the duct. These measures are inexpensive and have little potential for damage to the historic building.

Awnings and Shading Devices: In the past, awnings and trees were used extensively to provide shade to keep buildings cooler in the summer. If awnings or trees are in place, keep them in good condition, and take advantage of their energy-saving contribution. Building owners may consider adding awnings or trees if the summer cooling load is substantial. If awnings are added, assure that they are installed without damaging the building or visually impairing its architectural character (see figure 7). If trees are added, select deciduous trees that provide shade in the summer but, after dropping their leaves, would allow the sun to warm the building in the winter. When planting trees, assure that they are no closer than 10 feet to the building to avoid damage to the foundations. Adding either awnings or shade trees may be expensive, but in hot climates, the benefits can justify the costs.

Doors and Storm Doors: Most historic wooden doors, if they are solid wood or paneled, have fairly good thermal properties and should not be replaced, especially if they are important architectural features. Assure that the frames and doors have proper maintenance, regular painting, and that caulking and weatherstripping is applied as necessary.

A storm door would improve the thermal performance of the historic door; however, recent studies indicate that installing a storm door is not normally cost effective in residential settings. The costs are high compared to the anticipated savings. Therefore, storm doors should only be added to

buildings in cold climates, and added in such a way to minimize the visual impact on the building's appearance. The storm door design should be compatible with the architectural character of the building and may be painted to match the colors of the historic door.

Vestibules: Vestibules create a secondary air space at a doorway to reduce air infiltration occurring while the primary door is open. If a vestibule is in place, retain it. If not, adding a vestibule, either on the exterior or interior, should be carefully considered to determine the possible visual impact on the character of the building. The energy savings would be comparatively small compared to construction costs. Adding a vestibule should be considered in very cold climates, or where door use is very high, but in either case, the additional question of visual intrusion must be resolved before it is added. For most cases with historic buildings, adding a vestibule is not recommended.

Replacement Windows: Unfortunately, a common weatherization measure, especially in larger buildings, has been the replacement of historic windows with modern double paned windows. The intention was to improve the thermal performance of the existing windows and to reduce long-term maintenance costs. The evidence is clear that adding exterior storm windows is a viable alternative to replacing the historic windows and it is the recommended approach in preservation retrofitting. However, if the historic windows are severely deteriorated and their repair would be impractical, or economically infeasible, then replacement windows may be warranted. The new windows, of either wood or metal, should closely match the historic windows in size, number of panes, muntin shape, frame, color and reflective qualities of the glass.

Wall Insulation—Wood Frame: The addition of wall insulation in a wood frame building is generally not recommended as a preservation retrofitting measure because the costs are high, and the potential for damage to historic building materials is even higher. Also, wall insulation is not particularly effective for small frame buildings (one story) because the heat loss from the uninsulated walls is a relatively small percentage of the total, and part of that can be attributed to infiltration. If, however, the historic building is two or more stories, and is located in a cold climate, wall insulation may be considered if extreme care (as explained later) is exercised with its installation.

The installation of wall insulation in historic frame buildings can result in serious technical and preservation problems. As discussed before, insulation must be kept dry to function properly, and requires a vapor barrier and some provision for air movement. Introducing insulation in wall cavities, without a vapor barrier and some ventilation can be disastrous. The insulation would become saturated, losing its thermal properties, and in fact, actually increasing the heat loss through the wall. Additionally, the moisture (in vapor form) may condense into water droplets and begin serious deterioration of adjacent building materials such as sills, window frames, framing and bracing. The situation is greatly complicated, because correcting such problems could necessitate the complete (and costly) dismantling of the exterior or interior wall surfaces. It should be clear that adding wall insulation has the potential for causing serious damage to historic building materials.

If adding wall insulation to frame buildings is determined to be absolutely necessary, the first approach should be to consider the careful removal of the exterior siding so that it may later be reinstalled. Then introduce batt insulation with the vapor barrier facing in into the now accessible wall cavity. The first step in this approach is an investigation to determine if the siding can be removed without causing serious damage.

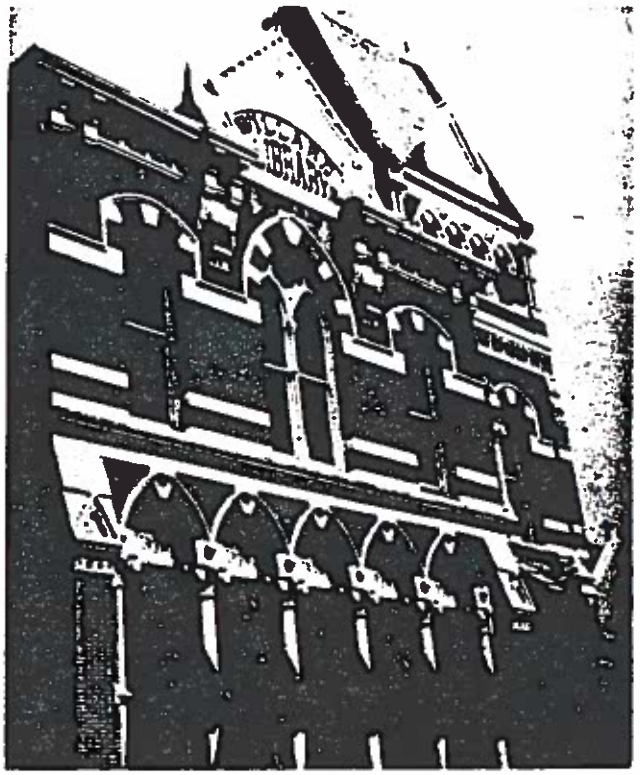


Figure 7. The awnings on the Willard Library in Evansville, Indiana, reduce heat gain in the summer and, when they are raised in the winter, radiant heat from the sun provides free supplementary heat. (Photo: Lee H. Nelson)

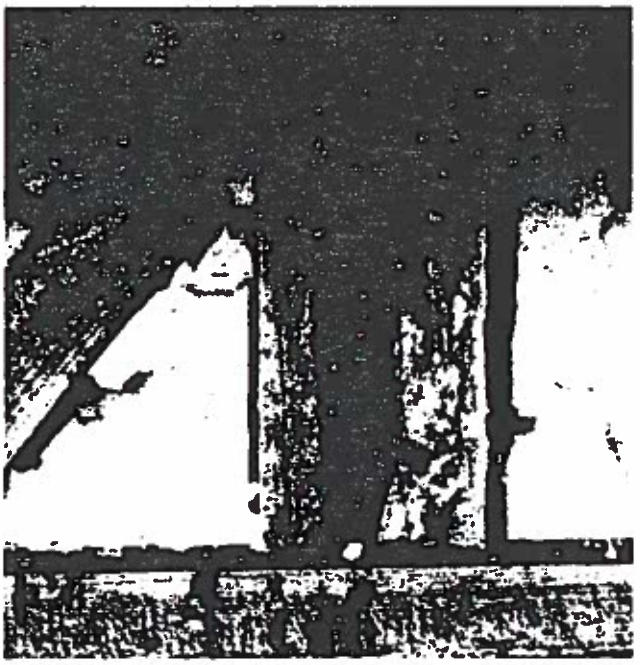


Figure 8. The white material seen between the wooden wall studs is urea-formaldehyde foam. It is injected into the wall cavity wet, and as it cures, large quantities of moisture are given off creating the potential for serious deterioration of adjacent materials and may cause paint to blister on interior and exterior wall surfaces. Additionally, foam can shrink as much as that shown here (about 7% by volume), thus reducing the predicted insulating performance. Until some of the technical problems are corrected, its use is not recommended in historic structures. (Photo: Baird Smith)

If it is feasible, introducing insulation in this fashion provides the best possible solution to insulating a wall, and provides an excellent opportunity to view most of the structural system for possible hidden structural problems or insect infestations. A building owner should not consider this approach if it would result in substantial damage to or loss of historic wooden siding. Most siding, however, would probably withstand this method if reasonable care is exercised.

The second possible approach for wall insulation involves injecting or blowing insulation into the wall cavity. The common insulations are the loose fill types that can be blown into the cavity, the poured types, or the injected types such as foam. Obviously a vapor barrier cannot be simultaneously blown into the space. However, an equivalent vapor barrier can be created by assuring that the interior wall surfaces are covered with an impermeable paint layer. Two layers of oil base paint or one layer of impermeable latex paint constitute an acceptable vapor barrier. Naturally, for this to work, the paint layer must cover all interior surfaces adjacent to the newly installed wall insulation. Special attention should be given to rooms that are major sources of interior moisture—the laundry room, the bathrooms and the kitchen.

In addition to providing a vapor barrier, make provisions for some air to circulate in the wall cavity to help ventilate the insulation and the wall materials. This can be accomplished in several ways. One method is to install small screened vents (about 2 inches in diameter) at the base of each stud cavity. If this option is taken, the vents should be as inconspicuous as possible. A second venting method can be used where the exterior siding is horizontally lapped. Assure that each piece of siding is separated from the other, allowing some air to pass between them. Successive exterior paint layers often seal the joint between each piece of siding. Break the paint seal (carefully insert a chisel and twist) between the sections of exterior siding to provide the necessary ventilation for the insulation and wall materials.

With provisions for a vapor barrier (interior paint layer) and wall ventilation (exterior vents) satisfied, the appropriate type of wall insulation may then be selected. There are three recommended types to consider: blown cellulose (with boric acid as the fire retardant), vermiculite, or perlite. Cellulose is the preferred wall insulation because of its higher R factor and its capability to flow well into the various spaces within a wall cavity.

There are two insulation types that are not recommended for wall insulation: urea-formaldehyde foams, and cellulose which uses aluminum or ammonium sulfate instead of boric acid as a fire retardant. The cellulose treated with the sulfates reacts with moisture in the air and forms sulfuric acid which corrodes many metals and causes building stones to slowly disintegrate. This insulation is not appropriate for use in historic buildings.

Although urea-formaldehyde foams appear to have potential as retrofit materials (they flow into any wall cavity space and have a high R factor) their use is not recommended for preservation retrofitting until some serious problems are corrected. The major problem is that the injected material carries large quantities of moisture into the wall system. As the foam cures, this moisture must be absorbed into the adjacent materials. This process has caused interior and exterior paint to blister, and caused water to actually puddle at the base of a wall, creating the likelihood of serious deterioration to the historic building materials. There are other problems that affect both historic buildings and other existing buildings. Foams are a two-part chemical installed by franchised contractors. To obtain the exact proportion of the two parts, the foam must be mixed and installed under controlled conditions of temperature and humidity. There are cases where the controls were not followed and the foam either cured improperly, not attaining the desired R factor, or the foam continued to emit a formaldehyde smell. In addition, the advertised maximum shrinkage after curing (3%) has been tested and found to be twice as high (see figure 8). Until this material is further developed and the risks eliminated, it is clearly not an appropriate material for preservation retrofitting.

Wall Insulation — Masonry Cavity Walls: Some owners of historic buildings with masonry cavity wall construction have attempted to introduce insulation into the cavity. This is not good practice because it ignores the fact that masonry cavity walls normally have acceptable thermal performance, needing no improvement. Additionally, introducing insulation into the cavity will most likely result in condensation problems and alter the intended function of the cavity. The air cavity acts as a vapor barrier in that moist air passing through the inner wythe of masonry meets the cold face of the outer wythe and condenses. Water droplets form and fall to the bottom of the wall cavity where they are channeled to the outside through weep holes. The air cavity also improves the thermal performance of the wall because it slows the transfer of heat or cold between the two wythes, causing the two wall masses to function independently with a thermal cushion between them.

Adding insulation to this cavity alters the vapor barrier and thermal cushion functions of the air space and will likely clog the weep holes, causing the moisture to puddle at the base of the wall. Also, the addition of insulation creates a situation where the moisture dew point (where moisture condenses) moves from the inner face of the outer wythe, into the outer wythe itself. Thus, during a freeze this condensation will freeze, causing spalling and severe deterioration. The evidence is clear that introducing insulation, of any type, into a masonry cavity wall is not recommended in a preservation retrofitting plan.

Wall Insulation—Installed on the Inside: Insulation could be added to a wall whether it be wooden or masonry, by attaching the insulation to furring strips mounted on the interior wall faces. Both rigid insulation, usually 1 or 2 inches thick, and batt insulation, generally 3½ inches thick, can be added in this fashion, with the **vapor barrier facing in.** Extra caution must be exercised if rigid plastic foam insulation is used because it can give off dense smoke and rapidly spreading flame when burned. Therefore, it must be installed with a fireproof covering, usually ½ inch gypsum wallboard. Insulation should not be installed on the inside if it necessitates relocation or destruction of important architectural decoration, such as cornices, chair rails, or window trims, or causes the destruction of historic plaster or other wall finishes. Insulation installed in this fashion would be expensive and could only be a recommended preservation retrofitting measure if it is a large building, located in a cold climate, and if the interior spaces and features have little or no architectural significance.

Wall Insulation—Installed on the Outside: There is a growing use of aluminum or vinyl siding installed directly over historic wooden sidings, supposedly to reduce long-term maintenance and to improve the thermal performance of the wall. From a preservation viewpoint, this is a poor practice for several reasons. New siding covers from view existing or potential deterioration problems or insect infestations. Additionally, installation often results in damage or alteration to existing decorative features such as beaded weatherboarding, window and door trim, corner boards, cornices, or roof trim. The cost of installing the artificial sidings, compared with the modest increase, if any, in the thermal performance of the wall does not add up to an effective energy-saving measure. The use of artificial siding is not recommended in a preservation retrofitting plan.

Good preservation practice would assure regular mainte-

nance of the existing siding through periodic painting and caulking. Where deterioration is present, individual pieces of siding should be removed and replaced with matching new ones. Refer to the earlier sections of this brief for recommended retrofitting measures to improve the thermal performance of wood frame walls.

Waterproof Coatings for Masonry: Some owners of historic buildings use waterproof coatings on masonry believing it would improve the thermal performance of the wall by keeping it dry (dry masonry would have a better R factor than when wet). Application of waterproof coatings is not recommended because the coatings actually trap moisture within the masonry, and can cause spalling and severe deterioration during a freezing cycle.

In cases where exterior brick is painted, consider continued periodic painting and maintenance, since paints are an excellent preservation treatment for brick. When repainting, a building owner might consider choosing a light paint color in warm climates, or a dark color in cold climates, to gain some advantage over the summer heat gain or winter heat loss, whichever the case may be. These colors should match those used historically on the building or should match colors available historically.

Mechanical Equipment

A detailed treatise of recommended or not recommended heating or air conditioning equipment, or of alternative energy sources such as solar energy or wind power, is beyond the scope of this brief. The best advice concerning mechanical equipment in historic buildings is to assure that the existing equipment works as efficiently as possible. If the best professional advice recommends replacement of existing equipment, a building owner should keep the following considerations in mind. First, as technology advances in the coming years, the equipment installed now will be outdated rapidly relative to the life of the historic building. Therefore, it may be best to wait and watch, until new technologies (such as solar energy) become more feasible, efficient, and inexpensive. Secondly, do not install new equipment and ductwork in such a way that its installation, or possible later removal, will cause irreversible damage to significant historic building materials. The concept of complete invisibility, which necessitates hiding piping and ductwork within wall and floor systems, may not always be appropriate for historic buildings because of the damage that often results. Every effort should be made to select a mechanical system that will require the least intrusion into the historic fabric of the building and that can be updated or altered without major intervention into the wall and floor systems. These points should be considered when weighing the decision to replace a less than efficient exiting system with a costly new system, which may cause substantial damage to the historic building materials and in turn may prove inefficient in the future.

SUMMARY

The primary focus of this brief has been to describe ways to achieve the maximum energy savings in historic buildings without jeopardizing the architectural, cultural and historical qualities for which the properties have been recognized. This can be accomplished through undertaking the passive measures and the "recommended" preservation retrofitting. Secondly, this brief has emphasized the benefits of undertaking the retrofitting measures in phases so that the actual energy savings anticipated from each retrofitting measure can be realized. Thus, the "not recommended" retrofitting measures, with potential for damage or alteration of historic building materials, would not have to be undertaken, because the maximum feasible savings would have already been accomplished.

Lastly, and perhaps most important, we must recognize that the technologies of retrofitting and weatherization are relatively new. Unfortunately, most current research and product development is directed toward *new construction*. It is hoped that reports such as this, and the realization that fully 30% of all construction in the United States now involves work on existing buildings, will stimulate the development of new products that can be used with little hesitation in historic buildings. Until that time, owners of historic buildings can undertake the preservation retrofitting measures recommended here and greatly reduce the energy used for heating and cooling, without destroying those historic and architectural qualities that make the building worthy of preservation.

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This publication was prepared pursuant to Executive Order 11593, "Protection and Enhancement of the Cultural Environment," which directs the Secretary of the Interior to "develop and make available to Federal agencies and State and local governments information concerning professional methods and techniques for preserving, improving, restoring and maintaining historic properties." The Brief has been developed under the technical editorship of Lee H. Nelson, AIA, Chief, Preservation Assistance Division, National Park Service, U.S. Department of the Interior, Washington, D.C. 20240. Comments on the usefulness of this information are welcome and can be sent to Mr. Nelson at the above address. This publication is not copyrighted and can be reproduced without penalty. Normal procedures for credit to the author and the National Park Service are appreciated. April 1978.

The Secretary of the Interior's *Standards for Rehabilitation*

1. A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.

2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.

3. Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.

4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a historic property shall be preserved.

6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

7. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.

8. Significant archeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.

9. New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale,

and architectural features to protect the historic integrity of the property and its environment.

10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

For further information on specific guidelines which are designed to help property owners apply the *Standards for Rehabilitation*, contact the State Historic Preservation Office at (404) 656-2840.

Landscape Architecture

GEORGIA'S LANDSCAPE TRADITION

Georgia has a rich landscape heritage and love of gardens that has been handed down from generation to generation. Georgia's ancestors maintained strong ties with the land and endowed the state with a strong landscape tradition.

The earliest development in Georgia's landscape tradition was the "landscape of work." Generally referred to as the working yard, this early landscape included a variety of practical activities associated with everyday life - food production, care of domestic animals, washing, cooking, storage and shelter. Another early domestic landscape tradition in Georgia was the "swept yard." This vernacular landscape was comprised of a ground surface consisting of sand, packed dirt, clay or fine-textured gravel neatly maintained or "swept" into pleasing ground forms and decorative patterns.

Enclosed ornamental gardens were also developed on plantations and in many of Georgia's early cities and towns. These gardens were enclosed by brick or tabby walls and fences and were filled with ornamental plants and vines including: oleander, crape myrtle, boxwood and jasmine.

Plantation gardens best reflect Georgia's landscape tradition during the antebellum era. These formal, geometrically designed "parterre" gardens were generally based on Italian and French designs. Elaborate patterns created by low, clipped evergreen borders were filled with flowers, shrubs and flowering trees.

The gradual development of the "naturalistic" style of gardening during the middle and latter half of the nineteenth century encouraged a shift of garden design in Georgia to a more informal or "picturesque" style. Initially slow to embrace these changes, Georgia soon gave rise to gardens and landscapes reflecting the naturalistic style, including the Victorian tradition where horticultural pursuits took precedence over interest in design.

Georgia's landscape tradition during the early 20th century was influenced by the "Classical Revival" which looked to Europe and to 18th-century Georgian and Federal designs for inspiration and ideas. Gardens and landscapes during this period were generally "eclectic designs" that encompassed many variations of style.

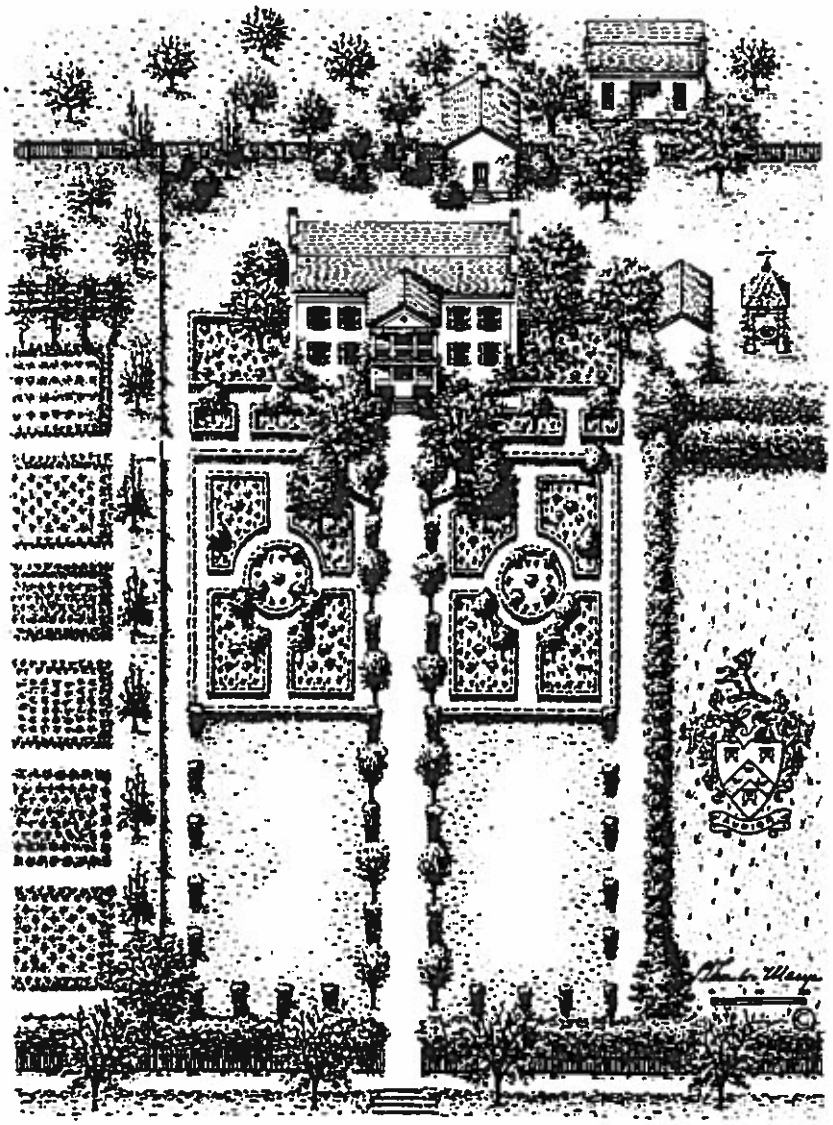
The 20th century also brought with it the advent of the "romantic suburb" with single-family houses set in large wooded lots with curving streets, drives and open landscapes of lawns, trees and shrubs. These park-like landscapes established the norm and greatly influenced residential design in Georgia throughout the remaining portion of the century.

While Georgia's garden history has been documented in such notable works as the *Garden History of Georgia 1733-1933*, published by Atlanta's Peachtree Garden Club, additional efforts are needed to chronicle the state's rich landscape heritage. Limited knowledge of Georgia's landscape tradition has in part been responsible for the secondary role landscape preservation has taken when compared to the more extensive efforts associated with the preservation of historic buildings and structures.

While landscape preservation has proceeded at a slower pace than architectural preservation, interest in the restoration and recreation of historic gardens and landscapes is a growing concern. The practice of limiting landscape preservation efforts solely to gardens is rapidly changing to encompass a concept that addresses the "total landscape." Landscape elements including: **gardens** (enclosed spaces reserved for cultivation of plants); **yards** (designated areas of special use); **grounds** (an open area planted with trees and shrubs); and **landscape** (a combination of gardens, yards and grounds comprising the scene) are an integral part of this "total landscape" concept. This comprehensive approach is essential for telling the complete story of historic sites and properties.

An expanding interest in landscape preservation has created a demand for additional information and definitive guidelines to assist property owners with a variety of issues and concerns. How do I begin a landscape restoration project? How should the final result look? Where do I go for assistance? These are but a few of the many questions being asked. To assist with this effort, the following information has been prepared to

provide property owners with sources, guidelines, procedures and references, which will provide direction and guidance in restoring and recreating historic gardens and landscapes. It is hoped that this information will both encourage and support existing and future efforts in the field of landscape preservation and will assist in preserving and enchancing Georgia's landscape tradition.



1787-1810-1863

The gardens at Rose Hill Plantation were planted in 1810, when the original cottage built by Governor Stephen Heard was incorporated in a larger dwelling. Giant cedar hedges and plinths of euonymus gave them individuality.

Courtesy Peachtree Garden Club, Atlanta

PLANTS POPULAR IN GEORGIA'S GARDEN HISTORY

It should be pointed out that styles in American garden history, unlike styles in architecture, did not change abruptly but generally blended one into another. Garden styles were slow to change and often continued for extended periods of time even when new styles came into vogue.

For general reference Georgia garden design has been divided into four broad periods–**Colonial/Early American, Antebellum, Victorian, and Early Twentieth Century.** Information on representative plants associated with each of these periods has been provided.

Colonial/Early American 1733 - 1820

While Georgia was the last of the original colonies to be settled, historical records indicate that many gardens were developed during this period in the English Tudor tradition with simple, symmetrical patterns. Walks were a central element in these formal designs and were usually made of brick, sand, tamped soil or crushed oyster shells. These early gardens were often surrounded by brick or tabby walls or enclosed by picket fences. They generally contained flowers and ornamental plants which were grown for both pleasure and utilitarian purposes. Plants and flowers for these early gardens were either obtained from Europe or collected as native species from the surrounding forest and countryside.

Representative Plants of the Colonial/Early American Period

TREES

Common Name	Botanical Name
American Beech	Fagus grandiflora
Chinaberry	Melia azedarach
Common Catalpa	Catalpa bignonioides
Flowering Dogwood	Cornus florida
Live Oak	Quercus virginiana
Mimosa	Albizza julibrissin
Red Cedar	Juniperus virginiana
Sweet Bay	Magnolia virginiana
Sycamore	Platanus occidentalis
Tulip Tree	Liriodendron tulipfera

SHRUBS

Common Name	Botanical Name
Althaea	Hibisus syriacus
Carolina Allspice	Calycanthus floridus
Chaste Tree	Vitex Agnus - castus
Cherry Laurel	Prunus caroliniana
Edging Box	Buxus sempervirens suffruticosa
Fringe Tree	Chionanthus virginica
American Holly	Ilex opaca
Inkberry	Ilex glabra
Waxmyrtle	Myrica cerifera
Yapon	Ilex vomitoria

FLOWERS

Common Name	Botanical Name
African Marigold	Tageter erecta
Bee Balm	Monarda didyma
Black Eyed Susan	Rudbeckia hirta
Columbine	Aquilegia canadensis
Four-O'-Clock	Mirabilis jalapa
Hollyhock	Althaea rosea
Larkspur	Delphinium consolida
Sweet William	Dianthus barbatus
Tawny Daylily	Hemerocallis fulva
Yarrow	Achillea millefolium

VINES

Common Name	Botanical Name
American Wisteria	Wisteria frutescens
Carolina Jessamine	Gelsemium sempervirens
Cherokee Rose	Rosa lavigata
Trumpet Creeper	Campsis radicans
Trumpet Honeysuckle	Lonicera sempervirens

Antebellum Period 1820-1860

Antebellum gardens were generally formal in nature and consisted of geometric shapes and circles that reflected Italian and French designs rather than English Tudor traditions prevalent during the Colonial/Early American Period. Foundation plantings did not occur during the antebellum period, although one or two specimen shrubs might be planted close to the house for fragrance or flowers. Garden design in the South was influenced to some degree by the "natural style" of gardening that was in vogue in Europe. Naturalistic plantings of ornamental trees and flowering shrubs were sometimes used to enhance grounds and gardens. Grass was not a common feature in southern gardens until after 1825 when Bermuda grass was introduced by William H. Crawford. Even then grass was used only to a limited extent since it did not grow well in shade and required a considerable investment in time and money. Most Georgia gardens and grounds continued to be "swept" or clay yards.

