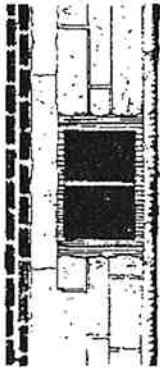


# STRUCTURAL ELEMENTS

## FOUNDATIONS



A foundation, as its name denotes, is the basis upon which anything is constructed. A house or similar structure rests on a masonry foundation since masonry is nearly impervious to deterioration and can sustain great weight. While a foundation is undoubtedly a structural element, it incorporates design features which correspond to the theme and style of the building.

Early construction utilized foundations made of field stone or rocks found at the site upon which the building was to be built. The stones were placed randomly to a height of about one foot. This height prevented frame building members from rotting.

By the mid-nineteenth century, local building trades had progressed sufficiently to rely on quarried limestone or soft baked bricks for foundation materials. Though brick was used, limestone was considerably more prevalent. Day-laid stone—a white, heavily veined or marbled limestone—was favored.

As basements replaced cellars and featured windows for ventilation, coursed or uniformly-sized pieces of limestone became the standard. This presented a more formal, finished appearance, and a foundation began to contribute more to the overall theme of the building.

The first quarter of the twentieth century witnessed a return to simple building designs. Poured concrete replaced lime-

stone as the common foundation material because it was easier to work with and did not require repointing.

The final detail a brick or stone foundation could afford was a styled mortar joint. Commonly finished joints were flush with the foundation surface. Other styles of joints include raked (which is recessed back from the surface) and grapevine (which is convex in shape and projects outward from the foundation surface).

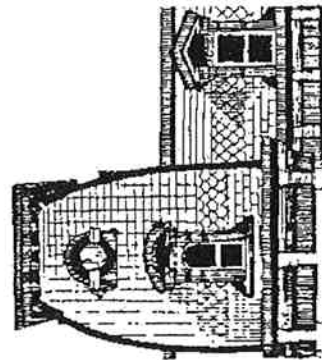
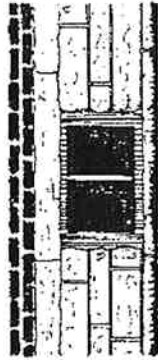
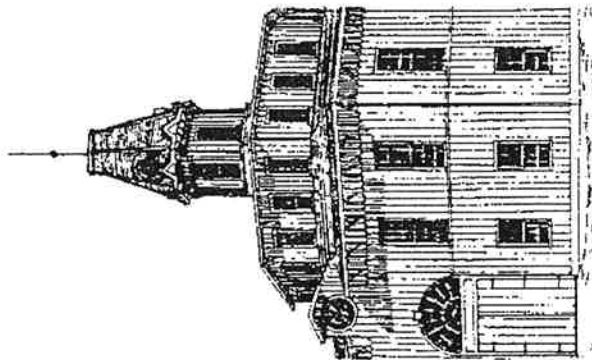
The most common form of deterioration in a foundation is the cracking between the stones or bricks and the subsequent crumbling of mortar in those joints.

Replacing the mortar is done by repointing, a process which is described in *Exterior Walls Masonry* section.

Serious foundation problems such as shifting or uneven settling situations which can affect the overall stability of the structure—require some treatment which can compensate for the movement of the foundation and prohibit any further damage. Frequently, this is accomplished by pouring concrete around the footer—the portion of the foundation below ground—since the footer is usually the first area to deteriorate. It reacts to movements in the earth around the structure, particularly those resulting from weather changes.

Because foundation damage can be difficult to correct, consulting an expert trained in structural building design is advised.

Brick and stone are still available for use as foundation materials. Poured concrete and concrete block (smooth or rough-faced) are readily obtainable and most common.