Representative Plants of the Antebellum Period

TREES

Common Name	Botanical Name
Chinese Elm	Ulmus parviflora
Crape Myrtle	Lagerstroemia indica
Ginkgo	Ginkgo biloba
Redbud	Cercis canadensis
Red Maple	Acer rubum
Southern Magnolia	Magnolia grandiflora
Southern Sugar Maple	Acer barbatum
Sweet Gum	Liquidambar styraciflua
Water Oak	Quercus nigra
Willow Oak	Quercus phellos
Weeping Willow	Salix babylonica

SHRUBS

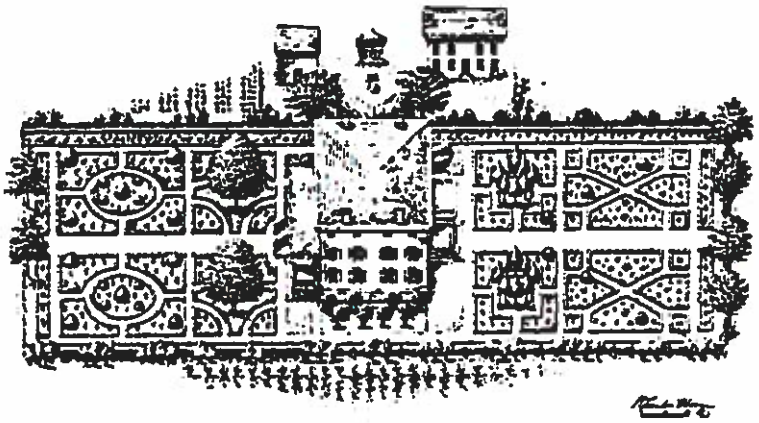
Common Name	Botanical Name
Anise Tree	Illicium anisatum
Banana Shrub	Michelia figo
Camellia	Camellia japonica
Common Box	Buxus sempervirens
Cutleaf Lilac	Syringa lacinata
Gardenia	Gardenia jasminoides
Oak-leaved Hydrangea	Hydrangea quercifolia
Tea Olive	Osmanthus fragrans
Tea Plant	Camellia sinensis
Kerria	Kerria japonica

FLOWERS

Common Name	Botanical Name
Bearded Iris	Iris germanica
Daisy	Chrysanthemum leucanthemum
Evening Primrose	Oenothera brennis
Nasturtium	Tropoealum majus
Pot Marigold	Calendula officinalis
Peony	Peony lactiflora
Stokes' Aster	Skokesa laevis
Sweet Violet	Viola odorata
Thrift	Phlox subulata
Verbena	Verbena canadensis

VINES

Common Name	Botanical Name
Chinese Wisteria	Wisteria sinensis
Banks Rose	Rose banksiae
Smilax	Smilax lanceolata
Star Jasmine	Trachelospermum jasminoides
Virginia Creeper	Parthenocissus quinquifolia



1851-1863

The twin box gardens of the Kelly-Poe-Newton Place display unusual symmetry in design.

Courtesy Peachtree Garden Club, Atlanta

Victorian Period 1860 - 1900

During the Victorian Period of garden design a greater emphasis was placed on horticulture than on design. Principles of design were sometimes ignored in pursuit of horticultural interest in exotic and unusual plants. This was a period when many new plants were introduced into this country as a result of explorations to China, Japan, Asia and South America. Decorative groupings such as cannas, red salvia, ageratum, and coleus were planted in arrangements generally referred to as "carpet bedding". Specimen trees and shrubs were randomly planted throughout the lawn and in the surrounding landscape. Ornamental urns, fountains and benches were also common features in Victorian landscapes. The Victorian Period is often referred to as the "naturalistic" or "picturesque" approach to landscape design. With the arrival and use of the lawn mower in the late 1860s, along with the introduction of improved varieties of grass, lawns gained increased popularity in southern gardens during the Victorian period.

Representative Plants of the Victorian Period

TREES

Common Name	Botanical Name
Smoke Tree	Cotinus americanus
Deodar Cedar	Cedrus deodara
Hinoki False Cyprus	Chamaecyparius obtusa
Japanese Dogwood	Coruns kousa
Japanese Flowering Crabapple	Malus floribunda
Japanese Maple	Acer palmatum
Japanese Zelkova	Zelkova serrata
Saucer Magnolia	Magnolia soulangeana
Purple Beech	Fagus sylvatica atropunicea
Weeping Beech	Fagus pendula

SHRUBS

Common Name	Botanical Name
Fall Blooming Camellia	Camellia sasanqua
Forsythia	Forsythia suspensa
Glossy Abelia	Abelia grandiflora
Hydrangea Grandiflora	Peegee hydranger
Japanese Acuba	Acuba japonica
Leatherleaf Mahonia	Mahonia beali
Thunberg Spirea	Spirea thunbergia
Thorny Eleagnus	Eleagnus pungens
Vanhoutte Spirea	Spirea vanhouttei
Winter Honeysuckle	Lonicera fragrantissima

FLOWERS

Common Name	Botanical Name
Canna	Canna hybrids
Coleus	Coleus hybrids
Dusty Miller	Centaurea gymnocarpa
Madagascar Periwinkle	Vinca rosea
Mexican Ageratum	Ageratum houstonianum
Pansy	Viola tricola hortensis
Plantain Lily	Hosta species
Petunia	Petunia multiflora
Scarlet Sage	Salvia splendens
Small Flowered Zinna	Zinna elegans

VINES

Common Name	Botanical Name
Bigleaf Wintercreeper	Euonymus fortunei vegetus
Boston Ivy	Parthenocissus tricuspidata
Five Leaf Akebia	Akebia quinata
Jackman Cematis	Clematis jackmanii
Morning Glory	Ipomoea purpurea
Sweet Autum Clematis	Clematis paniculata

Early Twentieth Century 1900–1940

Garden design during the early 20th century was a period of eclecticism consisting of an adaption of historical styles encompassing English Tudor, Italian and French Renaissance, and Colonial designs. Gardens often contained strong architectural elements including elaborate walls, steps, balustrades, fountains, water features and a variety of garden structures. This period of garden design is often referred to as the "Country Place Era" when great wealth and fortune give rise to a class of social elite.

Gardens and grounds of the average homeowner during the early twentieth century were generally characterized by a spatial arrangement consisting of a front and back yard. The front yard generally included an open lawn with trees, along with a variety of shrubs planted close to the house in what is generally referred to as a "foundation planting". The back yard contained a border of trees and shrubs planted around a central lawn area which was used for recreation and relaxation. Flowers were relegated to flower borders or included as an integral part of the total design. While

a wide variety of new plants were added to twentieth century landscapes and gardens, many old favorites from previous periods were also used as well.

Representative Plants of the Early Twentieth Century

TREES

Common Name	Botanical Name
Deodare Cedar	Cedrus deodara
Dogwood	Cornus florida
Hemlock	Tsuga canadensis
Japanese Maple	Acer palmatum
Red Maple	Acer rubrum
Sargent Crabapple	Malus sargentii
Southern Magnolia	Magnolia grandiflora
Tulip Tree	Liriodendron tulipfera

SHRUBS

Common Name	Botanical Name
Bridal Wreath	Spirea pruniflora
Common Box	Buxus suffruticosa
Firethorn	Pyracantha coccinea
Japanese Holly	Ilex crenata
Mock Orange	Philadelphus coronarius
Slender Deutzia	Deutzia gracilis
Vanhoutte Spirea	Spiraea vanhouttei
Wax Leaf Ligustrum	Ligustrum japonica
Weigela	Weigela species
Winter Jasmine	Jasminum nudiflorum

FLOWERS

Common Name	Botanical Name
Balloon Flower	Platycodon grandiflorum
Chrysanthemum	Chrysanthemum hydrids
Dahlia	Dahlia hydrids
Hosta	Hosta plantaginea
Japanese Iris	Iris kaempferi
Peony	Paeonia species
Petunia	Petunia hydrida
Purple Cone Flower	Echinacea purpurea
Shasta Daisy	Chrysanthemum superbmum
Sundrops	Oenothera fruticosa

VINES

Common Name	Botanical Name
Autumn Flowering Clematis	Clematis paniculata
Boston Ivy	Parthenocissus tricuspidata
Chinese Wisteria	Wisteria sinensis
English Ivy	Hedera helix
Yellow Jessamine	Gelsemium sempervirens

WALLS AND FENCES

From Colonial times until the end of the 19th century, no domestic landscape was considered complete without some form of fence or wall for enclosure. The first boundaries of gardens and grounds were rail fences made by splitting native trees. These early split rail fences were followed by simple wooden ones. Drawings of Savannah as early as 1743 show the first domestic structures surrounded by high wooden fences made of crudely fashioned boards. The more decorative picket fence did not become common until after the Revolution.

Brick or tabby walls were also built for enclosure and made a pleasing backdrop for decorative plants and vines. Tabby walls were common features in Savannah and Georgia's coastal area. Many of these walls enclosed small gardens planted with oleander, crape myrtle, and small ornamental trees.

In the 18th and early 19th centuries, many gardens and yards were also enclosed by wrought-iron fences of delicate design. Cast-iron began to appear about 1830, and fences were cast into countless numbers of designs for both large and small scale properties.

While use of fences and walls continued into the early 20th century, use gradually began to decline, particularly in the front yard, in favor of allowing adjoining properties to merge one into another to create continuous parklike settings. Back yards continued to rely on fencing and hedges to provide privacy and enclosure for children, pets and service needs.

STREET TREES

Throughout America's past, trees have played a major role in the development of the nation. When the first settlers landed, two-thirds of the American continent was covered in trees. Trees supplied the essentials from which this country prospered and thrived. Trees supplied fuel for warmth and cooking, wood for the famous sailing ships, building materials for houses, and food for nourishment and survival. Finally, trees brought beauty to the land. In turn, stately trees planted by our forefathers have added enjoyment and pleasure to our lives. It is only natural that people want trees around their homes, along their streets, and in their parks and communities.

While trees have obviously played a major role in the history of this country, they were initially excluded from early American settlements. This was done to create places for the militia to gather and for cattle to be herded in the event of a hostile attack. The use of trees in town commons, city squares and along streets is a late 18th and early 19th century development. This effort grew out of the influence of the French baroque garden and matured as a result of the English romantic landscape movement.

Many of the early trees that were planted as American street trees were native species - Oaks, Maples, Birch, Elms, and Linden. In addition to native trees many introductions from China, Japan and Europe were also used as street trees with a limited degree of success. A representative list of native and imported trees that have historically been used for street trees in America include the following:

Trees for Streets and Avenues

Common Name	Botanical Name
American Elm	Ulmus americana
Red Oak	Quercus rubra
Norway Maple	Acer plantanoides
Oriental Plane	Platanus orientalis
European Linden	Tilia europaea
Scarlet Oak	Quercus coccinea
Pine Oak	Quercus palustric
Sugar maple	Acer saccharum
Hackberry	Celtis occidentalis
Maidenhair Tree	Ginkgo biloba
American Linden	Tilia americana
White Ash	Fraxinun americana
Sweet Gum	Liquidambar styraciflua
Tulip Tree	Liriodendron tulipifera

Historic Tree Planting in Georgia

While historical references indicate that street trees were planted in Georgia throughout the 19th century, it was not until the early 20th century that major street tree planting programs occurred. As few nurseries existed, many early street trees were native species collected from the woods. Apart from the early courthouse squares, street trees were the major historic public landscape element in most Georgia communities.

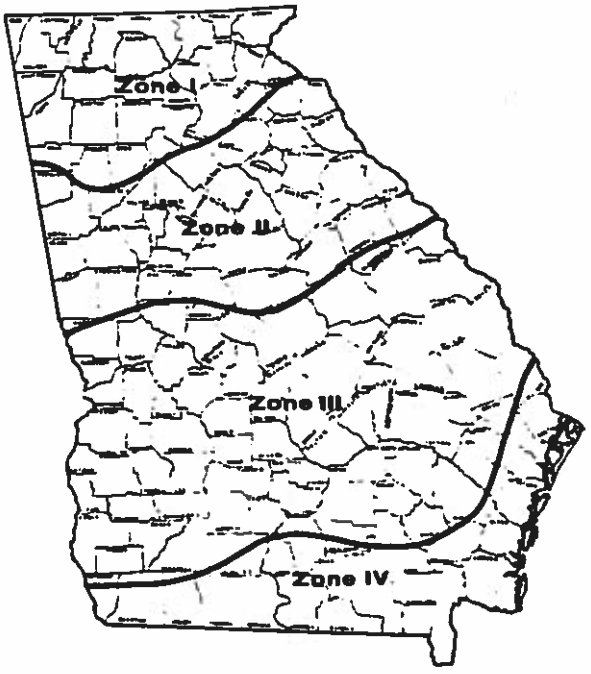
It was during the period between 1920-1930 that the majority of street trees within the state were planted. Representative cities with street tree programs during this period include Savannah, Macon, LaGrange, Columbus, Augusta and Atlanta. Street trees typically planted in the coastal plain included the Live Oak and Sabal Palmetto, while Water Oaks, Willow Oaks and American Elms were planted elsewhere in the state. Many of these trees continue to thrive and enhance the beauty and charm of towns and neighborhoods.

Following is a list of street trees recommended for use in Georgia. Trees that are designated as native species would be appropriate for "historic plantings." This list is by no means complete but simply illustrates some of the more popular trees that are used in the state. An expanded list of trees appropriate for specific landscape periods can be found in the section Plants Popular in Georgia's Garden History.

LARGE TREES
40 to 100 feet

Botanical Name and COMMON NAME	HARDY* ZONE	MATURE HEIGHT / SPREAD	SERVICE LIFE	REMARKS
Acer barbatum** SOUTHERN SUGAR OR FLORIDA MAPLE	I, II, III, IV	40′–50′ / 25′–35′	Medium	Dull red fall color.
Acer rubrum** RED MAPLE	I, II, III, IV	40′–50′ / 25′–35′	Short	Good fall color.
Celtis laevigata** SUGAR HACKBERRY	I, II, III, IV	60′–80′ / 25′–35′	Medium	Hardy, shade tree.
Quercus alba** WHITE OAK	I, II	60′–100′ / 40′–60′	Long	Difficult to transplant.
Quercus hemisphaerica** DARLINGTON OAK	II, III, IV	60′–80′ / 40′–60′	Medium to Long	Drought tolerant shade tree.
Quercus laurifolia** LAUREL OAK	III, IV	60′–80′ / 30′–40′	Medium	Shed leaves earlier than Laurel Oak.
Quercus nigra** WATER OAK	I, II, III, IV	50′–80′ / 40′–50′	Medium	Not as desirable as other oaks.
Quercus phellos** WILLOW OAK	I, II, III, IV	40′–60′ / 30′–60′	Long	Shade tree. Yellow fall color.
Quercus virginiana** LIVE OAK	III, IV	60′–80′ / 50′–60′	Long	Shade tree, spreading habit of growth.
Ulmus parvifolia LACE BARK ELM	I, II, III, IV	40′–60′ / 30′–40′	Short to Medium	Resistant to Dutch Elm Disease.

* *See PLANT HARDINESS ZONES Map.*
** *Denotes native trees throughout this table.*



PLANT HARDINESS ZONES

Treescape: A Citizen's Guide for Urban Tree Planting, prepared by the Cooperative Extension Service, University of Georgia, College of Agriculture, Athens

Historic Tree Preservation Policies

In respect to historic street tree plantings a number of environmental and physical factors often enter into the picture. As trees grow and mature, they are often susceptible to insects and disease as in the case of the American Elm. Many trees of an original planting may also die as a result of environmental factors and conditions, such as drought, lightning, air pollution and drainage problems. Other trees often reach a mature size and gradually experience deterioration due to age and longevity. In each of these situations decisions have to be made regarding partial or wholesale replacement of existing plantings, maintenance procedures to encourage continued viability of healthy plantings, and establishment of policies directed at balancing "aesthetics" and "historical authenticity."

In order to preserve existing historic street trees, it is recommended that a Historic Tree Management Program be initiated. Such a program can best be carried out by a Tree Preservation Board that includes community and civic leaders, professionals and neighborhood representatives. It is also recommended that the board seek the assistance of a tree arborist or urban forester to provide technical and professional assistance.

To obtain the name and location of a certified tree arborist or urban forester, the Georgia Forestry Commission should be contacted at PO Box 819, Macon, Georgia 31298-4599; 912-744-3211 or 1-800-GA-TREES.

To accomplish an effective Historic Tree Management Program the following steps should be followed:

Tree Inventory
A tree inventory should be conducted to include: location, spacing and species identification of all existing trees. This information should be compiled and documented on a plan.

Hazardous Tree Identification
Hazardous trees should also be identified and recorded on the plan. Hazardous trees include ones that are dead, diseased or damaged and could potentially cause destruction or danger to property or individuals.

Removal Program
A systematic program of phased removal of hazardous trees should be developed. This program should include an estimate of potential costs and a time table to accomplish this task.

Replacement/Restoration Plan
A comprehensive replacement plan should be prepared to include policies and procedures for replacement of existing trees where needed. This plan should include species to be planted, phasing and budget.

Care and Maintenance Program
It is essential that an adequate maintenance program be initiated which will address periodic spraying, fertilizing, pruning, and inspection to insure the health and longevity of existing historic trees.

Courtesy Library of Congress as presented in *Landscapes and Gardens for Historic Buildings*

Street Tree Selection

Street trees can typically be divided into two main categories– deciduous and evergreen. Deciduous trees drop their leaves in the fall and produce new leaves in the spring. Evergreen trees hold their leaves for one or more seasons.

Selecting the right tree for a particular situation is not always an easy decision. A number of important points should be considered:

Beauty
While most trees possess a certain aesthetic quality, a tree's total physical characteristics including fruit, bark, flowers and foliage should be taken into consideration when appraising its ornamental value.

Shade
Shade is a relative term in that all trees provide a varying degree of shade from dense to light. The degree of shade is obviously more important in the south where trees provide a cooling effect to homes and buildings.

Freedom from Insects and Diseases
It goes without saying that trees susceptible to serious insect pests or diseases should be avoided. While few trees are totally free from insects and disease, it is important to know which trees grow best in which area.

Soil Requirements
While most trees can tolerate a wide range of soils, it is important to determine soil and moisture conditions in providing for rigor and long life of a tree.

Root System
Knowledge of the root system of a particular tree is important from many standpoints. While some trees have deep-root systems that can withstand wind and severe storms, others with shallow roots compete with grass and shrubs and can be undesirable because of damage they may cause to sidewalks and curbs. Root systems also determine how well a tree may be transplanted.

Growth Habits
Every tree has a characteristic habit of growth–either pyramidal, weeping, columnar or horizontal in form. These various shapes should be taken into consideration when selecting a tree to enhance the architectural lines of a building or to provide for certain landscape effects.

Foliage and Flower Characteristics
A tree with attractive foliage and fall color obviously has higher landscape value than one that is dull or lacking in seasonal change. Trees with flowers in spring or summer also add seasonal interest.

Life Expectancy
A tree's longevity is dependent upon its natural habit of growth, its susceptibility to insects and diseases, and to some extent the environment in which it grows. Where there is a choice, preference should be given to trees that are long-lived as they provide the best return on the investment and provide benefits to several generations.

GUIDELINES FOR HISTORIC GARDENS AND LANDSCAPES

Before decisions are made about undertaking a landscape preservation project, a detailed thought process, supported by comprehensive research must be undertaken in order to answer a number of basic questions. What period does the garden or landscape represent? What information is available to document the design? Does the design represent several major periods of landscape history? Does evidence indicate that a garden or period landscape ever existed on the site? These and other questions must be addressed in developing a philosophy and plan of action.

Essential is the determination as to whether the landscape approach to be taken should be one of restoration or re-creation. In some cases where historic features such as walls, walks, fences and hedges remain and where research can provide information on an early landscape, restoration is an appropriate course of action. Ideally, "restoration" will provide an insight into the authentic history and interpretation of a site. In instances where little or nothing remains of a former garden or landscape, "re-creation" of a sympathetic or representative period garden or landscape might be considered. In all cases, whatever decision is made, careful thought and methodical research is of uttermost importance. Research should include three broad areas of evaluation:

- Site Analysis
- Research and Documentation
- Philosophy and Plan Development

The objective of this process should be the development of a landscape preservation plan which includes the following key components:

- Location and relationship of all physical elements and features included in the project: Walls, fences, buildings, walks, paths, flower borders, garden ornaments.

- Location and description of all plants and grasses: This includes trees, shrubs, vines, perennials, annuals, and bulbs. Both common and botanical names should be provided along with quantities and recommended sizes.

- The plan also should show existing and proposed contours along with spot elevations for site features, such as walls, steps, and drains. Floor elevations of existing buildings and structures are also important for reference.

- Construction drawings and specifications for all landscape features such as fences, gates, and walls should accompany the plan. This ensures that the project can be undertaken according to standards that will comply with the design and support the integrity of the plan.

A set of guidelines to assist property owners in formulating an approach to the preservation of historic gardens and landscapes has been developed by Rudy and Joy Favretti in *Landscapes and Gardens for Historic Buildings*. An abbreviated version of these guidelines follows:

Site Analysis

The first step is to conduct a detailed survey of the site in question and to plot all information on a plan drawn to scale. It is not necessary to be a skillful draftsman to do this. The major point is to gather everything on paper for future use in the plan development process. The following items should be recorded on the plan:

Property boundaries: These are exceedingly important because they define the edges or bounds of the property. This information can be obtained from a surveyor's map. Most states require such a document when property ownership is transferred. A plot plan accompanying the original recorded deed may contain the exact boundaries of the property.

Structures on the property: Buildings such as houses, barns, sheds, chicken houses, and garages must be recorded on the site analysis plan. These

should be drawn to precise scale; first-floor windows and doorways should also be indicated.

Fences, walls, and elements of enclosures: All fences and walls, whether retaining walls or freestanding, should be shown on the plan.

Walks, driveways, and all other pavement: Record these on the site analysis plan along with an indication of materials used.

Posts, bollards, poles: Any freestanding post, bollard, or pole should be recorded whether wood, stone, or some other material. There may be only one standing post, for example, but research may reveal that this was just part of a row or series of hitching posts that were later sheared off at ground level.

Plants and vegetation: Record the location of all existing trees, shrubs, and perennials and properly identify them. All trees, shrubs, and perennials should be plotted on the plan. Some of them may indicate a pattern for future restored landscape. Make no decisions concerning what will be left out or removed at this point except for noxious weeds or overgrown brambles that obstruct the analysis process. If the identity of some plants is unknown, consult an expert for identification.

All other specific features such as remnants of old foundations, man-made riprapping, arbors, trellises, and curbing: These should be plotted on the plan, drawn to scale. Further research may show that some of these elements were part of the plan to be recreated or restored.

Site observation: Any distinct depressions in the ground, mounds or heaps, paved-in areas, or any undulation in the land or openings in a fence or wall should be indicated on the site analysis plan.

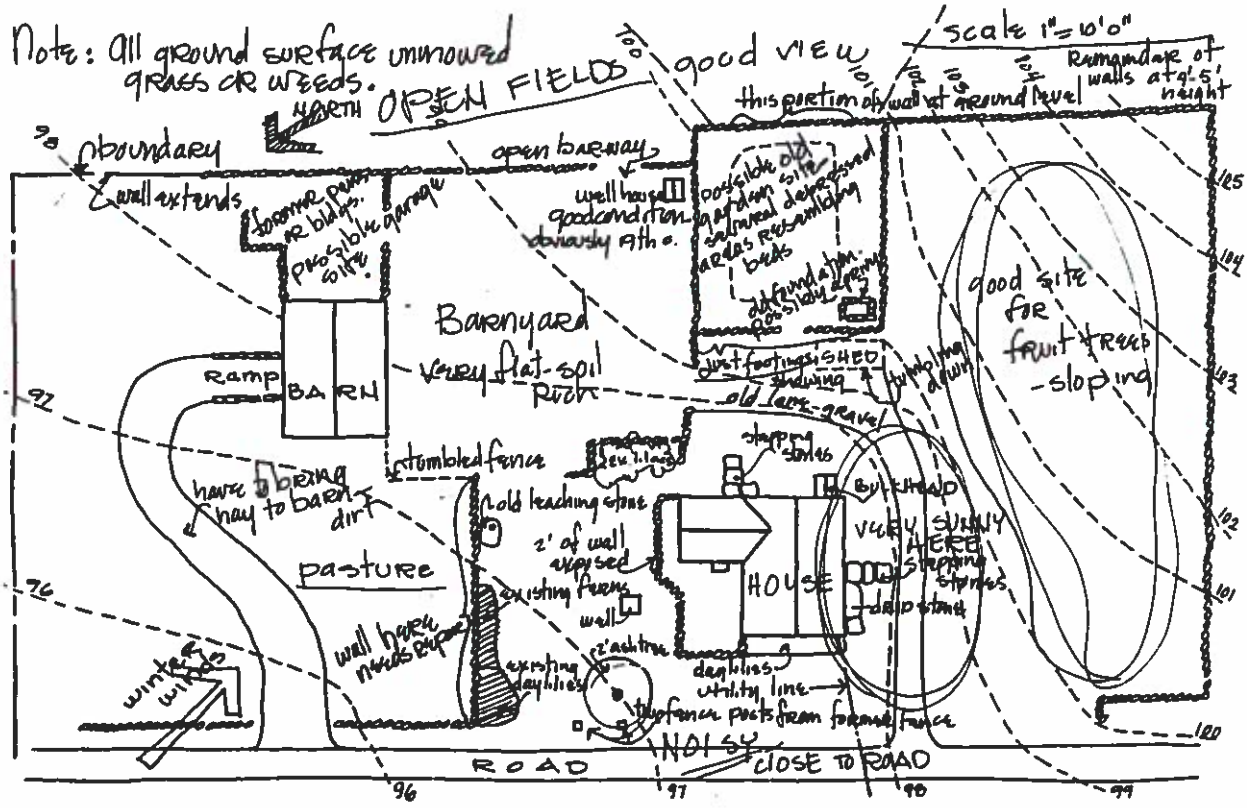
Views or vistas, within the site and without: With defining arrows, indicate any outstanding vistas or views both within the site and off the site.

Utilities: The location of all utilities, such as sewer, water, gas, and electric should be indicated. While these are modern conveniences, they must be dealt with as restoration proceeds.

Natural features: Natural features such as variation in soil types, rocks, ledges, water, and changes in elevation must be recorded in the site analysis. They may well be incorporated into the final plan.

Weather information: Record direction of winter winds, summer breezes, or any micro-climatic information that is known, such as frost pockets that hamper early spring bloom.

Other features not previously mentioned: Because a site analysis plan should be a complete and detailed document of everything found on a site before restoration begins, all data found through general observation and detailed probing should be recorded.



Taken from *Landscapes and Gardens for Historic Buildings*

Photographic Record

In addition to being recorded on the site analysis plan, each of the categories indicated above should be recorded photographically. The angle from which each picture is taken should be indicated on the site analysis plan or on another plan drawn specifically for the purpose. These notations should be coded to numbers on the pictures. Each photograph must be carefully numbered and labeled. The label should contain as much information about the subject as can be recorded.

Research and Documentation

In the research and documentation phase, look for information that can be obtained through graphic and written records, archeological investigation, or hearsay. In searching for these kinds of information, learn as much as possible about:

1. The general layout of the grounds, landscape, or gardens surrounding the building in question.

2. Any details, such as plans, for any part of the total landscape.

3. Details concerning specific landscape features, such as fences, summerhouses, trellises, sculpture, sundials, hitching posts, steps, paving, plants, and related items.

4. Specific information about the people who inhabited structures on the property, as well as information on how the structure and landscape were used.

Graphic Records

Daguerreotypes, Tintypes, and Photographs: These are the best sources for documentation when available. They show an image exactly the way it was and there is less opportunity for errors through interpretation.

Prints: Sketches were drawn by artists and made into lithographs, etchings and engravings to illustrate newspapers, journals, and books. Any artists' work may contain considerable license taken by the artist, but it is generally agreed that prints specifically done for illustration are apt to be more precise than images conveyed through paintings.

Drawings and sketches: These refer to sketches of an amateur nature, drawn in journals or diaries or kept by members of a family.

Maps: Maps are a useful source for determining layout among buildings and the arrangement of streets, walks, roads, and paths. While maps do not often contain minute detail because of their scale, they do contain valuable generalities and may even show the location of major features such as trees, monuments, flagpoles, bridges, signs, and gardens.

Paintings: Paintings are useful guides for restoration purposes. If one knows the painter's reputation for accuracy, then paintings can be more than

guides. It is wise to keep in mind that, especially in the placement of gardens, trees, shrubs, and plants, artists take great license and are apt to place these features where they create the best composition or improve upon the scene.

Written Records

Diaries and journals: Diaries and journals have been found to be valuable sources of information not so much to provide information about a garden plan but to describe how a landscape was used. Diaries and journals yield valuable information including long lists of plants grown and what plants were used for what purposes (culinary, medicinal, fragrance). For the careful researcher it is safe to say that a diary or journal, no matter how brief, will yield some valuable information about landscapes and how they were used.

Correspondence: Letters often contain descriptions of places visited or tasks performed, and these descriptions sometimes are about landscapes or gardens.

Travel accounts: There were many travelers, especially in late colonial and early federal times, who wrote extensive accounts of places they visited.

Scrapbooks: Especially during the late 19th century, it was quite fashionable to keep scrapbooks containing clippings from newspapers, postcards, and a myriad of other information. Sometimes these descriptions are valuable in reconstructing a landscape scene.

Probate Records: In dealing with residences, probate records may be a valuable descriptive resource, especially those that contain inventories. These inventories vary as to completeness, but during certain periods, particularly from about 1790 to 1830, they were unusually complete in some regions.

Land Records: Land records or deeds quite often contain a description of a property or at least mention elements that are reference points along a boundary, such as "the SW corner of the garden wall." Trees were also used as reference points. One is more apt to find simple plans affixed to a deed than to a will or probate inventory.

Hearsay

Conversations with citizens familiar with a site's history, particularly a community's older citizens, can yield valuable information and provide leads for future research.

Locations for Research Sources

References may be found in any of three general locations:

Local sources: Photographic, manuscript, map, and book sections of local libraries; collections of genealogical, historical, and patriotic societies; collections of art galleries and museums; private collections; town and country records.

State and regional sources: Photographic, manuscript, map and book sections of county and state libraries; collections of state genealogical, historical, and patriotic societies; state and county museums and art galleries; county and state records.

National sources: Photographic, manuscript, map, book, and special collections in national libraries such as the Library of Congress; national genealogical societies; national historical groups; national art galleries and museums; national patriotic and fraternal organizations.

Developing A Philosphy and Developing A Plan

Once a site has been carefully analyzed and all sources of possible information thoroughly researched, it is time to pull all of this data together in the form of a development or restoration plan. But before this can be done, a few decisions must be made.

Which period or periods will the restoration represent? There is no way to plan a restoration effectively until this question has been answered. Will the restoration bring the whole project back to the date of original construction or will it represent a subsequent period? Will a portion of the landscape setting represent the earliest possible period and another portion a later period?

The research data should help you in making these decisions. Perhaps in the course of the research, it was discovered that a particular individual inhabited the dwelling in question for a long period of time. You

may decide to represent that person's tenure. Or another individual, representing a different or particularly interesting profession, may be the subject of your restoration. Or you may conclude that the building should represent all the periods through which it passed and that the landscape should follow this theme. Your decision must be made on the basis of careful thinking based on extensive research. Also, what presently exists on the site should be a deciding factor. For example, if most of your buildings are nineteenth century and the dwelling is late eighteenth century, it seems a shame to tear the outbuildings down and construct new eighteenth century types with their corresponding landscapes.

Developing the Plan

Once you have gathered site and landscape data, the next step is to develop the plan for restoring the grounds surrounding the building or buildings in question. It is wise to select an accredited landscape architect for this project. The landscape architect should be one who specializes in historic landscapes.

In making this selection a distinction should be made between a landscape architect who specializes in historic preservation and one who specializes in historic landscapes. The two are not the same. Professionals dealing in the former are more concerned with designing landscape for areas such as downtowns where historic buildings are preserved and for creating a setting for them. They may become involved with adaptive uses to meet present-day needs and problems. Professionals who deal with the latter are experts in period design and the interpretation of research for a particular era. They have the ability to think in the style of the period selected and to have a clear understanding of what landscapes were like historically.

* For a complete text of the above referenced guides, please refer to *Landscapes and Gardens for Historic Buildings - A handbook for reproducing and creating authentic landscape settings*, by Rudy J. Favretti and Joy Putman Favretti. Copyright 1991 by American Association for State and Local History, 172 Second Avenue, North, Suite 202, Nashville, Tennessee 37201 (615) 255-2971.

Utilitarian Considerations

Utilities including electric and telephone lines, gas and water meters, air conditioning systems, service areas, storage facilities and parking areas are functional and utilitarian elements that exist on most domestic

properties. Many of these elements are visually distracting. Whenever possible action should be taken to minimize their visual impact on the site through a variety of measures including the following:

- The use of plant material such as hedges, evergreens and buffers of shrubs and small trees can often be employed to screen utilities and undesirable views. Cherrylaurel (Prunus Caroliana), Canadian Hemlock (Tsuga canadensis), Nellie R. Stevens Holly (Ilex x cv. 'Nellie R. Stevens'), Burford Holly (Ilex cornuta 'Burfordii'), Wax-leaf Privet (Ligustrum japonicum), and Wax Myrtle (Myrica cerifera) are evergreen plants suitable for screening purposes.

- Solid wood fences also present many possibilities for enclosing utility and service areas. Fence design should be in keeping with the architecture or garden style and compatible in height, material, and color with existing buildings and structures.

- Consideration should also be given to the consolidation or relocation of service and storage areas to areas on the site which are not in visual contact with restoration efforts. This can best be accomplished when the site is relatively large and alternative arrangements exist.

- Mitigation of overhead power lines can be achieved either by placing lines underground or by consolidating and relocating existing lines to areas outside the normal area of vision.

- In many instances these simple practices can be effective methods in minimizing the visual impact of utilities and functional elements.

Archeological Considerations:

See Section IV for information.

INFORMATION SOURCES

The following information sources are divided into two lists. List "A" includes sources and organizations that are available within Georgia or the Southeast. List "B" includes national sources and organizations. Each includes resources to assist individuals and groups involved in landscape preservation.

List "A": Local and Regional Information Sources

Historic Preservation Section
Georgia Department of Natural Resources
1462 Floyd Tower East
205 Butler Street, S.E.
Atlanta, Georgia 30334

The Historic Preservation Section of the Georgia Department of Natural Resources serves as the state historic preservation office in Georgia. Working in partnership with the United States Department of the Interior, this office carries out the mandates of the National Historic Preservation Act, as amended, and works with local communities to preserve the historic, architectural and archaeological resources of Georgia.

Georgia Department of Archives and History
330 Capitol Avenue
Atlanta, Georgia 30334

The Georgia Department of Archives and History serves as depository for the "Vanishing Georgia" collection of historic photographs. Historical records and a collection of garden plans and landscape drawings are also on file.

University of Georgia
Main Library
Athens, Georgia 30602

The Georgia Room located in the Main Library of the University of Georgia is an excellent source of documents, manuscripts and information relating to Georgia history. The Main Library also houses an extensive collection of current books and professional publications relating to landscape architecture, garden history and horticulture.

Georgia Historical Society
501 Whitaker Street
Savannah, Georgia 31499

The Georgia Historical Society offers a wide selection of books, articles and manuscripts relating to Georgia history.

Cherokee Garden Library
Atlanta History Center
McElreath Hall
3101 Andrews Drive, N.W.
Atlanta, Georgia 30305

Dedicated to the conservation and dissemination of educational and research information for the gardening and horticultural community of the Southeastern United States, the library maintains a comprehensive collection of current books, pamphlets and magazines covering all subjects relating to horticulture, landscape design and garden history. The library also contains a fine rare book collection.

Southern Garden History Society
Old Salem, Inc.
Drawer F, Salem Station
Winston-Salem, North Carolina 27101

The purpose of the Society is to promote interest in Southern gardens and landscape history, historic horticulture and the preservation and restoration of historic gardens and landscapes in the South.

Thomas Jefferson Center for Historic Plants
Monticello
P.O. Box 316
Charlottesville, Virginia 22902

To request a source list of historic plants, send a postcard to the Center. An updated, expanded list is being prepared and should be available in early spring 1991.

List "B": National Information Sources

The following material is excerpted from the National Park Service Reading List, *Preserving Historic Landscapes*, compiled by Lauren Meier and Betsy Chittenden, 1990.

Organizations Interested in Historic Landscapes

Alliance for Historic Landscape Preservation
82 Wall Street, Suite 1105
New York, New York 10005

American Society of Landscape Architects (ASLA)
Open Committee on Historic Preservation
4401 Connecticut Avenue, N.W.
Washington, DC 20008-2302

Association for Preservation Technology (APT)
Box 8178
Fredericksburg, Virginia 22404

The Garden Conservancy
Box 219, Main Street
Cold Spring, New York 10516

National Association of Olmsted Parks (NAOP)
5010 Wisconsin Avenue, Suite 308
Washington, DC 20016

National Park Service (NPS)
History Division
(National Historic Landmark Program)
P. O. Box 37127, Mail Stop 418
Washington, DC 20013-7127

Interagency Resources Division
(National Register of Historic Places)
P. O. Box 37127, Mail Stop 413
Washington, DC 20013-7127

Preservation Assistance Division
(Technical assistance related to landscapes other than NPS lands)
P. O. Box 37127, Mail Stop 424
Washington, DC 20013-7127

National Trust for Historic Preservation (NTHP)
1785 Massachusetts Avenue
Washington, DC 20036

Journals and Publications Featuring Articles on Historic Landscape Preservation

Antique Plant Newsletter
Published and edited by Dr. Arthur O. Tucker
Department of Agriculture and Natural Resources
Delaware State College
Dover, Delaware 19901

APT *Bulletin*
Published by the Association for Preservation Technology
Box 8178
Fredericksburg, Virginia 22404

Bulletin of American Garden History
Published by Ellen Richards Samuels
P.O. Box 297A
New York, New York 10024

Courier
Published by the National Park Service
U.S. Department of the Interior
P.O. Box 37127
Washington, DC 20013-7127

Landscape Architecture
Published by the American Society of Landscape Architects
4401 Connecticut Avenue, N.W.
Washington, DC 20008-2302

Landscape Journal
Published by the University of Wisconsin Press
114 North Murray Street
Madison, Wisconsin 53715

Linen and Trace
Newsletter of the Olmsted Archives
Frederick Law Olmsted National Historic Site
99 Warren Street
Brookline, Massachusetts 02146

Old House Journal
Published by the Old House Journal Corporation
69A Seventh Avenue
Brooklyn, New York 11217

Historic Preservation
Published by the National Trust for Historic Preservation
1785 Massachusetts Avenue, N.W.
Washington, DC 20036

Preservation News
Published by the National Trust for Historic Preservation
1785 Massachusetts Avenue, N.W.
Washington, DC 20036

Preservation Forum
Published by the National Trust for Historic Preservation
1785 Massachusetts Avenue, N.W.
Washington, DC 20036

American Society of Landscape Architects
Resource Center
4401 Connecticut Avenue, NW
Washington, DC 20008-2302

The ASLA Resource Library has back issues of *Landscape Architecture* and a small landscape architecture library. Use of the library is limited to ASLA members.

Dumbarton Oaks
Garden Library
1703 32nd Street, N.W.
Washington, DC 20007

Dumbarton Oaks maintains a private reference collection and rare book room, open by appointment. Books and periodicals of the collection (both rare and modern) relate to the history of gardens.

Federick Law Olmsted National Historic Site (Fairsted)
44 Warren Street
Brookline, Massachusetts 02146

This National Park Service Historic Site was the home and office of Frederick Law Olmsted Sr. and his successor firms until 1980. Today, it serves as the archives and conservation headquarters for the drawings and photographs produced by the firm. Some access to the materials is possible by special arrangements with the Archivist, but the collection is currently in the process of conservation.

Library of Congress
Washington, DC 20540

Manuscript Division: The Library of Congress serves as the archives for correspondence of the Olmsted office, including the Frederick Law Olmsted Papers and the Olmsted Brothers Papers.

Prints and Photographs Division: This Division of the Library of Congress serves as the depository for the HABS/HAER collection of drawings, photographs and data pages. Accessed by writing or visiting.

National Trust for Historic Preservation Library
Curator
University of Maryland
Architecture Library
College Park, Maryland 20742

The National Trust Library is housed in the Architecture Library at the University of Maryland. This library is a good source for Preservation Press publications (especially those that are out of print), newsletters, journal articles, and texts related to preservation.

Databases and Computerized Bibliographies

The Catalog of Historic Landscape Records in the United States

The Catalog is a computerized, cumulative index to documentation for landscapes and landscape architects, past and present. It contains information on scope and content of public and private collections of landscape records. The Catalog is operational but still searching out collections. Contact:

Wave Hill
675 West 252nd Street
Bronx, New York 10471
(212) 549-3200

List of Classified Structures (LCS)

The LCS is a computerized inventory of the historic structures within the National Park System. A subset, called Landscapes in the National Park System, has been compiled in draft, identifying the cultural landscape components listed in the LCS. For information on either CRBIB or LCS or their landscape components, contact:

National Park Service
Park Historic Architecture Division
P. O. Box 37127, Mail Stop 422
Washington, DC 20013-7127

Landscape Architecture Foundation Research and Information Clearinghouse (LAFRICH)

LAFRICH is a computerized bibliographic database providing information from diverse sources. Standardized searches are available for a small fee. Custom searches can be arranged. Contact:

LAFRICH
Landscape Architecture Foundation
4401 Connecticut Ave. N.W.
Washington, DC 20008-2302

BIBLIOGRAPHY

Georgia References

Bell, Laura Palmer. "The Vanishing Gardens of Savannah." *Georgia Historical Quarterly*. 28 (September 1944): 196-208.

This article provides an insightful description of Savannah town gardens of the nineteenth century. Included are several plans from a collection of measured drawings of old Savannah gardens prepared for Mrs. Bell by Miss Clermont Lee, a Savannah landscape architect.

Beck, Lewis H. *Historic Gardens of Georgia*. Griffin, Georgia: The Southern States Printing Company. 1942.

This small book by Lewis H. Beck offers a short description and account of the private gardens and parks of the old regime of Georgia. Written in plain and understandable language, it provides a brief description of gardens and landscapes in the state.

Cooney, Loraine M., et al. *Garden History of Georgia, 1733-1933*. Atlanta: The Peachtree Garden Club, 1933. Reprint, Athens: The Garden Club of Georgia, Inc., 1976.

This comprehensive book of the garden history of Georgia is an excellent source of information on historic gardens throughout the state. It contains an extensive collection of plans and photographs of individual gardens along with narrative descriptions.

Georgia State College of Agriculture, Extension Division. *Plans and Plantings for Georgia Homes*, Volume XIX, Bulletin 402. University of Georgia, 1931.

This technical bulletin prepared in 1932 provides an interesting collection of guidelines, photographs and plans to assist in the landscaping of rural homes. It also contains a list of suggested plants for a variety of landscape purposes.

Griffin, Florence P. "Gardens in Early Georgia," *New Directions in Preservation*. Collected Papers, The Georgia Trust for Historic Preservation, Sixth Annual Conference. (May 1974): pp 13-20.

An informative article prepared by Florence Griffin describing aspects of garden history, historic plants and information sources derived from her work and research as grounds chairman for the restoration of the Tullie Smith House garden, located on the grounds of the Atlanta Historical Society.

Linley, John. *The Georgia Catalog: Historic American Building Survey*. Athens: The University of Georgia Press. 1983.

This comprehensive work by John Linley provides a guide to the architecture of the state. It includes several sections on landscape history associated with the major periods of architectural development. The extensive collection of historic photographs and plans in this excellent work offers a visual documentation of many historic gardens and landscapes throughout Georgia's past.

Mitchell, William. *Gardens of Georgia*. Atlanta: The Garden Club of Georgia, Inc., Peachtree Publishers, Ltd., 1989.

This book by the Garden Club of Georgia provides a collection of historic and contemporary gardens throughout the state. Published in 1989 to celebrate the heritage and beauty of Georgia gardens, it includes photographs and narrative descriptions of representative gardens found in three distinct areas of the state; South Georgia, the Piedmont Plateau and North Georgia.

Savannah-Chatham County Metropolitan Planning Commission. *Savannah Victorian District Design Guidelines: A Renovation Manual*. Savannah Metropolitan Planning Commission. 92 pages.

Prepared by the Savannah-Chatham County Metropolitan Planning Commission, this document provides a series of design guidelines for

restoring Victorian houses in Savannah's Victorian District. The section on landscaping includes information and recommendations on the restoration of garden and grounds.

General References

The following material is excerpted from the National Park Service Reading List, Preserving Historic Landscapes, compiled by Lauren Meier and Betsy Chittenden, 1990.

American Society of Landscape Architects. *Colonial Gardens: The Landscape Architecture of George Washington's Time.* Washington, DC: United States George Washington Bicentennial Commission, 1932.

Arthur Shurcliff, Fletcher Steele and others contributed articles to this interesting anthology of topics related to colonial gardens. The history and meaning of colonial gardens, as well as regional characteristics are discussed. The book includes several interesting plans.

Cairns, Malcolm. "Country Estates." *American Landscape Architecture: Designers and Places.* Edited by William Tishler. Washington, DC: The Preservation Press, 1989. pp 130-135.

Cairns describes the precedents and form of the "country place," a period in the development of American landscape architecture that sprang from post-Civil War affluence and ended with the Depression. During this period, substantial country estates were designed by many historic landscape architects including the Olmsted firm, Fletcher Steele, Warren Manning, Beatrix Farrand and Ellen Shipman.

Favretti, Rudy J. and Joy Putnam Favretti. *Landscapes and Gardens for Historic Buildings.* Nashville, Tennessee: American Association for State and Local History, 1978. 200 pp.

This well-known book covers a wide range of aspects of historic gardens and period landscape settings for buildings, including a history of American landscape design, focusing on gardens, public buildings and cemeteries; a chapter on research and documentation; and a chapter on maintaining the restored landscape. A large section is on authentic plants

for period landscapes, with a list of historic plants material, grouped by time period. (This book will be reprinted by AASLH in 1991.)

Hedrick, U.P. *A History of Horticulture in America to 1860 with an Addendum of Books Published from 1861-1920 by Elisabeth Woodburn.* Portland, Oregon: Timber Press, 1988.

This is an exhaustive account of American horticulture, arranged chronologically and geographically including fruits and vegetables, viticulture and landscape development. Woodburn's addendum reviews horticulture books of more recent decades.

Highstone, John. *Victorian Gardens: How to Plan, Plant, and Enjoy Them.* New York, New York: Harper and Row, Publishers, Inc, 1982.

Highstone describes the basic tenets of the Victorian garden: planting arrangements (unbroken lawn, open vistas, placement of shrubs and trees, small sites, convenience, and paths and walks); garden planting; plants, lawns and ground covers; kitchen gardens; components of the Victorian scene; the greenhouse; and the basics of gardening. Though the book is well illustrated, locations and dates of the photographs are not included. The sample garden plants should not be considered authentic.

Kunst, Scott G. "Post-Victorian Landscapes and Gardens." *Old House Journal*, Vol. XIV, No. 3 (April 1986), pp. 128-136.

This article discusses the specifics of early 20th-century home gardens, including garden philosophies, styles, features, furniture and plant materials.

Leighton, Ann. *Early American Gardens: For Meate or Medicine.* Originally published by Houghton Mifflin, Boston, 1970. Reprinted by University of Massachusetts Press, Amherst, Massachusetts.

Leighton, Ann. *American Gardens in the Eighteenth Century: For Use or Delight.* Originally published by Houghton Mifflin, Boston, 1976. Reprinted by University of Massachusetts Press, Amherst, Massachusetts.

Leighton, Ann. *American Gardens of the Nineteenth Century: For Comfort and Affluence.* Originally published by Houghton Mifflin, Boston, 1987. Reprinted by University of Massachusetts Press, Amherst, Massachusetts.

This trilogy, a classic of American garden and landscape history, covers domestic gardens of all types, as well as cemeteries and parks. Each volume contains an appendix with information about the historic plants, and extensive bibliographies of historic and contemporary sources.

Scott, Frank J. *Victorian Gardens, The Art of Beautifying Suburban Home Grounds: A Victorian Guidebook of 1870.* Originally New York: Appleton, 1870. Reprinted Watkins Glenn, N.Y.: American Life Foundation, 1982.

This historical work celebrates Victorian domestic life by offering suggestions on decorative gardening for the suburban home. Originally intended to supplement Downing's early works, *Suburban Home Grounds* offered design principles for residential landscape design to achieve a maximum aesthetic effect at a minimal cost. It is useful as a reference for those creating period gardens for Victorian homes.

Shelton, Louise. *Beautiful Gardens in America.* Revised Edition. New York: Charles Scribners and Sons, 1924.

Shelton's work, published in two editions, is a standard collection of historic photographs and text describing significant residential gardens, largely built before 1920; organized by region and state.

Taylor, Raymond L. *Plants of Colonial Days: A Guide to One Hundred and Sixty Flowers, Shrubs and Trees in the Gardens of Colonial Williamsburg.* Colonial Williamsburg Foundation, Dietz Press, 1952.

This annotated list of 17th-century and 18th-century plant materials includes a description of the plant, information on the origins of names, date introduced (either from Europe to America or from America to Europe), and early references to the plants in historic publications, journals and correspondence.

Landscape "Mythtakes" in Historic Preservation *

Rudy J. Favretti, Professor of Landscape Architecture,
University of Connecticut, Storrs

The landscaping of grounds around historic structures is important because an appropriate setting for the structure will help to tell the whole and true story. In recent years the importance of authentic landscapes for historic buildings has been given consideration in most cases, but the results have not always been correct.

Mistakes are made for a variety of reasons. First of all, landscapes are hard to deal with because they change by the day, quite unlike a structure, which stays put. Landscapes grow, they break up with storms, they flower, they shed, they die. With them we deal with an element that is hard to freeze in time. For that reason, most restored landscapes represent an era or several generations.

Errors are also made out of lack of a clear-cut philosophy or a set of distinct objectives concerning just what period is to be represented. Often a committee will decide upon an era but then will deviate from their decision in order to accommodate ideas of certain committee members who have the ability to "out shout" the others.

Failures also occur from ignorance of of what was typical for a particular period. If research data is available, it will show what should be done. If it is not, then there are typical plans and styles for certain epochs in our past. One has only to read what these are or hire a professional to assist.

Two of the biggest reasons for mistakes in landscape restoration are that legends and myths are all-powerful and tend to take precedence over actual fact. Then those in charge of the restoration tend to see things through their 20th-century eyes rather than through the eyes of those who lived in the period to be represented.

Following are some of the most common mistakes made in landscape restoration:

1. "We want the landscape to be pretty for the visitors to see." Naturally, everyone wants the landscape to be pretty; but should it be pretty as in the 20th century, or for the period that the landscape should represent? What is pretty today was not necessarily the standard in the 18th or 19th century. Gardens, especially the ornamental types such as flower gardens, were always planted for beauty, but our eye for beauty changes over time.

It is precisely this point that we see brought out so strongly at Williamsburg. The designer knew what the landscape should look like, but the donor wanted his contribution to be as showy as possible. The result was a landscape that is quite untrue to the period and one in which, should the early inhabitants return, they would be as lost as if they had landed on Mars. (See The Colonial Revival in America, Alan Axelrod, ed., W.W. Norton Company, New York, pp.52-70) Yet because Williamsburg was one of the earliest landscape restorations, it has influenced many.

2. "Couldn't we have more color throughout the season?" This I find is a common comment by some members of garden restoration committees. In fact, I hear it on practically every restoration I do, and it is a perfect example of seeing a landscape through 20th-century eyes. The concept of compatible colors in a garden and a sequence of color throughout the garden season came forth in the late 19th and 20th centuries through the writings of William Robinson, and especially those of Gertrude Jekyll, who has recently been rediscovered. They, along with their American followers who wrote books on the subject (Mrs. Francis King, Mrs. Helena Rutherford Ely, Louise Beebe Wilder and others) soundly spread the word that gardens should have coordinated color as well as a sequence of color or bloom. Today this is a basic principle for garden design, but before the late 19th century it was not used or thought

* adapted from The Bulletin(Connecticut League of Historical Societies) and printed as a supplement to Magnolia, bulletin of the Southern Garden History Society.

***EDITOR'S NOTE:** Although directed toward public-garden restoration, this article provides helpful insights to the private homeowner.*

of to any great extent. When one visits an early 19th-century restoration and sees a beautifully coordinated garden in blue, yellow, and white, he can be sure that the designers did not do their homework.

3. "Couldn't we use something else? I hate lilacs." Individuals and committees engage in the practice of allowing their own personal taste to affect their acceptance or rejection of a particular landscape scheme. We must always remember that the historic structure is not our home, and what we like or dislike ought not to enter in. (If the building is your home, your very own castle, then do allow taste to guide you, since your garden will not be open to the public, and will not misinform others.)

I recently worked on a project where the committee did not like a particular shrub I had used, authentic as it was. They asked me to substitute another. I was amused by this request because they had just previously criticized the plan for not having enough sequence of color, and the plant they didn't like would have given them bloom at a time when little else was showy. Were they exerting their own taste!

4. "First we'll put in a herb garden." If we could only get garden restoration committees to be as indoctrinated with correct principles as they are with the herb garden notion, we will have achieved much. Again, an herb garden as such is a purely 20th-century idea. And herb gardens make us feel good because we can create pleasant textural and color differences, make them showy, make them fragrant, and get a lot of mileage from them.

But the only people who had herb gardens in the 17th, 18th, and 19th centuries were some doctors (most bought or bartered for herbs), and those who had botanical gardens. Certain sects, such as Shakers, grew herbs for sale. Average people, although they used herbs, grew them only here and there in their flower gardens or along a fence or wall of their vegetable garden. I have never found an instance in history where an entire garden was devoted to herbs (except in medieval times).

5. "It looks so bare. Can't we plant along the foundation?" This is another 20th-century idea. Foundation plantings were first written about in the last decade of the 19th century, and the notion finally came into vogue in the early part of this century. We are used to seeing plants along foundations now, and it is hard for some to conceive of a bare foundation. But if we think about it, we wonder how they could have banked around their foundations with seaweed, or hay, or leaves as they did if there were plantings there. Also, there was no need to plant, because foundations were not as a general rule high. Buildings hugged the ground.

In the 19th century, vines were often grown on trellises that were supported on houses. Or vines would be grown up pillars on porches. Several 19th-century books, starting with Andrew Jackson Downing's Landscape Gardening and Rural Architecture, mention the need to plant away from buildings so that flowers and shrubs might be viewed better from inside. This concept is again gaining favor today.

Bare foundations were particularly a part of the landscape of public buildings. Churches, schools, banks, stores and taverns rarely had plantings around them, aside from volunteer ferns, daylilies and weeds. With many sects it was considered a sacrilege to plant around churches. Children would trample plants other than trees in schoolyards. And roaming animals would devour any plants around banks, stores, or taverns.

6. "We can't have a Victorian landscape because they are too hard to take care of." This myth is also ingrained in too many people who sit on garden restoration committees. Because we have seen pictures showing embroidered carpet bedding, arabesque flower beds, topiary, or boxwood-edged rosariums, we often think that these features were common. Actually the most common elements in the Victorian landscape were lawns, shade trees, and shrub borders along the edge of the property. What type of landscape is easiest to maintain? One that consists of a few shade trees and a lawn.

Shade trees were very popular during Victorian times because so many new and exotic species were being introduced into

this country during that era. They were planted with a great deal of forethought so that they would shade structures, enframe a vista, or screen out an undesirable view.

7. "And we'll fence it with a nice split rail fence." Just a little thought will tell us that this would be wrong. Restraining laws on livestock ceased to be passed in the third quarter of the 19th century in most communities. This indicates that animals were on the loose until then. The long neck of a cow, or the stubby legs of a pig could carry them right through the rails of such a fence for a luscious meal of herbs and flowers. Fences during these eras had to be "horse high, bull tight, and pig strong".

Conclusion: These are but a few of the common myths or notions held by those who make decisions on gardens or grounds restoration. A recent survey of visitors to historic sites found that most visitors accept what they see as authentic. We do them a great disservice to exhibit untrue concepts. The same survey also showed that visitors like to see landscapes that are different from what they see every day in the 20th century. This is what makes their trips and admission fees worthwhile.

HISTORIC LANDSCAPES & GARDENS

procedures for restoration

By John J. Stewart
Restoration Landscape Architect

A landscape by its very nature is always changing. Unlike architectural remains, which are static, the landscape will have undergone alteration even when it is intact. Erosion and neglect modify the forms of terraced areas; plants as they grow will affect the appearance of the area and finally transform it. Any landscape or garden you plan to restore will have already gone through a series of changes.

These changes only accentuate the challenge of bringing the grounds back to life. For example, when the original houses of Upper Canada Village in Morrisburg, Ontario, were reconstructed to avoid inundation by the St. Lawrence Seaway project, care was taken to recreate the crops and gardens that would have originally surrounded the village. Authentic planting has also been important in the reconstructed setting at Colonial Williamsburg in Virginia. Curators at both sites and many more recognize that history is interpreted as much through what we did with the land as through the battles we fought and the buildings we erected.

Any historical society can and should consider the potential of plantings, gardens, and outbuildings in interpreting their restoration. In fact a historic landscape need not be associated with an architectural monument. Whether a domestic yard, a park, or a rural cemetery, the landscape may be just as educative as buildings and their furnishings. The procedures discussed in this leaflet will help you to portray developing attitudes toward the land and to show what role it has played at different times and places.

SURVEY EXISTING CONDITIONS

The first step in landscape restoration is careful examination and recording of the site as it currently exists. You must make "as-found" drawings, akin to measured drawings of buildings that are about to be restored (see center fold).

***EDITOR'S NOTE:** Although directed toward public garden-restoration, this article provides helpful insights to the private homeowner.*

These will include plans and photographs of conditions at the site when you took it over. Survey the entire area, indicating the contour lines (two-foot intervals are sufficient), with spot elevations around buildings and key features such as large trees.

Your plan should also include the location of shrubs, hedges, flower beds, grass areas, water features, patios, walks, and retaining walls. Indicate accessory structures as well as main buildings. Features such as telephone, water, sewer lines, and other utilities should be located. An accurate record of existing utilities is important to operational aspects of the restoration. Their location could be critical in deciding what to restore and how to phase your total restoration.

Detail plans showing especially important areas may be needed. For example, where an elaborate garden existed, a separate plan showing the layout on a larger scale is useful. A plant list keyed to the over-all plan giving both common and botanic names should be included. Measured drawings of architectural details that relate to the landscape such as trellises, fences, and gazebos can also be helpful. Paint remains and other features that are still identifiable should be noted on these drawings. Study the center-fold example, and modify it to fit your needs and abilities.

Photographic documentation is basic in recording the as-found condition. Oblique views from a second-story window or a tall tree can provide an overview. Photographs of details and accessory structures are good supplements to measured drawings. Use color film to help distinguish between plant materials that might not be identifiable in grey tones.

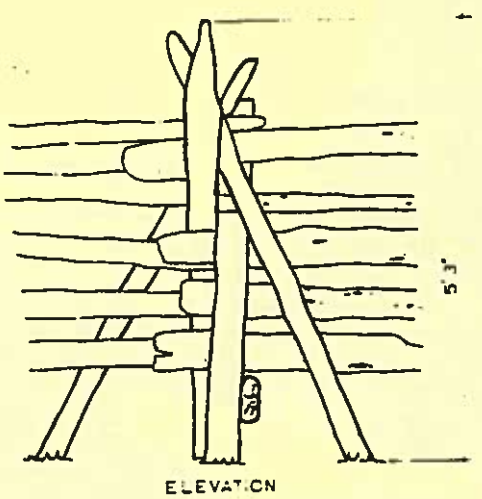
Never clean up the site before as-found drawings have been made. Tidying up often results in losing valuable information. Vestiges of old features can provide important clues. Limit any early maintenance to picking up litter and to maintaining the existing fabric of plant material and structures on the site.

As-found surveys can vary from elaborate architectural blueprints to simple sketches, depending on your resources. The process of accurately recording specific details as fully as your knowledge will permit is far more important than how your end product looks. It is the care you take at this early stage that counts.

HISTORICAL RESEARCH

Accurate historical research is of paramount importance in making a satisfac-

tory restoration. The physical aspects of the site as well as how it was used, and by whom, must be studied. If you are dealing with a domestic yard, the family must be re-created and their lives relived. If it was a fort, what sort of activities occurred on the grounds? Did the soldiers raise crops; were there parade grounds; was livestock kept? If it was a farm, you must understand the system of agriculture at the time: methods of homesteading, crops grown, livestock raised, and methods of processing, storing, and trading farm products. Although this "how" and "by whom" research may seem obvious, it is a slow



ELEVATION

and generally tedious process of unearthing primary evidence.

Sources such as diaries, miscellaneous private papers and letters, sketch-plans, travelers' reports, and early books and periodicals may contain clues on the original form and fabric of the historic landscape. Look at contemporary accounts of gardening and how-to books dating from that period. Paintings, engravings, and early photographs with exterior views will prove most useful as resources for documenting the physical past.

The best approach to take if research is being done by volunteers is to work in groups, each responsible for a certain area of research. One group may agree to study newspapers and other printed publications; another may tackle Department of Agriculture documents and private papers. In documentary research the best attitude is "don't believe it until you find a primary source."

STRUCTURAL RESEARCH

Archaeological investigation is also important in authentically restoring a once-extant landscape. For example, at the Eleutherian Mills garden site in Wilmington, Delaware, an archaeological excavation added surviving evidence to meager documentary material. A stone-walled well and a cold frame in addition to the greenhouse complex were unearthed. Traces of all former garden paths could be discerned from a high tree adjoining the garden area.

Sites whose grounds do not include elaborate gardens with walls and structural foundations may not merit an extensive archaeological program. A good deal of information can be discovered, however, through a technique known as

The present garden walk at Thomas Jefferson's Monticello (Charlottesville, Va.) follows exactly the depression of the old one. For years before restoration commenced, irises, tulips, jonquils, hyacinths, and other plants bloomed in season on either side of the path, outlining the location of original flower borders and the walkway they flanked.

landscape archaeology. The technique combines documentary research with field work, although no digging is done. Vegetative evidence and other signs of man's occupancy such as fence lines, earth mounding, and path and road outlines provide clues to property layout.

Vegetative evidence, unless someone has used a bulldozer on the site, is especially revealing. It requires keen observation and the ability to recognize types of plant material. For example, large clones of common lilac are a sure indication of former habitation. Day lily (*Hemerocallis fulva*) is another. Among the exotic plants that persist long after a site has been abandoned are peonies, tulips, and narcissuses. Other indicators include Norway spruce, black locust, Lombardy poplar, and in certain regions Osage orange.

The placement of plants is another clear signal of man's occupancy. Native sugar maples do not grow naturally in straight lines, evenly spaced 25 to 30 feet apart. Trees of the same size or clumped in an unnatural way indicate a possible planting program and some attempt at landscaping. Sometimes custom dictated where particular plants should be placed. In Upper Canada, for example, peonies were always in the back yard. Similarly, lilacs became almost synonymous with outhouses in certain areas and lily-of-the-valley with the north wall of the house.

The location and orientation of a vegetable garden can often be determined by persistent plants, such as rhubarb and asparagus. Domestic fruits such as apples and raspberries persist for a long time without tending. Burdock grows abundantly in rich soil, indicating a possible barnyard area. The presence of stones and rocks sometimes suggests the remains of a fence line. In other areas plants and trees such as hawthorn, wild grape, and chokecherry were frequently part of a fence row. Often, a scar ringing a tree trunk indicates where a fence once girdled it.

Plants can provide authentic plant material for the restoration as well as indicating occupancy. It is like finding the original planting plan, except you also have the plants. The gnarled old apple tree just barely alive, with one branch green, can provide old-variety grafting material on new root stock. Often these remnants of the original landscape are lost, however, by the well-intentioned person who just wanted to clean up the site.

PROPOSALS AND PLANS

Once the as-found drawings and research have been completed, you will have a fairly clear picture of what the site was like and how the grounds were used at various historic periods. Now you must decide what period to choose for your site interpretation. First determine terminal date, basing your selection on the availability of historic information, how much of the existing fabric is original, the condition of existing material, and how much will have to be altered. To destroy a well-documented nineteenth-century landscape with a good portion extant in order to reconstruct a hypothetical herb garden is inexcusable. The terminal date can be as late as the time the site was taken over for restoration.

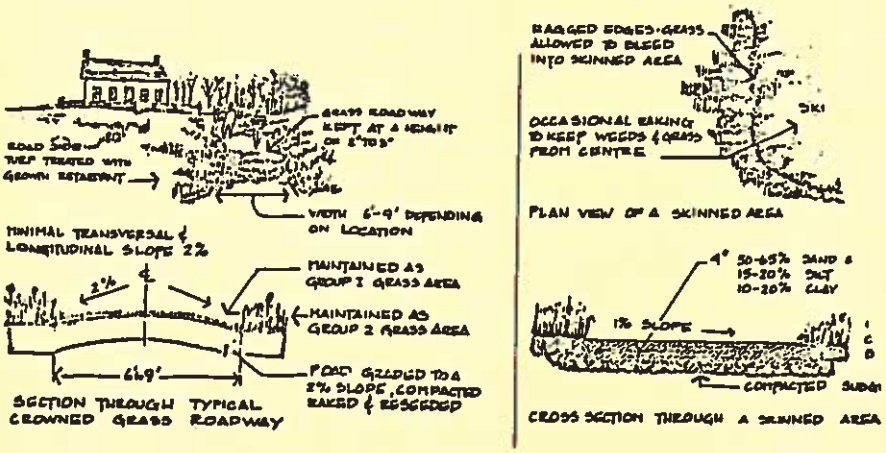
Landscape and architectural terminal dates do not need to be identical. While you are dealing with static elements in architecture, with landscape you have a modified ecosystem where controlled succession is constantly taking place. Plant growth in time affects and finally transforms the appearance of an area. Thus the cut-off date is often determined by the character and pattern of the landscape rather than by a fixed form as in architecture. In your planning, consider carefully the historical relationship between the buildings and the nature of the extant landscaping.

A recurring problem in landscape restoration, for example, is whether or not to remove mature trees planted later than the selected terminal date. There is no patent answer. Usually if the material reflects the character and pattern of the landscape it should be preserved. But make each decision on an individual basis.

The location of contemporary facilities associated with the landscape must be considered. Take particular care to estimate how much parking will be needed and where it will be located. Will off-street parking be sufficient? Is staff parking necessary? Take into account how services such as electricity, telephone, and water will be brought to the site. Outdoor furniture, benches, waste disposal units, directional signals, and lighting should also be reviewed.

Controlling visitor use can be a major problem. Grounds originally designed for use by five or six persons are expected to absorb hundreds. You may require design solutions that are not historical. Where the scale is such that too many people will destroy the intimacy and evanescence of the grounds, give serious consideration to excluding visitors from certain areas of the site.

Many projects fall short by overemphasizing a garden when, in fact, the open spaces tell more about the persons who lived there. Unless the house was a formal mansion, research will turn up scanty information about garden layout. The average landscape was arranged for utility and convenience rather than decorative effect. Look for such things as the woodpile and chopping block, outhouse, ash pit, well, chicken yard, cold frame, and orchard to understand this earlier way of life. Remember that the garden and plant material are only elements of the restoration.



Guidelines with sketches (such as the examples above) should be prepared to aid in pn pretive maintenance of landscape features, a critical procedure often overlooked.

PLANT MATERIAL

Prepare a preliminary planting scheme along with the layout. Express the ideal in this plan. If it is not possible to obtain certain plants, you can then look for substitutes.

Begin a program of research and acquisition of plant material once a terminal date has been selected. This will involve locating and propagating plants appropriate to the period. A difficulty in researching and in restoring early landscapes is the fact that plants, unlike furniture, do not live on indefinitely, particularly when neglected. Also, plant varieties naturally interbreed and may appear later in different forms and under different names. Most old varieties can, however, be located. The secret to successful period landscape planting is perseverance and continual searching.

A certain amount of material will be located through the landscape archaeological program. Do not limit yourself to the site. Seeds, roots, and cuttings can be obtained from old private gardens, graveyards, and rural areas where plant material has escaped. A number of commercial nurseries specialize in indigenous and old variety material, and many restored sites trade and sell period seeds and cuttings (see bibliography).

Botanic gardens, agricultural colleges, and the agricultural extension service have experts who will aid in identifying plants, give information on their gation and maintenance, and c testing. They also have good re libraries for research purposes garden or horticultural societies sibly provide expertise and m in searching out material. Do look their assistance and coop

Very early in the restoratio while research is under way, e in-house nursery. It does not a large area, but should be ized along the lines of a nursery, with all material catalogued. A nursery will receive, propagate, and pr tain plant material as it is a is particularly advantageo toration project involves Material displaced during will be preserved. By car quantity of material in a can also cut down on ma Most important, mater when available, and w tities are required the gated from a few cutti

THE RESTORATIO

Restoration work search and plans. Ba and the cost estima

ings are prepared. From these drawings landscape construction will be carried out. The actual construction should be under the technical direction of one person who is experienced in working with landscape contractors. His role will be to work with the landscape contractor, supervising construction and use of proper materials. He will also ensure that working drawings are followed and existing landscape features are not damaged during construction.

If budgetary considerations are paramount, establish a phased program in which construction takes place over several years and the costs are spread out. In phasing landscape work, major tree planting takes priority, so the trees can become established and grow as the work proceeds.

MAINTENANCE

Maintenance is a vital part of the restoration. A landscape restoration is dependent on the maintenance it receives. Prepare guidelines on all aspects of maintenance. Include the types and location of annuals to be planted each year; a schedule of care for site structures; even the length and regularity of grass cutting and what to do about weeds. At times both economics and manpower intrude on history. Modern equipment need not distract. The sound of a power mower adds nothing to the scene nor does dodging a sprinkler system. Imposing contemporary maintenance techniques on a historic landscape can void the restoration effort.

It is not enough to restore a landscape, and then go away and leave a caretaker to cut the grass. A historic landscape requires a person who is not only skilled as a gardener but, most important, is sensitive to the historicity of the project. In essence, he is a landscape curator. Bring the maintenance person in early so he can acquire an understanding of the interpretation and develop techniques appropriate to the period of restoration.

SOURCES OF PLANT MATERIAL

Ashby's Garden Centre, Rt. 2, Cameron, Ont.

Stark Nursery, Louisiana, Mo. 63353.

Wayside Gardens, Mentor, Ohio 44060.

FOR FURTHER READING

Beresford, Maurice. *History on the Ground: Six Studies in Maps and Landscapes.* London: Methuen, 1971. The author illustrates application of landscape archaeology techniques.

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Leighton, Ann. *Early American Gardens for Meate or Medicine*. Boston: Houghton Mifflin, 1970. Seventeenth-century New England gardens—what was found growing, what was planted, and what was followed as fashion—are described.

Lockwood, Alice G. B., ed. *Gardens of Colony and State*. 2 vols. New York: Charles Scribner's Sons, 1931 and 1934. First serious effort to correlate obscure and scattered records of gardens and gardeners before 1840, this book remains the primary source for studying historic American gardens.

Hume, Audrey Noël. *Archaeology and the Colonial Gardener*. Williamsburg, Va.: Colonial Williamsburg Foundation, 1974. Archaeological Series No. 7. Discussed are techniques and types of archaeological information unearthed at Colonial Williamsburg, including garden fences and walls, steps and walks, garden houses, tools, and equipment, plants and planters.

McKee, Harley J., ed. *Recording Historic Buildings*. Washington, D.C.: U.S. Government Printing Office, 1971. Pages 120-24 outline a technique for making landscape site surveys and measured drawings.

Minhinnick, Jeanne. *At Home in Upper Canada*. Toronto: Clarke, Irwin & Co., 1970. This discussion of domestic life in Upper Canada, the present province of Ontario, includes a description of early gardens and a list of historic plants.

"Recording Historic Monuments." *Bulletin, Association for Preservation Technology* (APT, Box 2682, Sta. D, Ottawa, Ont.). Vol. VII, No. 1. (Forthcoming March 1975.) A compilation of technical papers outlining procedures for recording buildings, making engineering inventories, and completing landscape surveys.

Stewart, John J., ed. "Historic Gardens in Canada and the United States." *Newsletter of the APT*. Vol. II, No. 3, 1973. The directory contains three headings: historic gardens, garden experts, and sources of historic plant material.

Sykes, Meredith, and Stewart, John, eds. "Historic Landscape Restoration in the United States and Canada: An Annotated Source Outline." *Bulletin of the APT*. Vol. IV, Nos. 3 and 4, 1972. Published and unpublished material on historic landscape preservation and restoration, classified and analyzed by categories: general discussions, restored gardens, historical references, archaeology, and seed sources.

John J. Stewart is a restoration landscape architect presently employed by Canada's department of Indian and Northern Affairs, specializing in the conservation of historic landscapes for the Canadian Historic Sites section. Along with his work with historic sites he does private consulting and teaches. A graduate of the School of Landscape Architecture at the University of Guelph, Ontario, he has published several articles dealing with period landscape architecture in North America. Stewart is a member of the Association for Preservation Technology and the American Society of Landscape Architects' historic preservation committee.

TECHNICAL LEAFLET 80

Technical Leaflets are published by the American Association for State and Local History for the purpose of bringing useful information to persons working in the state and local history movement. The series does not follow the same categories month after month, since the selection of subject matter is based upon varied inquiries received by the Association's home office. The leaflets, which are detachable from the magazine, are copyrighted © and should be catalogued as part of HISTORY NEWS.

American Association for State and Local History Technical Leaflet 80, HISTORY NEWS. Vol. 29, No. 11, November, 1974, *Historic Landscapes & Gardens: Procedures for Restoration.*

AASLH is grateful to the National Endowment for the Arts for financial assistance in the preparation of this leaflet.

Archaeology

BOXWOODS, BULBS, BARNS AND BUILDER'S TRENCHES

"Georgia's Living Places: Historic Houses in Their Landscaped Settings" brings together the three disciplines of architecture, landscape architecture, and historic archeology. This association acknowledges the linkage between the historic house and its surrounding grounds, the historic archeological site. Historic archeology is a relatively new discipline. In fact, it was not until the Federal government conducted research during the 1930s that archeology gained prominence in Georgia. Most archeological research from that time focused on the Indian occupation. The study of historic Euro-American archeology gained a foothold in the 1970s, but the information remained within the universities and the governmental agencies that were required to protect archeological sites from harm. "Georgia's Living Places" is one of the first attempts to introduce archeology to the individual owners of historic homes. To assist in the preservation of your historic property, the following information has been prepared to provide you with guidelines for using archeological techniques.

Most owners of historic houses enjoy the character and quality of an old building but still want the luxuries and amenities available to the owners of newer homes. The field of historic preservation has been successful in establishing appropriate techniques and guidelines for restoration and rehabilitation that protect the architectural integrity of historic structures yet allow for modern living. Those homeowners who want to restore the historic landscape have a dual problem--how to provide modern amenities without damaging or destroying the archeological features of the historic landscaped setting. The difficulty lies in

determining where landscape restoration ends and archeological interpretation begins. Both disciplines are involved with reading and observing changes to the land caused by historic activities. The guidelines presented in this document will help you learn to "read" the story your landscape can tell about the activities that once took place on your property.

Archeological **excavations** should be conducted by professional archeologists because information is difficult to recover from the earth without proper training. This does not mean that you, as the owner of historic property, cannot conduct certain investigations of your own. There is some information about the history of your property that cannot be obtained any other way, particularly in the absence of photographic or written information. Before attempting to utilize the following archeological techniques, you should be aware of two points that form the basis of an archeological code of ethics.

Archeological sites are extremely fragile. Once destroyed or excavated they are gone forever and so is the information they contain. Archeological sites can never be replaced or recreated.

Only by avoiding any ground disturbance or by carefully investigating your property can the information contained in the earth become part of our cultural heritage. Archeological sites are **cultural resources** as are historic structures and works of art. Compare cultural resources to natural resources. We all know that unless we manage our natural resources very carefully, animals and plants will become endangered species. We also know that unless we monitor the impact our activities have on our environment the air we breathe and the water we drink will become polluted. Sometimes, with research and active concern, endangered species can be brought back from the edge of extinction. Trees can be replanted. Polluted water and air can often be made clean. But historic buildings and the archeological sites that are associated with them can never be replaced because the people and times that created them, their materials and craftsmanship are now part of history. These **cultural resources** are non-renewable, unlike our frequently forgiving natural environment that sometimes allows us to correct our mistakes.

Artifacts alone have no monetary value.

An artifact's value lies in what can be learned from it about past lives and culture. Artifacts are priceless; there is no way to put a value on knowledge. For this last reason those references that place monetary values on artifacts and collectibles have not been included in the bibliography.

The following guidelines are presented with the hope that you, as owners of historic homes, will become part of the network of people who have more than a passing appreciation of historic homes, landscapes, and archeology. Through your preservation efforts you will be stewards of Georgia's cultural heritage.

WHAT IS HISTORIC ARCHEOLOGY?

When you look out the windows of your house at your surrounding property (gardens, yards, grounds, landscapes), do you realize that you are looking at an archeological site? For the present purposes, an archeological site is defined as the boundary of the property that you now own. The two key words to remember are "boundary" (space) and "now" (time). To understand the archeological site that makes up your property, you must understand that within time and space events occurred and objects were created that reflect the patterns of the lives of those who lived in your house before you. These long ago events show up as archeological features and artifacts left behind in the ground. **Archeology is best defined as the study of past people based on the things they made and left behind and the way they left their imprint on the earth.**

Archeology is really the study of other peoples trash and garbage. Artifacts are simply those man-made objects that were thrown away or lost. This trash can be food remains, personal items, ceramics, metal, broken toys or just the general clutter that is a by-product of everyday life. An earring dropped while walking from the car to the house, a toy hidden by a child or a bone buried by the family pet all become artifacts that reflect a family's activities and lifestyles. These remains can be as common as a peach pit, a ham bone, a broken teacup or bent soup spoon but all together these objects can tell an interesting story about the people that once used and discarded them. Archeology is also the study of the past, but it can be anybody's past and as recent as yesterday.

All Those Holes!

Georgians have been producing and disposing of trash and garbage since they landed with General Oglethorpe in 1733. It was not until 1972, over 200 years later, that the State of Georgia passed legislation to control trash disposal. Most local governments have voluntarily provided some form of garbage and trash collection for the last 40-50 years. Prior to that time the disposal of household refuse was left up to individuals, thus creating the historic archeological record. How did this garbage become part of the archeological record? Many years of archeological research have resulted in at least one proven fact–**If a hole exists in the ground, then someone will throw something into it!**

If this is an archeological truth, then once open holes such as wells, privy pits, builder's foundation trenches, ditches, and gullies are likely to contain artifacts. And because there were few ways to get rid of garbage and trash, often pits were dug just for disposal purposes. Any hole in the ground, even a hole dug for a fence post, will most likely contain information about the lives of people who used to live in your house.

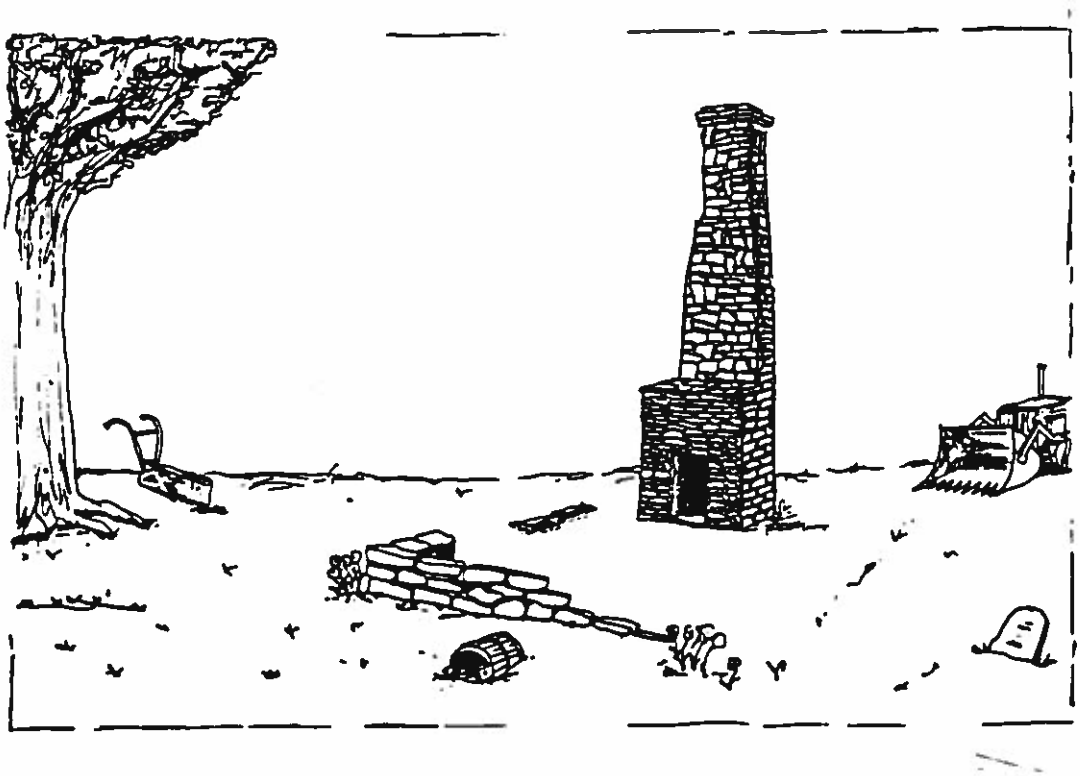
Is My Historic House an Artifact?

In addition to being a piece of "garbage/trash", an artifact is a three dimensional expression of an idea that someone once had. How an object was created and then used to make this person's world a better and more comfortable place is the human way of adapting to and controlling the environment. As artifacts are used to modify the environment, features of an archeological site are created. For example, a shovel (artifact) is used to dig a well (feature). A well house (artifact) is built to protect the water in the newly dug well. An axe (artifact) is used to fell trees and to make lumber in order to build a barn (artifact) to protect livestock and store grain.

In the same way people built houses (artifacts) to protect themselves and their families from the weather, unknown dangers, and to express ideas about architectural styles. It is easy to see that your historic house, so lovingly and carefully constructed by human hands, is actually an important artifact within the boundary of your archeological site. Houses, as archeological artifacts, are one of the best ways to study our heritage because, unlike many artifacts and features of an archeological site, they do not have to be excavated to be seen and studied.

There is more to your archeological site than just your house. People have only recently been able to carry out their daily activities under a single roof. During the 18th and 19th centuries, the house was only one of many buildings in an entire complex. The "yard" as we know it today did not exist during the 18th and most of the 19th centuries. The yard was a work area that surrounded the outbuildings and house, and many household activities were carried out there. Both urban and rural property owners had to construct many buildings in order to meet sanitation, food storage, food preparation, and livestock housing needs. Some examples of these outbuildings are cookhouses, smokehouses, privies, barns, wagon sheds, chicken coops, corn cribs, well houses, and spring houses. Other structures built for specialized needs and activities include dairies, granaries, tool sheds, silos, and arbors. Other types of houses that might occur are slave houses from the plantation era or more recent tenant houses.

All of these activities and buildings left their imprint on the land just as your activities do today. Our way of life has changed so that it is no longer necessary to maintain a complex of structures to support a family. As the end of the 20th century approaches, we see the survival of a single above ground structure--the house with an attached garage. The yard is no longer required to support the functions of the household. Now the yard is no longer a work area but the place where we carry out leisure and recreational activities...a personal retreat.



HOW TO RECOGNIZE ARCHEOLOGICAL FEATURES AND ARTIFACTS

Looking at your surroundings can tell you more than how much yard work you need to do. Most archeological sites and some archeological features are visible above ground. Indications of underground archeological features often can be seen on the ground surface as depressions. These may be old wells, privy pits, cisterns, graves, traces of old roads or paths. Mounds could be old foundations or walls. Occasionally someone is lucky enough to own a house that still has some of its original plantings such as formal boxwood gardens. These can indicate how the original landscape looked. Often careful trimming and clearing of undergrowth and removing dead leaves and weeds will give a better idea of the planting pattern. For example, long dormant bulbs may bloom. Many plant species are long-lived and are indicators of the location of original flower beds, walkways and garden borders. By training yourself to look for man-made changes in your surroundings, you can learn to identify archeological features through surface indicators very quickly.

Changes to Look for Above Ground

One of the best ways to locate an archeological feature is to look for those areas in your lawn that either turn brown or wilt first after a dry spell or those areas that turn green first in the spring or after a heavy rain. Brown areas of stunted growth usually mean that there is something hard beneath the surface. Plant roots cannot penetrate these areas and dry out faster when they cannot find moisture. This condition may be caused by a buried brick walk, fish pond, foundation footings or just a well

used path. A spot that turns green first in the spring or after a heavy rain usually does so because there is richer or looser soil in this location. This may indicate that this is the location of an old garden, a well, or a privy pit.

Ornamental plants and fruit trees were frequently used both for food and for ornamentation. Many of these species will survive with little or no care. Even if only a few plants remain, they often provide clues to the location of old orchards, formal gardens, and walkways. Look for straight rows of trees that may indicate old fence lines or paths. Growth patterns that do not look natural and plant species that do not occur naturally are indicators of past activity.

How Do I Locate a Missing Building?

Most of our historic Georgia houses and outbuildings are frame structures built on pier foundations. This building pattern allowed air to circulate freely, preventing moisture and insect damage. Pier foundations were not filled in until the late 19th or even the early 20th centuries when the "out house" moved inside. The addition of interior plumbing and other utilities made it necessary to enclose the underside of the house in order to protect plumbing from the weather and improve the appearance of the house. Although frame structures were substantial, if they were destroyed by fire nothing was left to mark their sites but the chimneys and pier foundations. It was easy for this remaining evidence to disappear from the surface given a little time and neglect. To make matters more difficult, materials from old buildings were often reused to construct a new one, leaving very little mark where a house once stood. The additional materials that were added to the foundation during the filling-in process make it a little easier to identify a old home site, as does a standing chimney, but it is still sometimes very difficult to locate structures that were largely made of wood.

Large old trees such as oak, hickory, and elm were often left standing to shade the house or yard. These giants are the quickest way to pick out the old homeplace and are often referred to as "homeplace trees". Cedar trees, respected for their insect repellent properties and their Christian and Masonic symbolism were also commonly planted near the house. In some parts of the South a cedar was planted when a boy was born. A crape myrtle or magnolia was planted for a girl child. Several varieties of climbing roses will continue to bloom long after a building is gone and undergrowth has spread. Ground covers such as English Ivy and Vinca minor (cemetery vine) are clues to locating both old buildings and old cemeteries. Privet was commonly used as a hedge but left untrimmed spreads like kudzu.

Look for these surviving trees, shrubs, and vines together with chimney and foundation remains to help locate old dwellings. When looking for an outbuilding, pay particular attention to possible old footing stones because they may be the only above ground remains. Never let someone remove brick rubble or other old building material without carefully clearing away the surrounding vegetation and inspecting the cleared area for signs of past activity.

What about Buried Features?

Although many archeological features are visible on the surface, there are always those features that you will not be able to see. The most common of these may be discovered when it is necessary to repair your house. You may have to remove deteriorated portions of the building in order to make repairs, thus exposing ground surface that has been covered since the house was built. A little archeological detective work in the newly exposed ground can provide clues to help you relocate the original place and measurements of long gone features such as porches, stairs, piers, walkways and foundations. You will also be able to tell if there was once a wing or ell attached to the house.

If it is necessary to repair the foundation of your house, you may damage an archeological feature which contains excellent information about the house's history and its former occupants. This feature is called the builder's trench, which was dug in order to build the footings or foundations of your house. It was used as a ready-made trash pit while your house was being constructed. After the house was finished, the trench was filled with dirt. The fill dirt may have come from the surrounding yard and could also contain artifacts. So you can see that this filled-in trench is a time capsule that contains objects thrown away by the people who built your house or lived in the area when it was being built.

Remember the "archeological truth" that addresses holes in the ground. There are many interesting objects in these easily overlooked places. A carpenter may have thrown away a broken tool or the remains of his lunch. A passing child may have lost a toy or a visiting neighbor dropped a coin through a hole in his pocket. Think of the trash and garbage that contemporary construction workers throw away. Make a comparison to what might have been a historic counterpart based on your knowledge of the materials in your home.

A word of caution about buried features: old cemeteries were not always marked. Also, headstones were sometimes removed by vandals

leaving nothing to mark the location of the graves. If you uncover a grave with human remains, notify your local law enforcement official. The county coroner or other official will want to determine if the remains are historic or the result of foul play. Never purposefully dig up an old grave or coffin. This is illegal!

How Old Is It?

How do archeologists figure out how old archeological sites and artifacts are anyway? There are many sophisticated chemical, physical and analytical tests that can be conducted to determine the age of artifacts. The simplest and most commonly used method is the concept of **stratigraphic** placement of artifacts, soil layers, or features. Simply stated, the oldest objects will be those on the bottom and the most recent will be on top, provided that the trash pit, privy hole or well has not been disturbed by any later digging. Even burrowing animals can move artifacts from one soil layer to another.

It was common practice for people to cover a layer of refuse or debris that had been placed in a trash pit with a layer of clean fill to reduce noxious odor and insects. Lime was often thrown into privies for the same reasons. These layers clearly separate the order in which objects were deposited. The old well is another feature in which layered (stratified) artifact deposits can be found; however, wells were routinely cleaned out to keep the water supply from becoming contaminated. Dried up and unused wells were filled up with trash just as any other open hole would have been. It is important to remember that removing artifacts from both wells and privy holes can be extremely dangerous. This is one of the activities that must be left up to a professional for your own safety because of potential cave-ins or collapse. The phrase "first in, last out" will help you remember when you are dealing with layers of materials that the oldest artifacts or

deposits will be on the bottom and the most recent will be on the top.

Artifacts are not the only things that are deposited in layers. Buildings frequently burned or were demolished and new structures built on the same place. Former fence lines with their rows of circular impressions left by the original posts often march across earlier activity areas or the remains of old buildings. Interpreting these intensively used areas can be confusing and best left to professional archeologists. Stratified deposits and the artifacts they contain are one of the best sources of information for archeologists. They can be accurately dated, and the artifacts occur in context with other artifacts. The association of groups of artifacts is called archeological context. These groups allow archeologists to determine how a particular area was used, why it was used and by whom. Most of these stratified deposits are deeply buried and will not be disturbed unless a great deal of dirt is moved.

Are All Artifacts Buried?

It is easy to think that all artifacts associated with archeological sites are buried. Actually some of the best preserved ones can be found above ground in protected areas such as abandoned cellars, the crawl space under buildings, dilapidated outbuildings and open trash pits. Whole or only slightly damaged glass bottles, ceramics, metal artifacts and on rare occasions leather, paper, and cloth can be preserved if dry, dark, and cool conditions exist. The bibliography included in this section contains references to assist you in identifying and dating artifacts. To keep from losing important artifacts, do not allow "trash or garbage" to be cleared away from your site by someone who is insensitive to the information it might contain about your house or property. Chances are, more than trash or garbage is being removed.

HOW TO RECORD YOUR BOXWOODS, BULBS, BARNS, AND BUILDER'S TRENCHES

Mapping and Collecting

Supplies you will need:

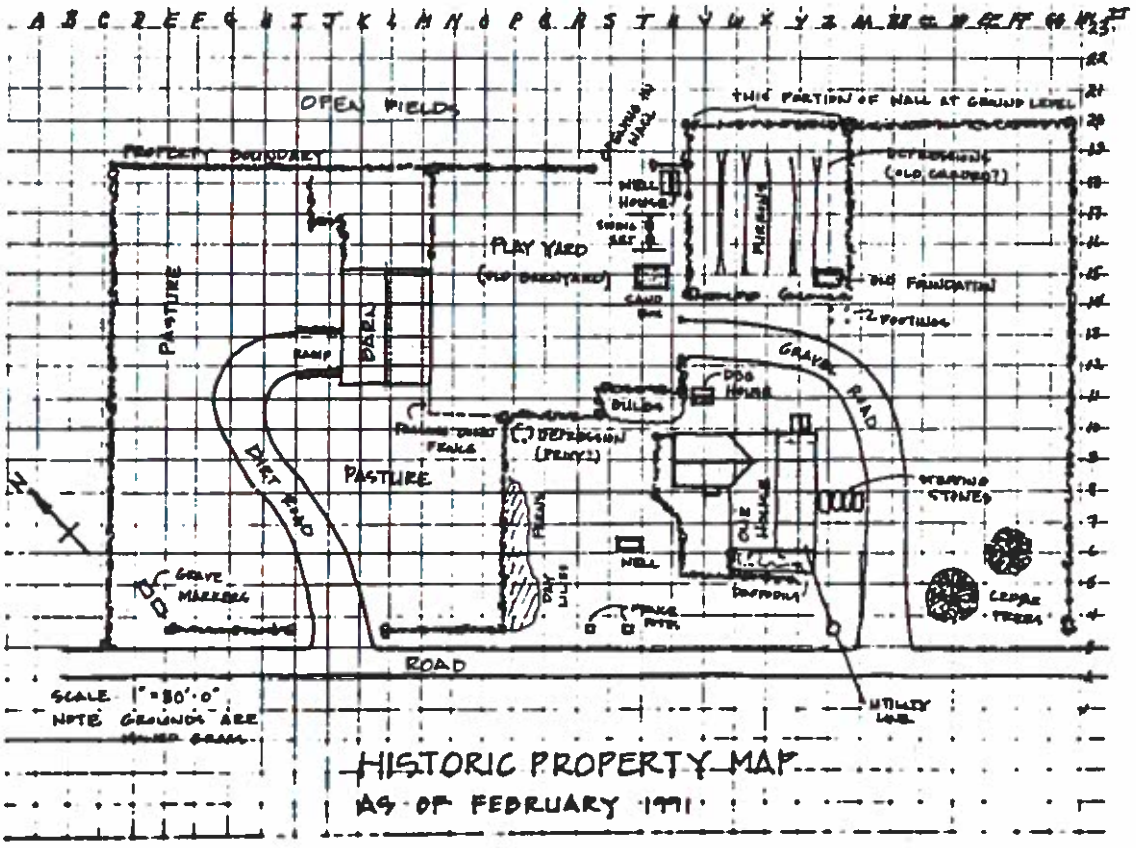
1. A good map of your property showing its legal boundaries
2. Pencil and straight edge
3. Fine point, indelible marking pen
4. Ziplock storage bags, assorted sizes
5. Storage boxes (shoe box size)
6. Camera and color negative film
7. Notebook with graph paper

The first thing you will need is a good map of your property showing the boundaries and any buildings, fences, permanent landscaping features, drives, and walkways. Draw the map to scale using your graph paper and make it as detailed as possible. Divide your property into equal divisions and mark these divisions on the map. In an urban setting, the divisions may be as simple as: front yard, side yards, and back yard. Give each division a number, letter, or name, and put this on the map. Mark a storage box for each division; these will be used to store and organize the artifacts found on your property.

Proceed slowly! Observe your property for at least four seasons before making any major changes to the landscaping. During the year make note of any changes in the vegetation that might indicate the presence of an archeological feature. When you see changes in vegetation, note these on the map and

photograph them. After you are satisfied that archeological features have been located that you do not want to damage, then your landscaping can be planned to avoid them.

It will be impossible to avoid disturbing all below ground features on your site but now, with your map and your knowledge, you will know what areas might contain important archeological features. After you decide what features to avoid and which areas to restore or change, you can begin your landscaping or other ground disturbing activities. Remember that heavy equipment will usually turn up enough dirt to bring artifacts into view. Clean each artifact, place it in a ziplock bag and label it according to where it was found. Place the artifact in the box marked for the area in which you found it. By organizing your collection and mapping your site, you will be able to tell what kinds of activities took place in the different parts of the yard or grounds. This information will guide you in future decisions about the use of your property.



Adapted from a plan in *Landscapes and Gardens for Historic Buildings*

Time Line Activity Sheet

It may help you understand the archeological process that has taken place on your property if you prepare a time line for the period your family has lived there. Start with the date that you moved to your property. Think about the changes your family has made over the years. Perhaps when you first moved there, the household consisted of you and your spouse. You may have made a few changes in the property to accommodate your lifestyle, but the major changes probably came after the birth of your children. Post holes were dug to put up a fence to keep children and pets in and others out. The ground was leveled for a swing set and sand box. A basketball court and a wider driveway were needed so forms were placed and cement poured. Gardening became a passion so an area was tilled. The dog died and was buried along with his collar and favorite toys. Someone decided a swimming pool would be nice, and raising livestock as a hobby necessitated the rehabilitation of the old barn. During all of this tools were lost or broken, nails dropped, and toys buried and forgotten. Sound familiar?

All of these activities have something in common; they leave an imprint on the ground and artifacts in the earth. You are in effect creating an additional layer on top of the old one. You are adding your historic footprint to those who have done so before you. By developing an awareness of your historic home in its historic setting, you are not creating a museum where you are afraid to put a shovel into the ground, rather you are insuring that your "hidden heritage" is not needlessly destroyed. Indeed, your children and grandchildren's "sense of place" may continue to be found in their own backyards.

Time Line Work Sheet

1990	foundation waterproofed, basement enlarged and finished
1985	porch enclosed and brick patio improved and enlarged.
1980	driveway widened; garage, pool/pool house built
1975	basketball goal built; garden plot established
1970	back yard fenced; swing set and sandbox constructed
1965	current owner purchased house

1955	porch remodeled/new one added; brick patio/grill built.
1950	owner subdivided and sold two acres; brick garden wall built; foundation plantings and lawn redone.
1920	garage built; driveway paved; major remodeling including indoor plumbing
19??	fish pond, gazebo
1900	iron fence replaced picket fence around front garden
1870	original 202 1/2 acres subdivided and given to heirs
1850	house built; original house used for hay storage
1840	land lot purchased from original owner; small frame structure built
1830	county created; land lots sold at auction

ARCHEOLOGICAL DO'S AND DON'TS

Do:

1. Make an archeological map of your property including boundaries, all existing structures, ruins, and above ground features.

2. Divide your site into equal parts or divisions, and locate these divisions on the map.

3. Collect any artifacts you see on the ground surface and identify the location in which they were found.

4. Watch for concentrations of artifacts when you are disturbing the ground in any manner.

5. Carefully clear undergrowth and vegetation from around old foundations and standing chimneys. Collect and map artifacts from these locations.

6. Remove any artifacts from crawl spaces, abandoned buildings or open trash pits. Label the locations where they were found on your archeological basemap.

7. Supervise any construction that involves earth moving activities. Stop construction if you run into a feature or concentration of artifacts. Collect, label and or map what you see.

8. Proudly display artifacts collected from your archeological site. Fill out the attached historic structure survey form and

the archeological site information form and send them in to the Regional Development Center's Historic Preservation Planner or the nearest chapter of the Society for Georgia Archaeology.

Don't:

1. Disturb human burials if you come across them. If you do, call your local law enforcement officer immediately.

2. Excavate privy pits or wells. This is dangerous and should be done only by a professional archeologist.

3. Do any major construction involving excavation without checking the effect it will have on both the landscape and the archeological site.

4. Allow anyone to remove artifacts from your property. You own the artifacts on your site, and they should remain with the property.

5. Fail to notify your RDC Historic Preservation Planner or the Historic Preservation Section of the Georgia Department of Natural Resources if you think you need professional assistance.

When Do You Need an Archeologist?

Archeological excavations are not usually necessary for the preservation of historic homes and landscapes. You will usually obtain sufficient documentary and graphic information as you research the history of your house to allow for the restoration of the house and landscape. If it is desirable to actually reconstruct outbuildings and other features that are no longer visible on the surface, then you may want the services of a professional archeologist. This is particularly true if you are attempting a historically accurate restoration.

Professional archeology is expensive. It requires equipment, time, and trained workers. This can cost quite a bit of money. Sometimes the interest of the homeowner and the significance of the property are such that a college or university may be willing to donate some services; however, this is rarely the case due to specialized research interests and limited funds for excavation.

If you do decide to obtain a professional archeologist, the place to start is with the Historic Preservation Planner at your Regional Development

Center or the Georgia Council of Professional Archaeologists. They may be able to assist you in evaluating the archeological potential of your property or put you in contact with the appropriate organization. The Historic Preservation Section of the Georgia Department of Natural Resources is also available to provide technical assistance.

The Society for Georgia Archaeology is an organization made up of both professional and avocational archeologists. It is open to anyone with an interest in archeology. This group is also a good contact if you require archeological assistance.

GLOSSARY OF ARCHEOLOGICAL TERMS

Archeology	The study of past people and cultures based on the artifacts they left behind and the ways they left their imprint on the world (Deetz, 1967).
Archeological Record	Information that can be obtained by excavating archeological sites.
Artifact	Objects made or modified by man and left behind either purposefully or unintentionally.
Context	Simply means "in association with."
Culture	The shared, learned, lifeways of a group of people.
Collection	An accumulation of artifacts deliberately gathered for exhibit or study.
Cultural Resource	Anything made or modified by human beings. This includes buildings, landscapes, objects, and archeological sites.
Excavation	The systematic removal of layers of soil and artifacts from the earth.
Features	These may be the remains of a foundation wall or a chimney base. Other features such as a filled-in post hole or a builder's trench are indicated by differences in soil colors. Often features have artifacts with them.
Heritage	Something that is acquired from the past.

Indicators	Plants or stains in the soil or changes in the surface of the ground that help identify the location of a site or feature.
Stratigraphy	Stratification refers to the sequence in which layers of soil or artifacts are deposited in the earth. Usually, the oldest deposit is on the bottom since it was put down or in first. Removing objects or layers stratigraphically to determine in what order they were deposited is usually referred to as "first in–last out".
Site	Any place in time where man's activities have left either artifacts or modified the earth in some way.
Time Line	A graphic line showing the passage of time from the most recent point in history to the most distant and activities that occurred at different intervals.

PLACES TO VISIT/SOURCES OF INFORMATION

Historic Georgia Sites to Visit

The following are examples of historic sites that have interpretive exhibits ranging from completely restored working plantations and villages to individual house museums. Visiting these different sites will expose you to the numerous types of outbuildings and other features that might have been present on historic properties. Some restorations have been based on the results of archeological excavations.

A.H. Stephens State Historic Park
PO Box 235
Crawfordville, Georgia 30631
(404) 456-2602
Taliaferro County

Atlanta Historical Society
3101 Andrews Drive, N.W.
Atlanta, Georgia 30305
(404) 261-1837
Fulton County

Cumberland Island National Seashore
P.O. Box 806
St.Marys, Georgia 31558
(912) 882-4338
Camden County

Elijah Clark State Park
Box 293, Route 4
Lincolnton, Georgia 30817
(404) 359-3458
Lincoln County

Etowah Mounds State Historic Site
813 Indian Mounds Road SW
Cartersville, Georgia 30120
(404) 387-3747
Bartow County

Fort Frederica National Monument
Rt. 9, Box 286-C
St.Simons, Georgia 31522
(912) 638-3630
Glynn County

Georgia Agrirama
P.O. Box Q
Tifton, Georgia 31794
(912) 386-3344
Tift County

Hofwyl-Broadfield Plantation State Historic Site
Route 10, Box 83
Brunswick, Georgia 31520
(912) 264-9263
Glynn County

Jarrell Plantation State Historic Site
Route 1, Box 220
Juliette, Georgia 31046
(912) 986-5172
Jones County

New Echota State Historic Site
1211 Chatsworth Hwy., N.E.
Calhoun, Georgia 30701
(404) 629-8151
Gordon County

Ocmulgee National Monument
1207 Emery Highway
Macon, Georgia 31201
(912) 752-8257
Bibb County

Okefenokee National Wildlife Refuge
Rt. 2, Box 338
Folkston, Georgia 31537
(912) 496-7836
Charlton County

Robert Toombs House State Historic Site
P.O. Box 605
Washington, Georgia 30673
(404) 678-2226
Wilkes County

Travelers Rest State Historic Site
Route 3
Toccoa, Georgia 30577
(404) 629-2598
Stephens County

The Vann House State Historic Site
Route 7, Box 7655
Chatsworth, Georgia 30705
(404) 695-2598
Murray County

Westville
P.O. Box 1850
Lumpkin, Georgia 31815
(912) 838-6310
Stewart County

Wormsloe State Historic Site
7601 Skidaway Road
Savannah, Georgia 31406
(912) 352-2548
Chatham County

ARCHAEOLOGY
Sources of Information
STATE AGENCIES AND INSTITUTIONS WITH ARCHAEOLOGICAL INTERESTS IN GEORGIA

Ga. Department of Natural Resources
Parks, Recreation and Historic Sites Division

Office of the State Archaeologist
208 Martha Munro Hall
West Georgia College
Carrollton, Ga. 30118
Lewis H. Larson, Ph.D., State Archaeologist
Dan Simpkins, Assistant to the State Archaeologist
Phone # 404/834-6454 or Gist 232-6454

State Historic Preservation Office
Historic Preservation Section
Suite 1462, Floyd Towers East
205 Butler St., S.E.
Atlanta, Ga. 30334
John R. "Chip" Morgan, Staff Archaeologist
Richard A. Warner, Cultural Resource Reviewer
Phone # 404/656-2840 or Gist 221-2840

Ga. Department of Transportation

Environmental Analysis Bureau
Ga. D.O.T.
65 Aviation Circle
Atlanta, Ga. 30336
William R. Bowen, Ph.D.
Robert F. Entorf, Archaeologist
Phone # 404/699-4423 or Gist 229-4423

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Social Science Division
South Ga. College
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Mr. Chris Trowell
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Kennesaw State College

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Augusta College

Dept. of Sociology
Augusta College
Augusta, Ga. 30910
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Phone # 404/737-1735 or Gist 337-1735

OTHER INSTITUTIONS AND ORGANIZATIONS

Shorter College

Division of Social Sciences
Shorter College
Rome, Ga. 30161
Ms. Ann Otteson
Phone # 404/291-2121, ext. 284

Columbus Museum

Columbus Museum of Arts & Science
1251 Wynnton Rd.
Columbus, Ga. 31909
Mr.Frank Schnell
Phone # 404/322-0400

Confederate Naval Museum

James W. Woodruff, Jr., Confederate
Naval Museum
201 - 4th Street
P.O. Box 1022
Columbus, Ga. 31902
Mr. Bob Holcomb
Phone # 404/327-9798

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REGIONAL PRESERVATION PLANNING SERVICES

Georgia is divided into eighteen planning regions, each served by a Regional Development Center (RDC) providing comprehensive planning assistance to local governments in cooperation with the Historic Preservation Section of the Georgia Department of Natural Resources. Thirteen RDCs operate Historic Preservation Planning Programs. A Preservation Planner is on staff at each of these RDCs to provide assistance to local governments, individuals and organizations.

Services include:

* guidance on nominating properties to the National Register of Historic Places
* information on Georgia history and archeology
* preservation tax incentive information and assistance
* grants and funding information
* education programs for schools, civic or community groups and libraries
* heritage tourism information
* assistance in establishing preservation commissions and local ordinances
* technical information on rehabilitation and maintenance of historic properties
* guidance on comprehensive planning for preservation
* assistance in meeting Federal Environmental Review requirements

Each Preservation Planning Program operates an Advisory Committee on Historic Preservation. Committee members assist the Planner in promoting preservation throughout their region.

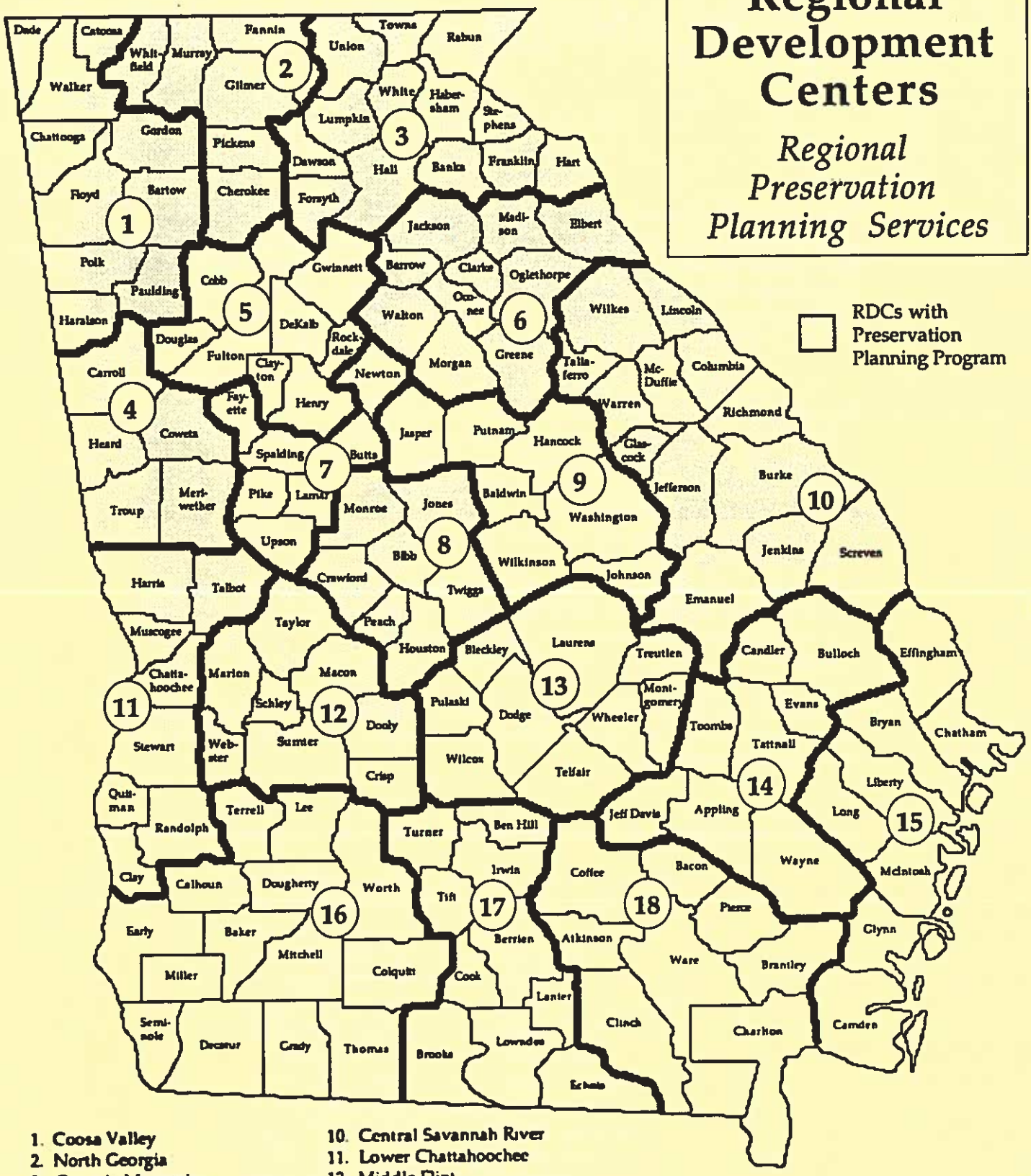
Regional Development Centers with Preservation Planning Programs in 1990 are:

Altamaha Georgia Southern - Baxley (912)367-3648
Central Savannah River - Augusta (404)737-1823
Chattahoochee-Flint - Franklin (404)675-6721
Coastal - Brunswick (912)264-7363
Coosa Valley - Rome (404)295-6485
Georgia Mountains - Gainesville (404)535-5480
Lower Chattahoochee - Columbus (404)324-4221
Middle Flint - Ellaville (912)937-2561
Middle Georgia - Macon (912)751-6160
North Georgia - Dalton (912)272-2300
Northeast Georgia - Athens (404)369-5650
South Georgia - Valdosta (404)333-5281
Southeast Georgia - Waycross (912)285-6097

To find out more about preservation in your region, contact your Regional Development Center or the Historic Preservation Section of the Georgia Department of Natural Resources at 404-656-2840.

Regional Development Centers

Regional Preservation Planning Services



RDCs with Preservation Planning Program

1. Coosa Valley
2. North Georgia
3. Georgia Mountains
4. Chattahoochee Flint
5. Atlanta Regional Commission
6. Northeast Georgia
7. McIntosh Trail
8. Middle Georgia
9. Oconee
10. Central Savannah River
11. Lower Chattahoochee
12. Middle Flint
13. Heart of Georgia
14. Altamaha Georgia Southern
15. Coastal Georgia
16. Southwest Georgia
17. South Georgia
18. Southeast Georgia

The

Society for Georgia Archaeology

Membership in the Society for Georgia Archaeology is open to anyone who has an interest in Georgia archaeology. Memberships run from January 1 to December 31, and entitles you to receive one copy of *Early Georgia* and the quarterly issues of *The Profile*. Please complete this application form and send it with a check payable to the Society for Georgia Archaeology to:

Ms. Karen Oates, Treasurer
The Society for Ga. Archaeology
5856 Dana Drive
Norcross, Ga. 30093

Name_____ Date of Application_____
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Type of Membership: (Check One)

- ☐ Student (School_____) ($7.00)
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- ☐ Family ($14.00)
- ☐ Institutional ($25.00)
- ☐ Life ($200.00)
- ☐ Benefactor ($500.00 minimum)

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CHAPTERS

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GEORGIA MOUNTAINS ARCHAEOLOGICAL SOCIETY
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Gainesville, Georgia 30501

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Atlanta, Georgia 30329

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LOWER CHATTAHOOCHEE ARCHAEOLOGIAL SOCIETY
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5629 Canterbury Drive
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MIDDLE GEORGIA ARCHAEOLOGICAL SOCIETY
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SOUTH GEORGIA ARCHAEOLOGICAL TEAM
c/o Mr. Frankie Snow
P.O. Box 873
Douglas, Georgia 31533

BIBLIOGRAPHY

Artifact Identification

American Association for State and Local History
172 Second Avenue, North, Suite 202, Nashville, Tennessee 37201.

This organization publishes a monthly magazine **History News**, a monthly newsletter "History News Dispatch," Technical Leaflets, and books relating to all aspects of history and material culture. Write for membership information and a list of publications. Specific AASLH articles of interest:

Darbee, Herbert C.
A Glossary of Old Lamps. AASLH Technical Leaflet No. 30.

DeCunzo, Lu Ann
Historical Archaeology as a Tool for Researching and Interpreting Historic Sites. AASLH Technical Leaflet No. 173.

Hodgkinson, Ralph
Tools of the Woodworker: axes, adzes, and hatchets. AASLH Technical Leaflet No. 28.

Archeological Services
The Archaeological Bookstore In Your Mailbox, Booklet of Archeological Publications, P.O. Box 386, Bethlehem, Connecticut 06751.

This is a catalogue of hard to find and out-of-print books, journals, and booklets on archeology and related subjects. While the majority of the selections relate to prehistory and the Native American Indian, there is still a good selection of historic material. Extremely interesting and unusual materials. Published quarterly.

Association for Preservation Technology
1980 *Illustrated Catalogue of American Hardware of the Russell and Erwin Manufacturing Company 1865*. Pub Press Inc., 200 North Bentalo Street, Baltimore, Maryland, 436 pp.

This is an unabridged reprint with an introduction by Lee H. Nelson, AIA. To say that this is a catalogue of hardware is somewhat misleading. Not only does this catalogue include traditional hardware but items such as fruit jars (metal lids), ice cream freezers, bird cages, lamps and flatware. One of the best references for identifying artifacts manufactured after the Civil War. The illustrations are a beautiful example of the engravers and printers art as well as being large in scale and numerous.

Carskadden, Jeff and Richard Gartley
1990 *Chinas: Hand-Painted Marbles of the Late 19th Century*. Muskingum Valley Archaeological Survey,24 South 6th Street, Zanesville, Ohio 43701, 118 pp.

This is a first time history and chronology of German hand-painted Chinas and related marbles. The book presents a classification of these marbles that should enable the archeologist, marble collector, or any other interested individual to describe their marbles in a standardized way. There is also a section on modern reproductions.

Clark, Hyla M.
1977 *The Tin Can Book*. New American Library, New York, 128 pp.

This is a complete reference on the history, chronology and typology of tin cans. Because the tin can is so common on all historic sites, this book is highly recommended. It is full of color, and black and white illustrations of all manner of tin containers.

Dover Publishing Company, 180 Varick Street, New York City, New York 10014.

This is an indispensable source of inexpensive republished paperback books on every conceivable subject. Write for a catalog on your field of interest i.e, history, houses, archeology, antiques.

Fike, Richard E.
1987 *The Bottle Book*. Peregrine Smith Books, Salt Lake City, Utah, 293 pp.

This is a comprehensive guide to historic embossed medicine bottles that are so frequently found on historic sites. The author is an archeologist, historian, writer and museum curator. A user's guide is included in the book to assist the reader through the columns of data. There is a good discussion of the patent medicine craze of the 19th century before the passage of the Pure Food and Drug Act of 1906 and a history of the glass bottle. Well illustrated with both black and white line drawings. Three different indices are included as well as a table of contents.

Godden, Geoffrey A.
1963 *British Pottery and Porcelain 1780-1850.* Barnes and Co., Inc.

1964 *Encyclopedia of British Pottery and Porcelain Marks*, Bonanza Books, New York.

1966 *An Illustrated Encyclopedia of British and Porcelain.* Crown Publishers.

These books can be readily found in most libraries and large book stores. They are an informative source for the identification and dating of British ceramics. The books were written for those interested in decorative arts and antiques.

Israel, Fred L., ed.
1968 *1897 Sears Roebuck Catalogue.* Chelsea House Publishers, New York, 786 pp.

As quoted on the flyleaf,..."If all the records for the 1890s should be lost, a scholar in the remote future who stumbled upon this book could obtain a fairly accurate description of American life during the last decade of the nineteenth century. The items displayed represent artifacts people really wanted and bought." Urban and rural homeowners alike relied on the original for mail order shopping.

Journal of the Society for Historical Archaeology.

Historical Archaeology is a major professional journal published annually by the Society for Historical Archaeology. Subscription is by membership in the Society, and it includes a quarterly newsletter. Individual membership dues are $50.00 annually. Checks should be made payable to the Society for Historical Archaeology and mailed to the American Anthropology Association, 1703 New Hampshire Avenue, NW, Washington, D.C.

This journal is for those who desire information on current research in historical archeology. Back issues are available and there is a special Publication Series as well. Publication Series No. 2, Historical Archaeology and the Importance of Material Things, edited by Leland Ferguson, is recommended reading for those interested in the philosophy of historical archaeology. Specific articles from **Historical Archaeology:**

Anderson, Adrienne
1968 "The Archaeology of Mass-Produced Footwear." Vol.2, pp. 56-65.

Busch, Jane
1981 "An Introduction to the Tin Can." Vol. 15, NO. 1, pp. 95-104.

Gates, William C. Jr., and Dana E. Ormerod
1982 "The East Liverpool Pottery District: Identification of Manufacturers and Marks." Vol. 16, No.1-2.

Lorrain, Dessamae
1968 "An Archaeologist's Guide to Nineteenth Century American Glass." Vol. 2, pp. 35-44.

Singley, Katherine R.
1981 "Caring for Artifacts after Excavation-Some Advice for Archaeologists." Vol. 15, No. 1, pp. 36-48.

Luscomb, Sally C.
1967 *The Collector's Encyclopedia of Buttons*. Crown Publishers, Inc., New York, 242 pp.

Alphabetically arranged, this book covers two hundred years of buttons. It includes some military buttons but is really oriented toward civilian clothing of the 18th and 19th century.

Noel Hume, Ivor
1970 *A Guide to Artifacts of Colonial America*. Alfred A. Knopf, New York, 323 pp.

From armor to hinges to wig curlers, this encyclopedia of 18th and early 19th century artifacts is alphabetically arranged and profusely illustrated. The best of its kind for the time period covered.

Price, Cynthia R.
1979 *19th Century Ceramics...in the Eastern Ozark Border Region.* Monograph Series No.1, Center for Archaeological Research. Southwest Missouri State University, Springfield, Missouri.

Although this monograph is an analysis of ceramics from the Ozark Border Region of Southeast Missouri, the descriptions and dates are still applicable to our region. This is one of the few references that deal with ceramics from the 19th century (specifically from 1810 to 1870). May be hard to find except through inter-library loan.

Sloan, Eric
1973 *Our Vanishing Landscape.* Ballantine Books, New York, 107 pp.

1974 *A Museum of American Tools.* Ballantine Books, New York, 108 pp.

These two books are as much a work of art as they are reference material for those interested in the information they contain. Written for a general audience.

Switzer, Ronald R.
1974 *The Bertrand Bottles.* National Park Service, U.S.Department of the Interior, Washington, D.C.

Interesting publication on the excavation of the steamship *Bertrand* that sank in the Missouri River on April 1, 1865, carrying a cargo in excess of 251 tons. After years of search the wreck was located and excavated in 1968-69. Unfortunately this volume is out of print but can be made available through inter-library loan.

Whiting, Gertrude
1971 *Old-time Tools & Toys of Needlework.* Dover Publications, New York, 357 pp.

Originally published in 1928 under the title *Tools and Toys of Stitchery*, this is a complete and unabridged reprint of the original that was first published by Columbia University Press. Delightful period reading with anecdotes and folklore on every page, it is still an excellent source for those frequently found but hard to identify artifacts that relate to the construction of clothing and household linens and lace.

DeCunzo, Lu Ann
1990 *Historical Archaeology as a Tool for Researching and Interpreting Historic Sites.* Technical Leaflet No. 173, AASLH, 172 Second Avenue, North, Nashville, Tennessee 47201.

This leaflet is intended as a guide for governing boards and staffs of historic sites that contain or potentially may contain archeological resources. Its purpose is to introduce historical archeology and its relationship to historic site management and to provide a general model for implementing a historical archeological research and preservation program. The article is not too technical for the average person who is interested in protecting his or her historic property.

Deetz, James
1977 *In Small Things Forgotten.* Anchor Books, Garden City, New York, 184 pp.

This book is a landmark study of the differences and similarities between ourselves and our ancestors. It also clearly explains how history can often misrepresent actual events and that the study of archeology and material culture may be the most objective source of information we have concerning America's past. It is "indispensable for everyone interested in American antiquities, not only because it can aid in identifying a piece of china, or in dating an ancient timber framed house, but also because it relates such artifacts to the people who used them in their everyday lives. By better understanding these ordinary people, we can only achieve a better understanding of ourselves." (Anchor Books, back cover).

1967 *Invitation to Archaeology.* Natural History Press: Garden City, New York, 150 pp.

The first book by Deetz is a good companion to *In Small Things Forgotten* even though it deals with prehistoric archeology. Somewhat technical in nature, it is interesting reading for anyone with an interest in archeology.

Dickens, Roy S., Jr. and James L. McKinley
1979 *Frontiers in the Soil: The Archaeology of Georgia.* Frontier Publishing Company, Chapel Hill, North Carolina, 111 pp.

Dickens and McKinley use cartoon sketches, realism, and gentle humor to portray the technical complexities of archeological research in a format that is manageable for students, teachers, and general readers. This book remains the best of its kind on the market today. For purchase information, write to Archaeology Branch, NC Division of Archives and History, 109 E. Jones Street, Raleigh, North Carolina 27611.

Glassie, Henry
1968 *Pattern in the Material Folk Culture of the Eastern United States.* University of Pennsylvania Press, Philadelphia, 316 pp.

Glassie brings together the traditions of architecture, folklore, material culture, anthropology and geography in this book. His approach is scholarly but entertaining. The book is well illustrated and the section on folk housing and barns would be of exceptional interest to owners of historic homes.

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1979 *Motel of the Mysteries.* Houghton Mifflin Co., Boston, 95 pp.

This is a humorous and somewhat satirical look at how archeologists in the year 4000 misinterpret twentieth century culture. It is a good laugh at our culture and archeologists. Illustrated by line drawings.

McIntosh, Jane
1986 *The Practical Archaeologist.* Facts on File Publications, New York City, New York, 192 pp.

This publication is for those who desire a thorough understanding of the history of archeology, the methodology involved, and a global perspective on all aspects of the discipline. An invaluable reference that is well illustrated.

Noel Hume, Ivor
1982 *Martin's Hundred.* Alfred A. Knopf, New York, 343 pp.

This is a first hand account of the excavations of Carter's Grove Plantation and the discovery of a 17th century settlement called Martin's Hundred. Written by the director of Williamsburg's archeological programs, this story of one of the most important excavations in American historical archeology. Reads like a novel. This book is highly recommended.

1969 *Historical Archaeology*. Alfred A. Knopf, New York, 355 pp.

This book has been frequently used as a college text but is still not too technical for lay archeologists. It is a good general reference on how to do archeology and includes a bibliography with a subject index.

Miscellaneous

Flocks, Sally
1987 *Directory of Georgia's Historical Organizations and Resources*. Georgia Department of Archives and History, 330 Capitol Avenue, S.E., Atlanta, Georgia 30334, (404) 656-2393.

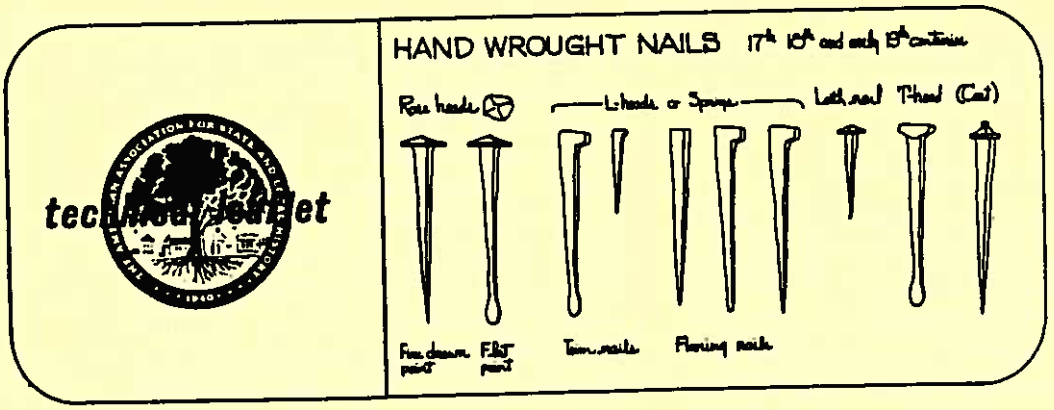
This comprehensive directory includes state, county, and private non-profit organizations. There is an alphabetical index by organization. Copies of the Directory are available for $5.00 from the Department of Archives and History at the above address.

Ordish, George
1981 *The Living American House*. William Morrow & Co., Inc., New York, 320 pp.

A serious but still amusing history of a house written from the perspective of all the living creatures (human and otherwise) that inhabit a house from 1633 to 1980. The family tree of the owners of the house include changes made to the house by each successive occupant. This would be particularly helpful in the preparation of an archeological time line.

Sanborn Fire Insurance Maps. Available from the Surveyor General, Georgia Department of Archives and History, Office of the Secretary of State, 330 Capitol Avenue, S.E., Atlanta, Georgia 30334, (404) 656-2393.

These maps were prepared for fire insurance purposes following the Civil War. Every structure was drawn somewhat to scale, and details such as building materials, number of stories and use were included for incorporated areas. Property boundaries, fence lines, and outbuildings are also shown. An excellent resource for the owner of historic properties.



NAIL CHRONOLOGY

as an aid to dating old buildings

By Lee H. Nelson
National Park Service

The National Park Service in its historic structures restoration program has developed some research techniques in the general field of nail chronology as an aid to dating old buildings. This paper was prepared for a National Park Service Historic Structures Training Conference held in July, 1962. The paper was published, along with a paper on "Paint Color Research and Restoration" by Penelope Hartshorne Batcheler, as Technical Leaflet 15 in the December, 1963, issue of HISTORY NEWS. *The Nail Chronology paper has been revised, and put in the new format, and published here in the hope that it will continue to be of use to other restoration projects and that it will stimulate further contributions to these studies. The Paint Color Research paper was revised and reprinted by itself as Technical Leaflet 15.*

Dating old buildings from their nails is not a precise technique, but when used with discretion, it has proved generally reliable and useful, for example, in Independence Hall which has been subjected to a complex series of alterations from 1750 to the present time. If a sufficient number of samples are taken from all parts of the building they can be a good indication that (1) the building was built entirely at a given time, or (2) the building has been subjected to additions, alterations, or simple maintenance measures. Nails can help to define the extent of these changes. For this reason we believe it worthwhile to discuss briefly the various nail types that are generally found in American buildings. They are (1) hand-wrought nails, (2) cut nails, and (3) wire nails. Within these major groups there is a surprising variety with subtle differences

in type which enable us to use nails as dating tools with some certainty.[1]

HAND-WROUGHT NAILS

The study of wrought nails, while interesting, has its limitations for they were used throughout the seventeenth and eighteenth centuries and even into the early nineteenth century. For this period other factors (especially decorative details, hardware, etc.) are better indicators of "period." However, it is useful to become familiar with wrought nails for purposes of identification and comparison with other nail types.

In medieval England nails were made into a great variety of special shapes and sizes and sold by the hundred, *e.g.*, 8d (pence) per 100 nails. From this practice developed the classification of nail sizes according to their price per hundred, a system which seems to have been established by the fifteenth century. After that time nails slowly became standardized by size rather than price. In 1471 for example, "fippenynayl" were only 4d per 100. In 1477 "xpenynayll" were only 8d per 100; and in 1494 "sixpenynayle" were 5d per 100.[2]

During the entire Colonial period nails were an important commodity for importation. In 1684 for example, James Claypoole (recently arrived in Philadelphia from London) wrote to a London merchant as follows: " . . . send no window glass nor lead, but Iron is much wanted, and nayls very much vizt 6d 8d & 10d a Tunn of each sort would quickly sell, I conclude."[3] The scarity of nails in colonial Virginia was reflected in a statute enacted in 1645 to prohibit settlers from burning down old buildings for their nails.[4] Some nails were made in the colonies in the seventeenth and eighteenth centuries, but despite this local production very large quantities of nails were imported during the same period.[5]

During and after the Revolution, America became more dependent upon local sources for the supply of nails. Perhaps a typical nailery was that operated by John Little in Philadelphia in late 1770s (during the British occupation). His manuscript "Account of Smiths and Nailors Work . . ." includes a variety of things like kettles, chain, tools, etc., but primarily covers the manufacture of nails in sizes varying from 3d to 30d.[6] John Little had several dozen

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[1] This paper does not encompass tacks or screws. Although they are interesting subjects, they are not especially useful in dating old buildings except in a very general way. Machine-cut tacks were perfected at an early date and thus not helpful as a dating tool, nor can they readily be identified as an original and integral part of a building. Machine-pointed screws with constantly tapered threads seem to have been introduced in the 1830s, but they are not a reliable indication of date because of their limited use in building construction.

[2] Louis Salzman, *Building in England* (Oxford, 1952), 315.

[3] *The Pennsylvania Magazine of History and Biography*, Vol. X (1886), 412.

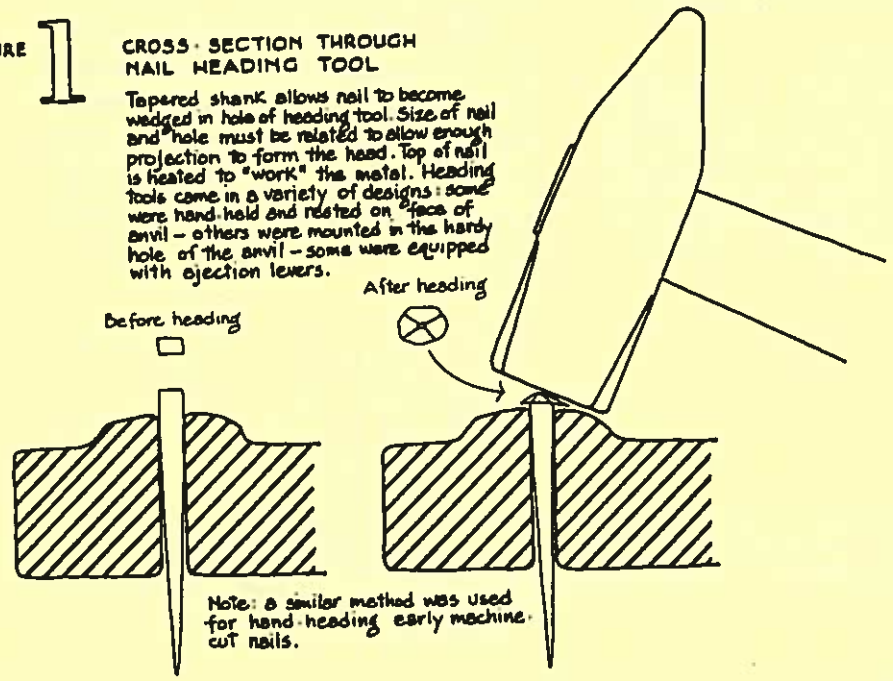
[4] Hening, *Statutes*, Vol. I, 291. See "Burning Buildings for Nails," American Notes, *Journal of the Society of Architectural Historians*, Vol. IX, No. 3, 23, showing that an early Kent County, Delaware, courthouse was ordered destroyed in 1691 "to gett the nailes."

[5] See also J. Didsbury, "The French Method of Nail-Making," *The Chronicle of the Early American Industries Association, Inc.*, Vol. XII, No. 4 (December, 1959), 47-48. On page 48 is an illustration of a nail-heading tool. This latter subject while interesting, is outside the scope of this brief paper.

[6] Peale-Sellers Papers, American Philosophical Society Archives, Philadelphia. Called to the writer's attention by Willman Spawn, Philadelphia.

FIGURE 1 CROSS-SECTION THROUGH NAIL HEADING TOOL

Tapered shank allows nail to become wedged in hole of heading tool. Size of nail and hole must be related to allow enough projection to form the head. Top of nail is heated to "work" the metal. Heading tools came in a variety of designs: some were hand-held and rested on face of anvil – others were mounted in the hardy hole of the anvil – some were equipped with ejection levers.



smiths and nailors working at various times and a typical entry from his accounts reads:

Supr.						Cr.			
1778	Size	Qnty. to the Pound	Weight	Total Number	Price of Making		Amount		
Jan.	10d	58	23	1334	@2/6/Pc	100	1	12	15
25	3d			5000	@1/9/D°		4	7	6
26	10d	63	14	882	@2/6/D°		1	2	
28	20		40		1/3/Pc		2	10	

It is important to emphasize that wrought nails continued to be used for several decades following the introduction of the cheaper cut nails. In the 1820s Philadelphia newspaper advertisements of "Nails, Brads and Spikes" often included both cut and wrought nails with prices for each in their respective sizes.[1] Wrought nails continued to be superior for certain purposes, especially where they required clinching or for trim work. For this reason it is not uncommon to find a few hand-wrought nails used well into the nineteenth century. It is interesting that many buildings of this period utilized both wrought and cut nails in their original construction. The Old Town Hall (built 1798-1800) in Wilmington, Delaware, for example utilized hand-headed machine-cut brads for flooring and crude, machine-cut lath nails, but all the finish woodwork was held with wrought nails.

The several characteristics of wrought nails are illustrated in the drawing in the center of this Leaflet. Included is a cast nail which perhaps does not properly belong in this group but is known

[1] See also a nineteenth century English metal trades catalog which includes wrought joiners sprigs, floor stubs, lath nails, etc. Catalog No. E 121-1898, *Old English Pattern Books of the Metal Trades*, Victoria and Albert Museum, Pub. No. 87 (1913), 32-33.

to have been used in the eighteenth century and well into the nineteenth.*

MACHINE-CUT NAILS

In 1923, Dr. Henry C. Mercer's pioneer study on cut nails was included in a published essay entitled *The Dating of Old Houses* (New Hope, Pennsylvania). Others, including the writer, have only built upon Mercer's early work; however, much research remains to be done in this field.

The study of cut nails is especially useful where late eighteenth and early nineteenth century buildings or alterations are involved. The period 1790-1830 encompasses a remarkable technological transition from wrought to cut nails. After the Revolution, many cut nail manufactories were established in New England, New York, New Jersey, and Pennsylvania. These were at first operated by hand power and later by water or steam power. America seems to have been leading the English in this particular field.

Authorship for the initial invention and specific improvement of cut nails remains largely anonymous. Certain individuals are known to have received patents during the 1780s-90s, but the precise nature and significance of their

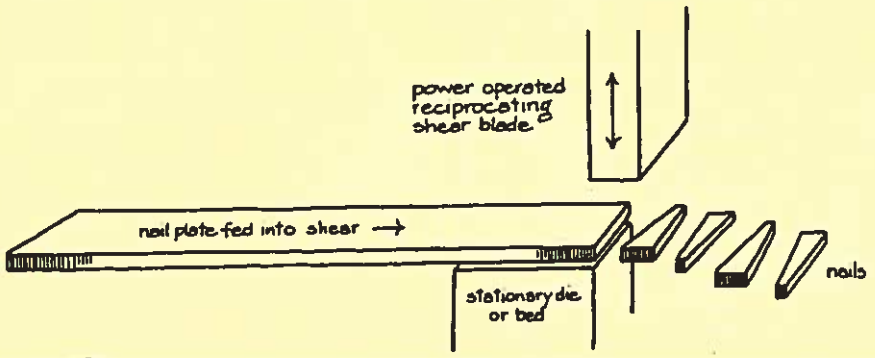


FIGURE 2 SIMPLIFIED DIAGRAM SHOWING THE BASIC PROCESS OF MAKING EARLY CUT NAILS

Nail plate was made in rolling mills, thus cut nails were of uniform thickness, depending on nail size. Thin nail plate (i.e., small nails) was usually hand-held while feeding into shear. Thicker nail plate (i.e., larger nails) offered more resistence to shearing – was usually heated and held with tongs while feeding into shear. To compensate for tapered shank, nail plate had to be alternately wiggled or flipped, see Figures 3 and 4.

After cutting, the nails were headed by: (a) hand, after heating them and using a heading tool similar to that used for wrought nails, see Figure 1. This was the earliest method, and was used for many years, even after the introduction of (b) machine heading, which gripped the nail instantly (after cutting) and applied great pressure to end of nail, thus forming the head by the displacement of metal.

*Cast nails are illustrated in a late eighteenth century English hardware catalog, and there is an 1829 reference in Bishop, *A History of American Manufacturers* (Philadelphia, 1864), Vol. II, 341. Several excellent specimens of cast-iron nails were supplied to the writer (in 1967) by J. R. Stevens, from a recently demolished c 1820 building in Halifax, Nova Scotia. The sketch and observations regarding cast nails, which accompany this paper, were partly based on the samples generously given by Mr. Stevens to the author.

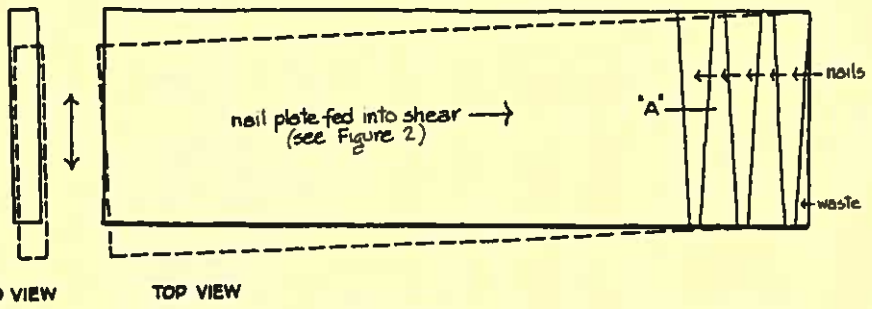
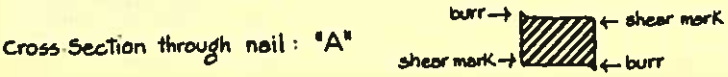


FIGURE 3 SIMPLIFIED DIAGRAM SHOWING HOW NAIL PLATE WAS WIGGLED BACK AND FORTH TO COMPENSATE FOR TAPERED SHAPE OF NAILS

One face of nail plate always remained "up", i.e., nail plate always cut from same side.
Wiggling the nail plate produced nails with: burrs and shear marks on diagonal edges.



inventions remains rather vague.[9]

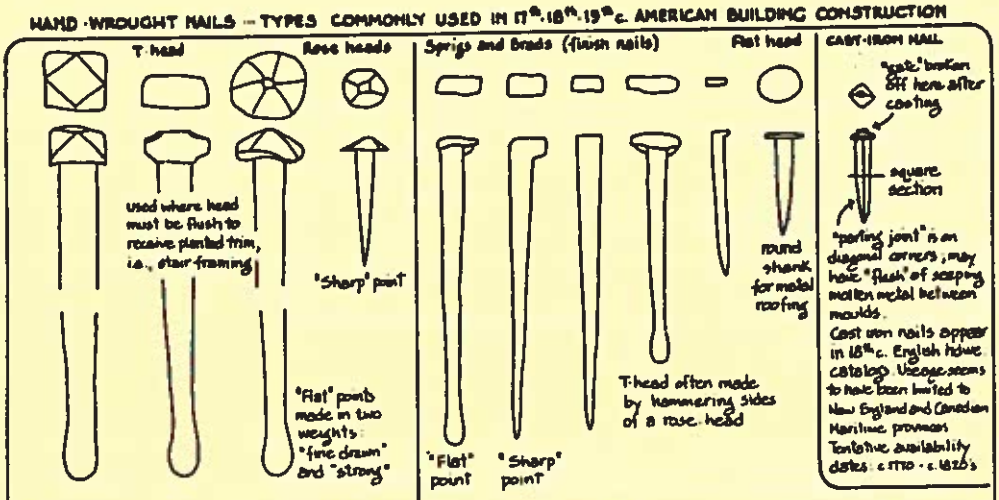
Unfortunately the Patent Office Record's fire of 1836 destroyed a vast amount of primary source material with respect to the invention of cut nail machines. Some of this information has been collected and appended to the scholarly biography *Jacob Perkins* by Greville and Dorothy Bathe.[10] This book provides an excellent background on the development of nail machines and includes a list of 88 patentees between the years 1791-1815. It would appear that the most important contributions were made by Perkins, J. G. Pierson, Jesse Reed, Mark and Richard Reeve.

The rapid development and sale of these machines made it possible to manufacture nails on a wide scale in the early nineteenth century. Thomas Jefferson for example, purchased a machine in 1796 and produced nails (for sale) until 1823. Prior to that time (1794-1796) Jefferson manufactured nails that were wrought by hand. His interest in this endeavor is reflected in a letter: "I am myself a nail-maker. . . . my new trade of nail-making is to me in this country

[9]For mention of a sixteenth century "instrument for making of Nails," see Greville and Dorothy Bathe, *Jacob Perkins, His Inventions, His Times, and His Contemporaries* (Philadelphia, 1943), 172, but it seems unlikely that this was in any way related to a cut nail machine.

[10]For a more complete listing of inventions and events relating to the evolution of nail-making, see H. R. Bradley Smith, "Chronological Development of Nails," supplement to *Blacksmith's and Farriers' Tools at Shelburne Museum* (Shelburne, Vermont, 1966). See also a general history of nail-making by Arthur S. Tisch, "Modern Wood Construction, only as good as its fastening!" reprinted as Bulletin No. 1, by the American Society of Precision Nail-makers, 630 Third Avenue, New York.

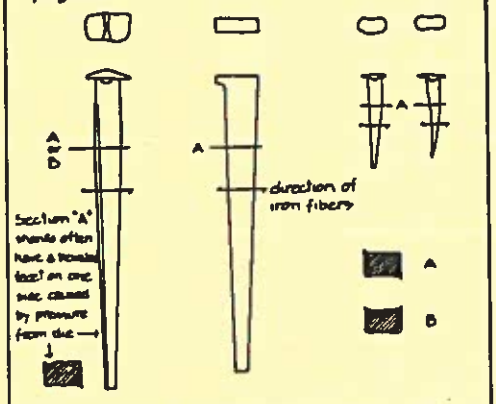
HAND-WROUGHT NAILS — TYPES COMMONLY USED IN 17th-18th-19th c. AMERICAN BUILDING CONSTRUCTION



General Purpose Nails: for framing, lathing, and most concealed work, sometimes for hinges, or where head was used for decorative effect. Other shapes were available for special purposes, i.e., clasp nails, boat nails, coffin nails, etc. Wrought nails continued to be used long after the introduction of cut nails, but generally such use was limited to situations where their superior clinching ability was needed (i.e., batten doors).

"Sprigs" and "Brads": These names were often confused, or used inconsistently; but they generally refer to headless, or L-head or T-head nails. Smaller sizes were usually called "sprigs," c. ½" to 2", usually sold by quantity. Larger sizes were usually called "brads," 4d to 24d, usually sold by weight. These nails were generally used for trim with heads countersunk and puttied; also used for flooring. Other characteristics of hand-wrought nails: shanks usually taper on both faces; iron fibers run lengthwise; lack of uniformity (especially heads).

EARLY MACHINE-CUT NAILS WITH HANDMADE HEADS

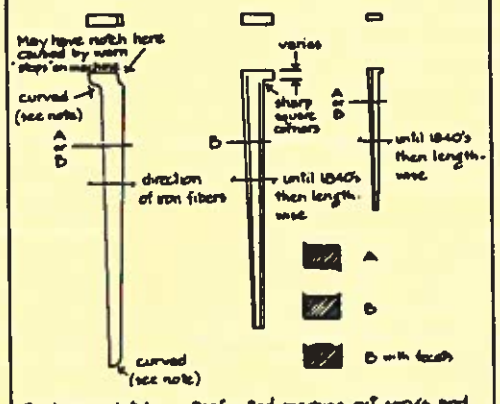


Heads usually have 2 facets, sometimes more. Headed in tool like wrought nails. Earliest nails of this type usually have section "A". Later ones usually have section B and are more uniform in manufacture.

Size and shape of heads very because heads were forged. Smaller sizes called sprigs (¾" or less), and larger sizes called brads but by early 19th c., all were often called brads.

Heads vary in size and shape, usually thin and flat (no facets), and eccentric to shank. Shanks vary in length and width and often have a sharp point. Rose under head often present.

COMPLETELY MACHINE-CUT SPRIGS AND BRADS



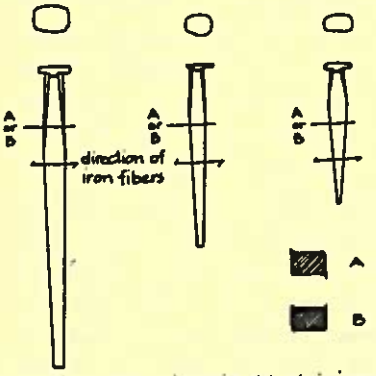
Early completely machine cut sprigs and brads available in a variety of sizes. Curved corners and points are characteristic of this type.

Perfected machine cut sprigs and brads were much used for trim and flooring. Once perfected, they have changed little, and are not readily datable except that the direction of iron fibers offers a general clue (see sketch above). Revealed facets caused by pressure of die, often missing on small nails.

EARLY MACHINE-HEADED CUT NAILS

1815's to late 1850's

Common Nails · See Sprigs and Brads for early cut finish nails

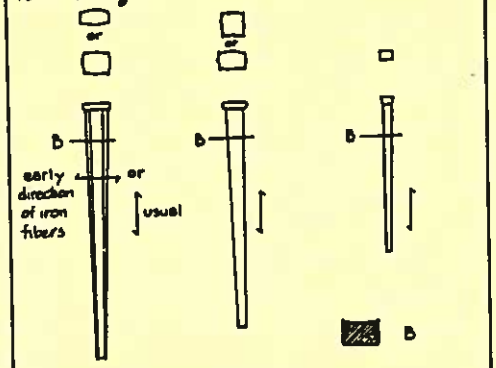


Nails of this period are distinguished by their irregular heads, which vary in size and shape, usually eccentric to shank, though they were more uniform by 1850's. Nails were irregular in length and width, but more uniform at end of period. Nails generally have a rather distinct rounded shank (under head), caused by wide heading clamp. These nails were more readily available than finishing nails, and were often locally modified by hammering the sides of the heads, thus making them into finish nails which could be countersunk.[1] The direction of iron fibers also distinguishes nails of this period from later nails.

"MODERN" MACHINE-CUT NAILS

late 1830's to present

Box or flooring nails · Common Nails · Finish Nails

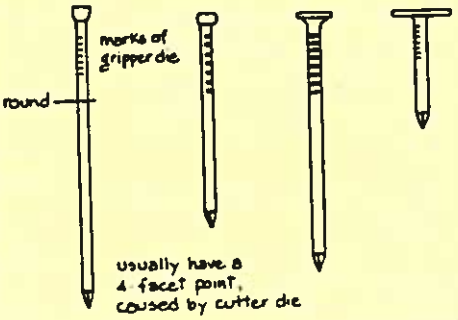


Heads tend to be uniformly convex on each side, and uniform in size and shape, depending on nail style. After c. 1840, cut nails were generally made with the iron fibers running lengthwise (and later were annealed), which made them capable of clinching without rupture, thus almost completely displacing the hand-wrought nail for building construction. There are many "modern" nail styles not illustrated here; but after the 1840's, cut nails are not readily distinguished from those made today, so that other factors, i.e., decorative details, etc., are better indicators for dating purposes.

MODERN WIRE NAILS

c. 1850's to present

Flooring Brads · Finish Nails · Common Nails · Roofing



These nails are usually manufactured from steel wire, which is held in gripper dies and headed (producing gripper marks on shanks), then wire is advanced and sheared to length with cutter die, and wire stock is then advanced to repeat operation. Earliest wire nails were only available in very small sizes (for picture frames, etc.). Larger sizes were not widely available or used in American building construction until the third quarter of the 19th century by the late 1880's. They were fast superceding cut nails because of their relative cheapness. Wire nails are not readily datable. Though early examples have bulbous heads that are eccentric to shank, in more recent years wire nails have been made in a great variety of sizes, head shapes and shank designs (e.g. "threaded nails"), although cut nails continue to be made for specific purposes.

The sets of nail drawings on these two pages are organized together so that the user will have a visual comparison when he is trying to identify a nail. The cast nail in the right hand corner of the upper drawing on the opposite page may not properly belong in the group but it is known to have been used in the eighteenth century and well into the nineteenth.

what an additional title of nobility or the ensigns of a new order are in Europe."[11]

One of the earliest cut nail machines in Pennsylvania, was one built by William J. Folsome at Harrisburg in 1789. Folsome (lately from New Hampshire) was producing 120,000 nails per week in March of that year.[12] Cut nails made in the 1780s undoubtedly exist, but the writer has not been successful in locating any unquestionably dateable specimens that predate the early 1790s.

In Philadelphia and Trenton, nails were manufactured using prison labor. Jacob Hiltzheimer notes in his diary for 7 March 1797, "went from the State House with John Shoemaker, of the House, and about a dozen members, to the [Walnut Street] gaol, to see the prisoners at work at different trades. We saw six men *cutting nails,* and twelve making heads to them. . . ." [italics supplied]. References to the making, sale, and use of cut nails are numerous after the late 1790s.

The development of cut nail manufacturing and their use is marked by at least five distinct phases and the evolution of cut nail types may be roughly outlined as follows:

1. Cut from Common Sides, 1790s-1820s Hammered Heads
2. Cut from Opposite Sides, 1810-1820s Hammered Heads
3. Cut from Common Sides, 1815-1830s Crude Machine-Made Heads
4. Cut from Opposite Sides, 1820s-1830s Crude Machine-Made Heads
5. Cut from Opposite Sides, Perfected Machine-Made Heads — late 1830s to present

Even the simplier machines continued to be used long after the more sophisticated machines were developed, which creates overlapping in the above chronology. It will be noted that this sequence is contrary to Mercer's theory that (1) early cut nails were sheared from *opposite* sides, and (2) later nails were cut from *common* sides. From an inspection of cut nail "shear marks," Mercer's theory seems correct. Surprisingly enough, nails cut from a common side have "shear marks" on their opposing sides (see Figure 6).[13] It should also be noted that until the 1830s most cut nails are also distinguished by the fact that the iron fibers run crosswise to the shank while later cut nails have a fiber structure parallel to the shank (see drawing). For this reason early cut nails could not be satisfactorily clinched and wrought nails continued to be preferred for clinching.

To use cut nails as a dating tool, several factors must be considered:

1. Identification of the cut nail type must be precise.

2. When did that nail type become available in the area?

3. When was that nail type superceded by a "better" cut nail?

4. Are there similar cut nails in dated houses of the same locale?

5. The existence of several cut nail types in the same building might indicate a transition period of nail improvements, or alterations within the build-

[11] Edwin M. Betts, ed., *Thomas Jefferson's Farm Book* (Princeton, 1953), 426

[12] This and several important related items were brought to the writer's attention by Hannah Benner Roach of Philadelphia.

[13] The writer is indebted to Donald Streeter, blacksmith and collector, of Iona, New Jersey, for calling attention to this fact.

ing. Note: *Cut nail improvements were first applied to the smaller sizes. For example, lath nails were perfected before the larger framing nails.*

6. No attempt should be made to date a building on the basis of a single nail.

7. Cut nails manufactured after c. 1830 are virtually undistinguishable from those made today.

8. Wrought nails were competing with cut nails until at least 1820.

9. Some naileries were contemporaneously offering a more advanced product than others. For example, in 1820 Pierson's nails (New York) were considered superior to those made at the Phoenix Works (Pennsylvania).

10. Urban areas responded to improved products more readily than did rural areas. The foregoing generalizations and dates are tentative and subject to correction and contributions by others interested in the subject.

In general, the study of cut nails has been quite useful in distinguishing alterations within Independence Hall. In the Assembly Room for example, extensive changes took place both in 1816 and 1831, but the evidence is easily discernible because of the vast improvement in cut nails in the interval.

WIRE NAILS

The introduction and development of wire nails has not been adequately studied. It appears that several manufactories were established in New York during the 1850s, following an earlier development in England, France, and Germany. The first American production of wire nails was from machines either imported or adapted from existing European models.[14] The earliest wire

[14]Clark, *History of Manufactures in the United States* (New York, 1949), Vol. I, 518. See also the transcript of an unidentified magazine article (dated 23 April 1896) by John Hassall, entitled "The Early

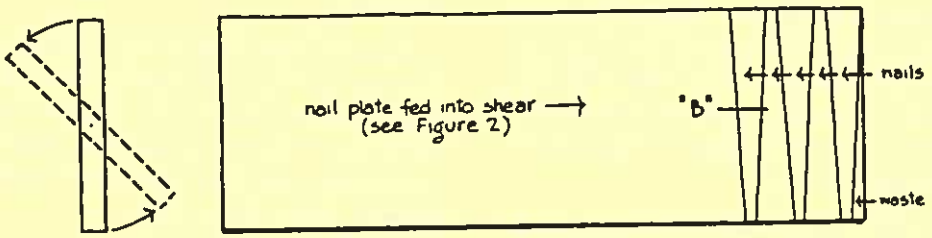
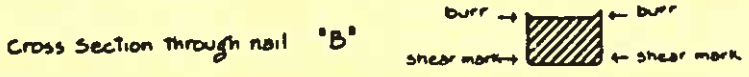


FIGURE 4 SIMPLIFIED DIAGRAM SHOWING HOW NAIL PLATE WAS FLIPPED OVER TO COMPENSATE FOR TAPERED SHAPE OF NAILS

Nail plate was alternately cut from opposite sides
Flipping the nail plate produced nails with burrs or shear marks on common edges



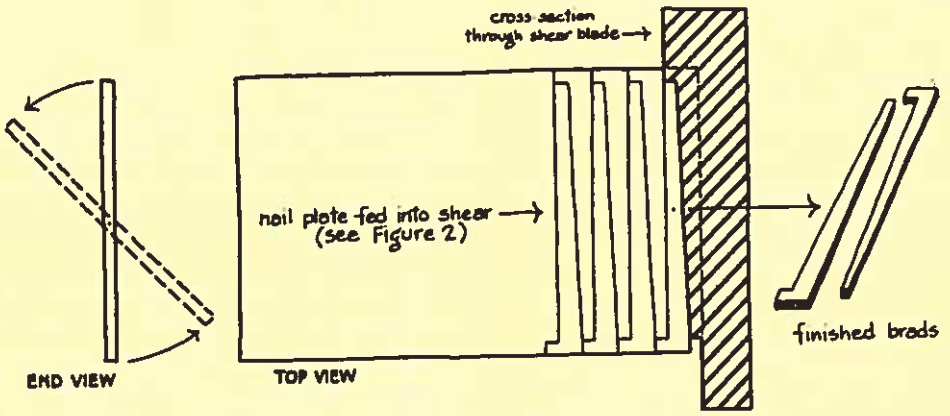


FIGURE 5 DIAGRAM SHOWING ONE EARLY METHOD FOR CUTTING "SPRIGS" AND "BRADS"

Nail plate was flipped over to compensate for tapered shape and to permit nesting pattern.
Nail plate was alternately cut from opposite sides, and produced nails with: burrs or shear marks on common edges.

Cross Section through nail: "B"

nails were not made for building construction, but rather in the smaller sizes for pocket book frames, cigar boxes, etc. American wire nail machinery was not really perfected until the 1860s and 70s. Machinery for this product was exhibited at the Philadelphia Centennial Exposition of 1876."[14]

An 1888 article which deals mainly with *cut nails*, comments on the "newer" type:

"Nails of a very different kind, manufactured from steel wire, have been in use for a number of years in America and for a longer period in Europe, and in both places they have been very favorably received and are fast superseding the common cut-nails for many purposes."

Several advantages were claimed and thirteen different varieties were illustrated in this article."[15] By this time wire nails were definitely in the builders' vocabulary and they were made in sizes ranging from 2d to 60d.

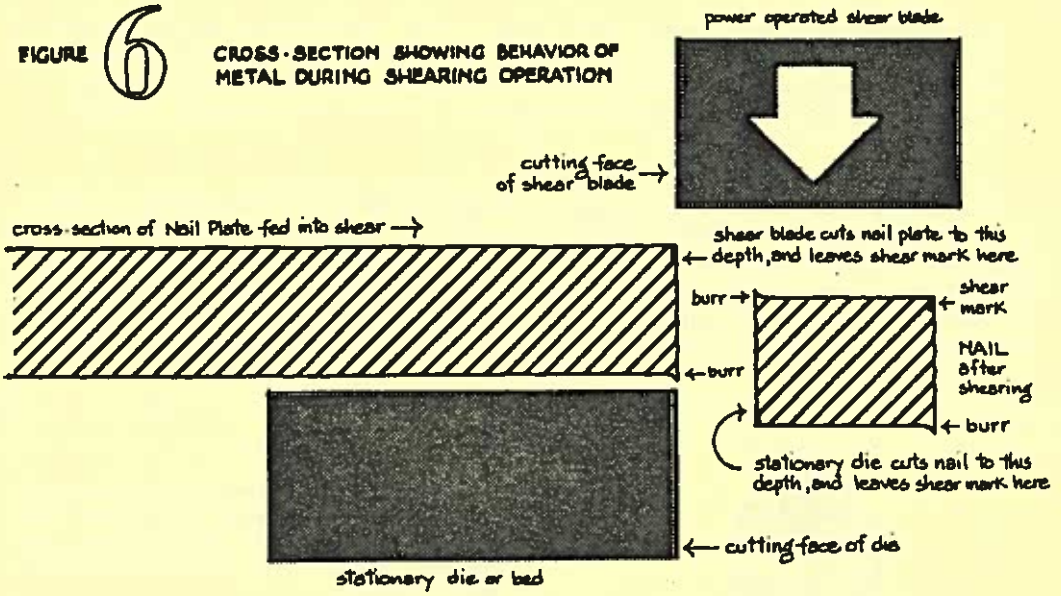
Wire nails did not supplant cut nails with the rapidity that wrought nails were replaced. The transition was more gradual. Wire nails did not really become the dominant type until the 1890s, and many builders preferred using cut nails well into the twentieth century. The greater holding power of cut nails was certainly a factor which delayed the quick acceptance of wire nails. In the

History of Wire Nail Manufacture," courtesy the Shelburne Museum and Donald Streeter.

[14] *Official Catalogue* of the U.S. International Exhibition (Philadelphia, 1876), "Dept. of Manufactures," 137 and *passim*.

[15] "Builders' Hardware—III. Nails," *The American Architect and Building News*, Vol. XXIV, No. 660 (18 August 1888), 73.

FIGURE 6 CROSS-SECTION SHOWING BEHAVIOR OF METAL DURING SHEARING OPERATION



The shear blade and die create equal and opposite forces. Simultaneously, the blade starts to cut the top of the nail plate, while the die starts to cut the bottom of the projecting portion (nail). With this action, the metal stretches beyond its elastic limits — the nail breaks off, and leaves shear marks and burrs on diagonal corners of nails.

Lee H. Nelson 15 Aug 68

1880s, a series of experiments on the adhesion of nails was carried out by the Watertown Arsenal, Massachusetts. These tests confirmed this advantage, but the relative cheapness, ease of handling and the variety of specialized wire nails gave them a gradually increasing preference.[11] The earliest wire nails can be distinguished from their modern counterparts by their "heads" being bulbous and generally eccentric with respect to the shank. There is not the clearly defined evolution of development that makes the cut nail so useful in dating buildings. As a generalization, the presence of wire nails indicates late nineteenth century repairs, alterations or maintenance, and to that extent they are useful "dating tools." Although wire nails are in common usage today in a multitude of varieties, cut nails continue to be used by some carpenters for specific functions, such as flooring nails, boat nails, and masonry nails.

[11]See "Adhesion of Nails, Spikes, and Screws in Various Woods, Experiments on the resistence of cut-nails, wire nails (steel), spikes, wood-screws, lag screws," published in the *Report of the Tests of Metals and Other Materials for Industrial Purposes made with the U.S. Testing Machine at Watertown Arsenal, Mass., 1884* (Government Printing Office, Washington, 1886), 448-71. This interesting publication was brought to the writer's attention by Orville W. Carroll, restoration architect, National Park Service.

Hand-wrought nails were turned out at forges such as this two-man forge operated by a blacksmith at Old Sturbridge Village, Sturbridge, Massachusetts. Latches, hinges, candlestands, foot scrapers, toasting forks, and a myriad of other objects were made by smiths at these forges of yesteryear. (Photo: Old Sturbridge Village.)

Lee H. Nelson, the author of this Leaflet, is an architect with the Office of Archaeology and Historic Preservation, branch of Restorations, of the National Park Service. He is active in the field of historic architecture and is at the Independence National Historical Park in Philadelphia, Pennsylvania.

For this part of the revision of the original Technical Leaflet 15, Lee H. Nelson did the whole set of new drawings except the front page drawing by G. Dysert.

TECHNICAL LEAFLET 48

Technical Leaflets are published by the American Association for State and Local History for the purpose of bringing useful information to persons working in the state and local history movement. The series does not follow the same categories month after month, since the selection of subject matter is based upon varied inquiries received by the Association's home office. The leaflets, which are detachable from the magazine, are copyrighted © and should be catalogued as part of HISTORY NEWS.

American Association for State and Local History Technical Leaflet 48, HISTORY NEWS, Volume 24, No. 11, November, 1968. *Nail Chronology As An Aid to Dating Old Buildings.*

Clorox Bottle Collecting

Bottle collecting has become an increasingly popular hobby among antique lovers in the United States. But bottle buff interest isn't confined to historical flasks and ornate decanters; it also includes many types of modern bottles, reproductions, and "collectibles"—bottles not old enough to qualify as antiques—such as the early *Clorox* liquid bleach bottles.

The trend toward "collectible" bottle gathering is growing. These bottles are more plentiful and considerably less expensive to purchase than their older counterparts, making it possible to possess an interesting bottle collection without a substantial investment.

Because people frequently write The Clorox Company asking the vintage of old *Clorox* liquid bleach bottles they've acquired, this guide has been prepared to help collectors determine the approximate age of different *Clorox* bottles used over the years.

The Earliest Bottles

In 1913, *Clorox* liquid bleach was initially offered in five-gallon crockery jugs since it was originally used exclusively by industrial concerns, such as laundries, breweries, walnut bleachers and municipal water companies. This product was delivered by horse and wagon to various customers in San Francisco Bay Area for use as a bleach, stain remover, deodorant and disinfectant.

Five years later, in 1918, *Clorox* bleach was introduced into American households in 15-ounce amber glass "pint" bottles by the Electro-Alkaline Co., forerunner of The Clorox Company. From 1918 through 1928, these same "pint" containers were also used by other companies to bottle a variety of liquid products. Consequently, these stock bottles had no markings of any kind. Since millions of these containers were used, it is virtually impossible—if the label is missing—to tell which of these bottles contained *Clorox* and which contained other products.

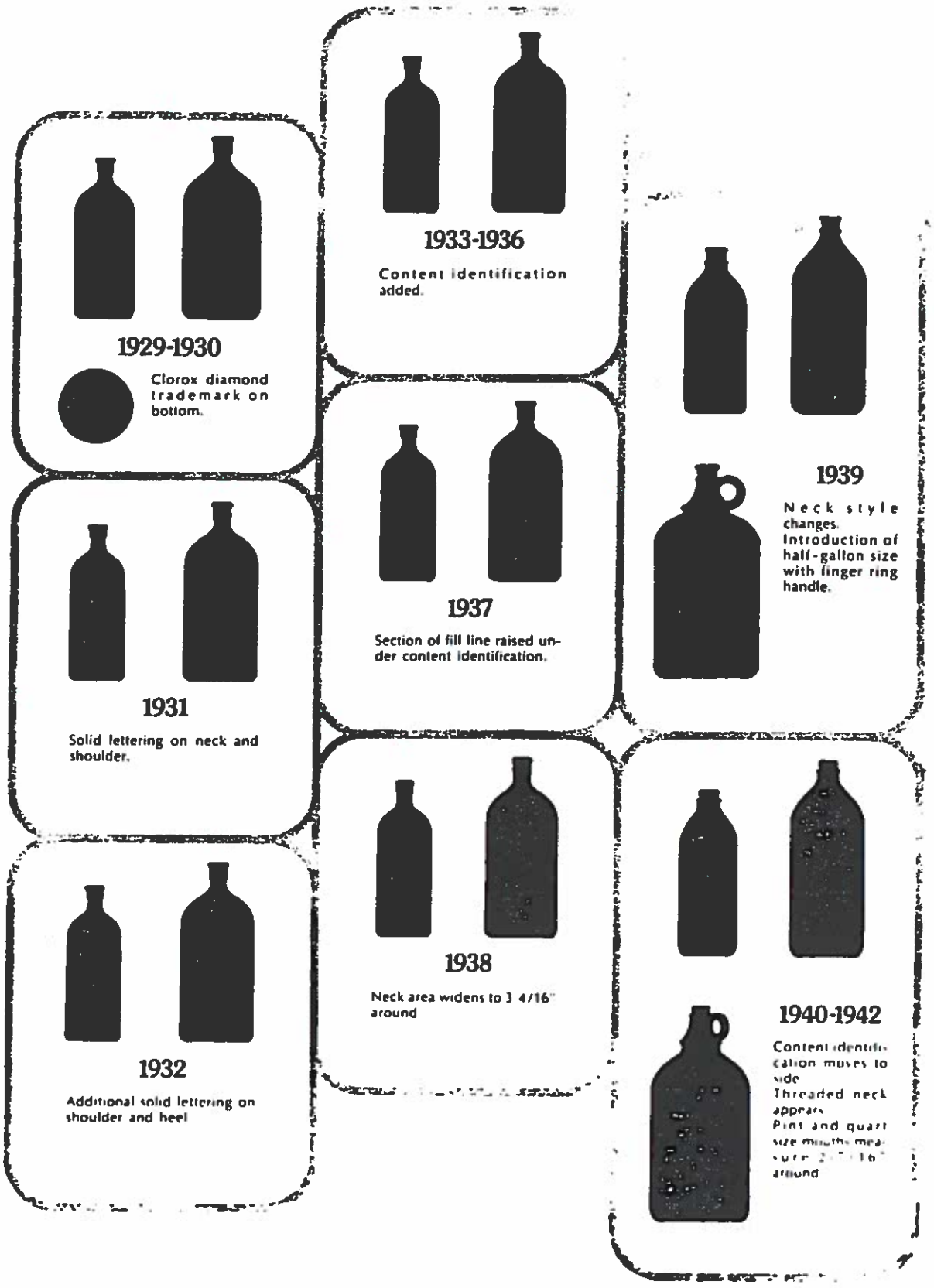
Glass bottles used by The Clorox Company after 1928 can be distinguished by various characteristics. The following tips and illustrations point out variations in style, markings, lettering, glass texture and handles, and together serve as a guide in determining the approximate vintage of early Clorox bottles.

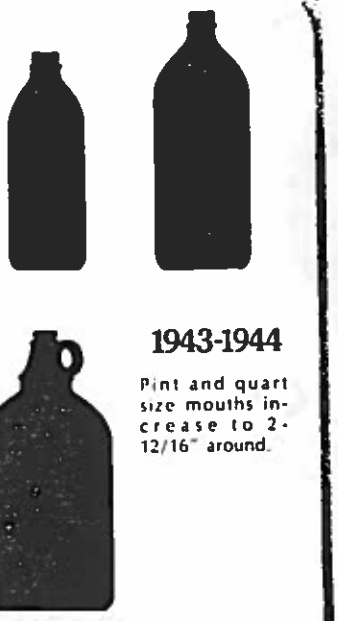
Some Specific Tips

From the days of the crockery jug until 1940, cork-style rubber stoppers were used on the standard *Clorox* bleach amber glass bottles. In 1940, a screw cap was introduced, and a modern adaptation of that top is still used today. These more modern screw cap bottles can be easily identified by their threaded necks as contrasted with the smooth finish, cork-style necks of the earlier *Clorox* bottles.

Height and content capacity is another way to determine the vintage of *Clorox* bottles. Until 1933, the Clorox "pint" contained 15 ounces and measured 7-10/16" in height. In 1933, the 15 ounce "pint" became a true pint—16 ounces—measuring 7-14/16" in height. Through the years, the quart bottle also experienced various changes in height and width, though it has always contained 32 ounces.

EDITOR'S NOTE: ***Bottles as artifacts can help pinpoint periods of activity on a site***


1929-1930
Clorox diamond trademark on bottom.
1931
Solid lettering on neck and shoulder.
1932
Additional solid lettering on shoulder and heel
1933-1936
Content identification added.
1937
Section of fill line raised under content identification.
1938
Neck area widens to 3 4/16" around
1939
Neck style changes.
Introduction of half-gallon size with finger ring handle.
1940-1942
Content identification moves to side
Threaded neck appears
Pint and quart size mouths measure



1943-1944

Pint and quart size mouths increase to 2-12/16" around.

1951-1954

Solid lettering replaced by outline lettering.
Grained texture extends down label panel.

1958-1959

Grained texture on shoulder and heel only.
Neck style changes.

1959-1962

More streamlined bulb shaped neck area on pint and quart.
Four finger handle on gallon and half-gallon.

1945-1950

Grained texture added on shoulder and heel.
Introduction of gallon size with finger ring handle.

1955-1959

Side content identification replaced by raised fill line.
Two-finger handle appears on gallon and half-gallon.

Odds and Ends

Through the years, other styles of *Clorox* bleach bottles were considered by The Clorox Company. None of these ever reached full national distribution because they failed to meet Clorox's exacting packaging standards. However, some were distributed as test market or sample bottles. Consequently, collectors may occasionally come across a *Clorox* bottle not included in this guide. Two of the most common odd *Clorox* bottles are shown below.

1960
Half-pint

1957
Quart

COLLECTORS GUIDE TO CLOROX BOTTLES

FROM GLASS TO PLASTIC

The conversion to white, polyethylene plastic bottles used today began in 1960, and perhaps was the most significant change of all. By 1962, this container had completely replaced the amber glass bottle because plastic is safer, lighter, easier to handle, and allows greater design flexibility.

In addition to numerous bottle changes over the years, *Clorox*'s manufacturing process has been improved many times to tailor performance to modern needs. However, the consistently high quality of the product itself has left little room for dramatic revision of its basic formulation.

This guide has been prepared purely as an aid for collectors wishing to determine the vintage of early *Clorox* bleach bottles. The Clorox Company sets no value on these bottles, nor does it wish to purchase old bleach bottles.

CLOROX

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IS THERE
ARCHEOLOGY IN YOUR COMMUNITY?

When many people think of historic preservation they think of fine old buildings, or perhaps of neighborhoods that retain distinctive architectural characteristics from the past. The National Historic Preservation Act, however — the nation's central historic preservation authority — extends the same protections and benefits to archeological resources as it does to historic buildings, structures, and districts.

More and more communities throughout the nation are learning that significant archeological resources lie under their streets and backyards, and are incorporating the identification and protection of such resources into their historic preservation programs. Archeological projects can be significant and rewarding activities for a historic preservation commission, revealing otherwise unobtainable information about its community's past, preserving such information for the future, and contributing notably to the community's understanding of itself. Local governments that excercise responsibility for the remnants of their past that lie under their streets and buildings find that residents and visitors alike are excited by what is being found.

What are archeological resources? They are the physical remains of the past, that can be studied by archeologists and other scholars to answer questions about history and prehistory. The answers to such questions can be used by everyone to better understand and appreciate our heritage. Although a standing building may be an archeological resource, most archeological resources are sites and groups of sites, buried in the ground and invisible, or very hard to see, on the surface.

Archeological sites are especially important to historic preservation because they are our only sources of knowledge about prehistory — the thousands of years before written records began to be made in the United States. More recent archeological sites can provide information on aspects of history that were never written down, even though they occurred after written records began to be kept. For example, the ways of life of the poorer segments of many communities, including such ethnic groups as slave communities in the antebellum South and Chinese immigrant communities in the West, were often not recorded by contemporary writers, and our only access to them today is through archeological study of their remains.

Archeological sites are fragile and irreplaceable; they cannot be rebuilt or remade. Destroying an archeological site is often equated with burning a book, since it destroys the information the site, like the book, contains. But each site is a unique resource — a one of a kind book. Even

excavation by archeologists, using modern techniques and great skill, destroys some information, so archeologists are careful to dig only as much as they need to in order to address important questions, and they try to concentrate their work on sites that must be destroyed for other reasons, such as to make way for modern development.

Protecting archeological resources: Recognizing the importance of their archeological resources, more and more communities across the nation are establishing programs to protect them. An important aspect of such programs is **identification.** Since most archeological resources are underground, they can be hard to see — especially if buildings, streets, or landscaping have covered them. Identifying them requires two things: background research to identify the most likely places to look, and fieldwork to determine whether resources really exist in the expected locations. Fieldwork may include both inspection of the ground surface, and excavation using hand tools or machines such as backhoes. Some communities have comprehensive archeological survey programs, while others provide for surveys, often at the expense of developers, only when needed in advance of development that will disturb the ground.

The **physical protection** of archeological resources can be achieved in many ways. If a site can simply be left alone, in the ground, this is usually to be preferred; there are plenty of threatened sites for archeologists to study, and a site preserved today is one that can be studied by archeologists ten years, a hundred years, or even a thousand years from now, when archeologists will have new tools and concepts to use, and new questions to ask about the past. Sometimes archeological sites can be **incorporated** into development projects, so that they remain intact within landscaped areas, are buried under fill on top of which new structures are built, or exposed to some extent and interpreted for the public.

Where an archeological resource cannot be physically preserved, **data recovery** is appropriate. Data recovery means excavating the site to study the information it contains, and translating that information from the form it takes in the ground into books, maps, notes, and other forms that can be consulted by scholars in the future, before the site is destroyed. Data recovery requires careful planning and development of research designs and strategies to guide the work. Fieldwork usually involves careful excavation, under professional supervision, to record not only objects in the ground but — most importantly — the way those objects lie in the ground relative to one another, which can reveal the human activities responsible for their being there. Analysis of the results of fieldwork leads to the preparation of reports, computerized data bases, and other documents that help answer questions about the past and preserve the site's information for future study.

Archeologists and pothunters. Professional archeologists are usually found in college and university anthropology departments (because archeology is a subdivision of anthropology), in museums, and in environmental consulting firms. Some local governments have established archeological programs, and all State Historic Preservation Officers have archeologists on their staffs. In some States and communities there are also avocational archeological societies, which make it possible for interested non-professionals to participate in archeological work. Unfortunately, there are also some people who excavate archeological sites for non-archeological reasons — to build up their own private collections of artifacts, to obtain artifacts for sale, or even to rob graves. Archeologists refer to such people, whose activities destroy archeological resources without scientific gain, as "pothunters." While the work of avocational archeologists should be supported, pothunting should be discouraged because it deprives all of us

of bits of our heritage.

Examples of archeological resources in our communities:

* The remains of prehistoric Hohokam Indian villages, with temple mound complexes and extensive agricultural fields and aquaducts, have been excavated in **Phoenix, Arizona,** sometimes under low-density surburban housing tracts.

* Buried ships dating from the early years of port development have been found in cities like **New York** and **San Francisco.**

* The remains of an early 19th century free, Black community have been found and extensively studied in **Alexandria, Virginia.**

Your community, too, may contain important archeological resources. To discuss the archeological potential of your community, and ways to protect it and make good use of it, contact your State Historic Preservation Officer.

Readings about archeology:

A Field Guide to Conservation Archeology in North America, by Georgess McHargue and Michael Roberts.

Archeology in the City, by Pamela J. Cressy, Belinda Blomberg, Rebecca Bartlett.

North American City Archeological Survey Results, by Pamela J. Cressy, Belinda Blomberg, Rebecca Bartlett.

Prepared by Patricia L. Parker, National Park Service, May, 1987

GEORGIA
Preliminary Archaeological Site Report

Site Name _____

Your Name _____

County _____

Address _____

Property Owner (if known) _____

_____

Address _____

Phone No _____

_____

Date of Submission _____

Phone No. _____

General Description of Site (Include present condition and land use, approximate size): _____

_____

_____

_____

Kind of Site and Artifacts (x): Prehistoric ____, Historic ____, Pottery Sherds ____, Historic Ceramics ____, Arrowheads ____, Stone Chips ____, Glass ____, Metal ____, Bone ____, Old Building ____, Shell Heaps ____, Earthen Mounds ____, Rock Shelter ____, Other (describe) _____

_____

Site Location: Briefly give directions and attach a map (topographic map, soil map, county or city road map, or other) showing scale and north arrow. _____

_____

_____

_____

_____

_____

**Call (404) 834-1433 during business hours if assistance is required to complete this form.

FOLD HERE AND STAPLE TOP

Attach xerox copy of map here *(If not available, please provide sketch map of site location)*

GEORGIA HISTORIC RESOURCES

Resource No.
County

Historic Preservation Section
Georgia Department of Natural Resources
205 Butler Street, Suite 1462
Atlanta, Georgia 30334
404/656-2840

For instructions, see the Georgia Historic Resources Survey Manual

1 Name(s) of resource

2 Location map with North at top

3 Address/location

4 Owner's name and mailing address

5 O Building O Structure
O Site O Object
O Landscape feature

6 O Representative example of building type
Number represented

7 Use, current
original

8 Date of construction (or estimate)

9 Major changes & date (explain in No. 25)
O Altered O Moved
O Addition O Destroyed

10 Architect/engineer/designer

11 Contractor/builder/craftsman

12 Style
O High style
O Elements
O No academic style

13 Building type

14 Original floor plan

15 Plan shape

16 Number of stories

17 Facade symmetry & front door(s)

18 Roof type & material

19 Chimney placement & material

20 Type of construction

21 Exterior material(s)

22 Foundation material(s)

23 Porch(es)

24 Windows

25 Additional physical description

26 Negatives: roll # frame #

Resource No.

27 Description of outbuildings (if any)

28 Site plan with North at top

29 Description of landscape features

30 Number of buildings ____ structures
outbuildings ____ sites
landscape features ____

31 Description of the environment

32 Archaeological potential O observed O reported

33 History

34 Historical theme(s)

35 Significance

36 Sources of information

37 Prepared by *(person, organization and address)*

38 Date of survey resurvey

39 Government preservation activity
O Section 106 review O Grant
O Tax certification O Other

40 SHPO evaluation

41 USGS quadrangle name
UTM reference
zone easting northing

42 Tax map number

43 Recognition and date
O National Landmark O Individual property
O National Register O District
O Georgia Register
O Local designation
O HABS/HAER
O Determination of eligibility
O Other

A service of the
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CHOOSING AN ARCHEOLOGICAL CONSULTANT

Local governments often find it necessary to obtain expert consulting services in archeology — perhaps to assist in the conduct of a community-wide survey, to help document a particular historic property that has archeological features, or to conduct archeological survey work or data recovery in advance of a construction or land-use project. The following are some guidelines to consider in choosing an archeological consultant.

Where can archeologists be found?

In academic institutions in the United States, archeologists are usually found in departments of anthropology. Some archeologists may be employed in departments of classics, art history, or humanities, but these are usually "classical" archeologists who specialize in the archeology of such places as Greece, Rome, and Egypt and are usually not knowledgeable about the archeology of the United States. Most archeologists who do specialize in U.S. archeology are trained as anthropologists, and many are employed in anthropology departments, so the anthropology department of your local college or university is a good place to start looking. Archeologists are also often employed by historical, anthropological, and natural history museums.

Some academic institutions and museums have special research units that specialize in consulting work, or other work under contract to local, State, and Federal agencies or private firms. These units are often called "cultural resource management" programs or "salvage archeology" units, and are usually attached to anthropology departments.

Some academic and museum-based archeologists are not particularly interested in working as consultants, however, and in many cases, you may find that your local anthropology department is more interested in studying African cultures than your local history or prehistory. You should never assume that you have exhausted all possibilities once you have checked your local universities, colleges, and museums.

In recent years a number of private consulting firms have been organized to provide archeological services. Some of these are non-profit institutes; others are profit-making firms. Many large architect/engineer firms have also developed archeological capabilities.

Government agencies are another source of archeological expertise. Agencies like the National Park Service, the Bureau of Land Management, the Forest Service, the Corps of Engineers, and many State parks agencies employ archeologists, who may be able to provide informal advice

and assistance, or even work under contract if such work does not conflict with their official duties.

Finally, there are many "avocational" archeological organizations that do highly competent work, and often specialize in the archeology of particular areas. If there is such a group in your area, it may be able to provide excellent service at low cost.

The State Historic Preservation Officer (SHPO) is an excellent source of information on where to find an archeological consultant, and can also help you with recruitment, evaluation of qualifications, proposals, and fees, and with the design of archeological contracts. You may also find it helpful to consult the Directory of Professional Archeologists, published by the Society of Professional Archeologists (SOPA). It should be noted, however, that not all archeologists have applied for certification by SOPA, so there may be highly qualified archeologists in your area whose names do not appear in SOPA's Directory.

What should I look for in a consultant?

Relevance to the work at hand. The archeological consultant should have knowledge and skills appropriate to the work you need to have done. For example, if you need assistance in evaluating the site where an old mill is reported to have stood, you will want to obtain the services of a specialist in historical archeology — the archeological study of sites created or occupied since the coming of Europeans to America. On the other hand, if you are undertaking a survey to identify sites representing your community's prehistoric Indian cultures, you will probably want to consult a specialist in prehistoric archeology — the archeological study of prehistoric cultures. If you are seeking an archeologist to excavate a site that is threatened by a Federally assisted construction project, such as a project funded using Community Development Block Grant funds, you should be sure that the consultant understands the laws and regulations under which such work is done (e.g. Section 106 of the National Historic Preservation Act, the regulations of the Advisory Council on Historic Preservation, and relevant regulations of the Federal agency involved).

Experience and education. A healthy mix of experience in your local area, or at least in your State or region, and advanced education is important. Your prospective consultant should have an MA or PhD in anthropology, archeology, or a closely related field. At the same time, the prospective consultant should be able to demonstrate substantial experience in the archeology of the area, the State, or similar regions. If the archeologist does not have such experience, he or she should have people on staff with such experience.

If the consultant will be expected to work with the SHPO, prepare National Register nomination forms, evaluate properties for possible inclusion in the Register, or conduct work to help an agency comply with Section 106 of the National Historic Preservation Act, experience with Federal and state historic preservation programs is very desirable.

The consultant should know how the State historic preservation program is organized and should understand National Register and Section 106 procedures. Prior work with local governments is equally desirable, so that the consultant may be expected to understand the governmental context in which you are working.

Communication. Many archeologists, like other scientists and academics, have difficulty communicating effectively with the general public. Particularly if your consultant will be expected to oversee non-professionals in the conduct of survey or excavations, participate in training or education programs, or provide oral reports to the City Council, planning board, or historical commission, you should give special attention to the archeologist's communication skills. The prospective consultant should be able to provide you with examples of material that he or she has prepared for the general public, or otherwise demonstrate his or her effectiveness in written and oral communication.

On-time delivery. The archeologist's record of performance on other jobs should document a history of delivering products, such as reports, on-time. Particularly if the archeologist's report will be needed to comply with grant conditions, or to comply with the terms of an agreement under Section 106 before a project can proceed, it is obviously vital that the archeologist be able to deliver his or her product on-time, and that he or she understand the need to do so. If the archeologist's work in the past has been subject to review by the SHPO, the National Park Service, the Advisory Council, or other Federal or State agencies, his or her record should document not only on-time delivery of products, but on-time delivery of products that the review agencies have found acceptable.

Cost. Consulting archeologists, like other consultants, generally cost money. In some special circumstances you may be able to obtain service for free, but this is rare, and there is always the danger of "getting what you paid for." Generally speaking, you can expect the cost of an archeological consultant to be equal to what you would pay for a consulting engineer, architect, or other professional working an equivalent amount of time. Costs can be reduced, however, where volunteers are available to assist the archeologist, where cost-sharing arrangements can be developed, or where cooperative agreements can be worked out with local institutions or organizations. The SHPO should be able to help you evaluate what a given archeological project should cost.

What kinds of procurement processes should I use?

Remember, that you are procuring professional services, and it is usually impossible to put a hard-and-fast price tag on such services, and if you simply contract with the lowest bidder you are very likely to get low quality services.

The National Park Service recommends procuring archeological services on the basis of competitive proposals. This involves developing a scope of work for the project and inviting multiple propsective consultants to offer separate proposals and bids. Proposals should then be evaluated by a Technical Proposal Evaluation Panel (TPEP) made up of knowledgeable people (but not necessarily all archeologists). The TPEP ranks the

proposals and reports to the contracting officer, who then opens the bids and negotiates, if possible, with the most qualified offeror with the best proposal to get the job done for the best price. If agreement cannot be reached with the highest ranking offerer, the contracting officer negotiates with the next highest ranking, and so on. In this sort of procurement, price is one consideration, but it is only one, and it is not the prime consideration; the prime consideration is obtaining a quality product, from the best possible consultant.

If you anticipate having the need for archeological assistance on a periodic or occasional basis and it is too complicated to seek competitive proposals on each project, it may be appropriate to seek competitive proposals for all archeological services needed for a given period of time -- perhaps a year, or several years. It must be expected that proposals and bids by individuals and organizations offering such open-ended services will be more general and open-ended themselves than would be proposals for the conduct of particular projects, but the same basic system can be used to evaluate them and winnow out the best offerers.

The SHPO, the Regional Office of the National Park Service, the Advisory Council, and other Federal agencies are sources of assistance in the development of strategies for procuring archeological services, and can often provide knowledgeable people to serve on TPEPs, sometimes for free, sometimes if salaries and travel costs are reimbursed.

For more information on choosing an archeological consultant, see:

Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation Professional Qualifications Standards

36 CFR Part 61 Procedures for State and Local Government Historic Preservation Programs, Appendix A

Directory of Professional Archeologists. Society of Professional Archeologists, c/o William Lovis, Michigan State University Museum, East Lansing, MI 48824-1045.

Guide to Departments of Anthropology. American Anthropological Association, 1703 New Hampshire Ave. NW, Washington DC 20009.

Prepared by Patricia L. Parker, National Park Service with assistance from Dr. Frank McMannamon, National Park Service, and Dr. Thomas King, Advisory Council on Historic Preservation, May, 1987

ACKNOWLEDGEMENTS

The technical material compiled for the *Georgia's Living Places* project is the result of the work of many people.

Thanks go to Catherine Howett, Maurie Van Buren, Darlene Roth, and Pat Garrow whose ideas contributed to the articles in the Overview Section.

For their support and assistance, special thanks go to Mary Bray Wheeler of the American Association of State and Local History and Clermont Lee.

Information on building materials was based on a cooperative project undertaken by the Historic Preservation Section and the Center for Architectural Conservation at Georgia Tech. Material was compiled by graduate research assistant, Keith Besserud; former Historic Preservation Section Architects, Jeff Brown and Bonnie Wilkinson, served as editors. Special thanks to John Myers for his support of the Building Materials Project.

For their kind permission to reproduce articles and illustrations, thanks go to the American Association for State and Local History; Rudy Favretti; Peachtree Garden Club, Atlanta; Cooperative Extension Service, University of Georgia; and The Clorox Company.

Thanks also to the National Park Service for their on-going assistance. Information prepared by Ward Jandl, Anne Grimmer, Lauren Meier, Betsy Chittendon, Kay Weeks, Baird Smith and Patricia Parker has been used in this project.

Drawings in the Architecture Section were adapted from illustrations in:

A Primer: Preservation for the Property Owner, by The Preservation League of New York State, Inc., Douglas Bucher Illustrator, Albany, New York, 1978.

Cheraw Preservation and Maintenance Manual, Thomason and Associates and the Ehrenkrantz Group, Cheraw, S.C., 1986

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Rehab Right: How to Realize the Full Value from Your Old House, c 1986 by the City of Oakland, with special permission from Ten Speed Press, Berkeley, California.

Savannah Victorian District Design Guidelines.

In addition, the entire staff of the Historic Preservation Section is heartily thanked for all its efforts in the preparation of this material.

This publication has been financed in part with federal funds from the National Park Service, Department of the Interior, through the Historic Preservation Section of the Georgia Department of Natural Resources. However, the contents and opinions do not necessarily reflect the views or policies of the Department of the Interior, nor does the mention of trade names, commercial products or consultants constitute endorsements or recommendations by the Department of the Interior or the Georgia Department of Natural Resources.

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