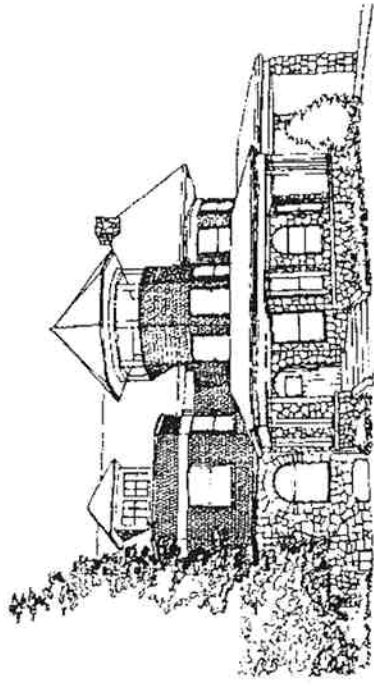
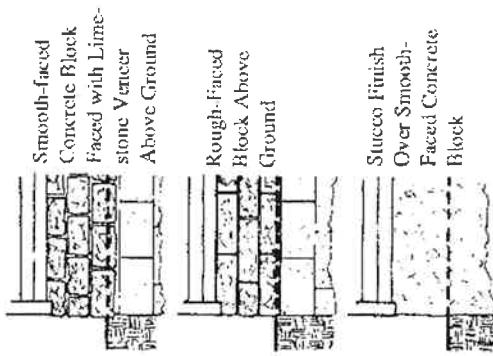


# EXTERIOR WALLS

For building additions, the choice of foundation materials should be guided by the foundation material of the original structure. For example, an historic structure with a limestone foundation would be complemented by an addition with a limestone, rough-faced or stuccoed foundation rather than a brick foundation. Scale and color are deciding factors.

## PROHIBITIONS

Smooth faced concrete block with an above ground exposure in excess of 8" —one course—is not permitted. If smooth-faced block is desired and the exposure is greater than 8", the foundation must be stuccoed.



The most visible structural building element is the wall. It has the greatest amount of exposed surface and, as such, provides the initial visual impact for the building. Beyond the first desire for shelter, building walls have been a major consideration in architectural design.

available and, particularly in the latter section, wood was not in abundance.

Locally, both masonry and board materials were common. Combinations of the two were found in buildings as early as the beginning of the nineteenth century.

The *Exterior Walls* section covers historical and contemporary masonry and wood materials.

Walls can be classified by materials into two primary categories. Masonry, the first category, includes brick, stone and concrete—non combustible materials derived from minerals and inorganic substances. The second category, Frame, includes wood products and wood derivatives—materials which are flammable and based upon organic substances.

Historically, geography played a major role in the selection of building materials. Wood was abundant in the eastern United States where rich forests supplied lumber for building frames, roofs, walls, windows, doors, and trim. In the southern and southwestern sections of the country, clay was readily

## MASONRY



By far, the most common masonry wall material was and continues to be brick. Techniques, however, have changed greatly. Initially, brick walls were several courses thick with interior and exterior walls sharing the building load. Brick has now assumed a decorative role, being applied as a veneer.

Primitive bricks were made at or near the construction site in wood frames. The outside or skin was baked to form a hard shell; the inside remained soft and, over time, returned to a powder. Due to the amateur nature of the process, solidity and strength varied between bricks.

Early builders used multiple thicknesses to compensate for the fluctuation within the individual members. Another variation was to use headers—bricks turned endwise. This was done within rows of stretchers—lengthwise laid bricks—or as complete rows. With improvement in building techniques, fewer number of header rows were required.

During the last quarter of the nineteenth century, manufactured bricks were the standard. They were uniform in size and consistency. Improved technology also accounted for the development of pressed brick. This was an oil-finished brick with sharp edges and was used on

the street facade(s) of a building with the rest of the building constructed in less expensive brick.

Color experimentation began at this time, too. Brick was no longer limited to shades of red. Browns and blonds complimented the stylistic return to nature. Color was used in mortar with shades matching the brick color.

The 1910's witnessed the use of texture brick, featuring raised lines or patterns. This variation was used extensively on workmen's houses and neighborhood commercial buildings constructed prior to the Great Depression.

Limestone and sandstone were used historically as wall materials; however, limestone was more commonly found in a foundation or as trim. Both materials were favored in Romanesque style buildings which used large quarried pieces of stone.

Concrete is a rigid masonry substance composed of cement, gravel, sand, and lime. Developed in the latter half of the nineteenth century, concrete was often faced with stucco, brick, or stone. Smooth concrete walls were favored for Art Deco and Art Moderne style buildings.

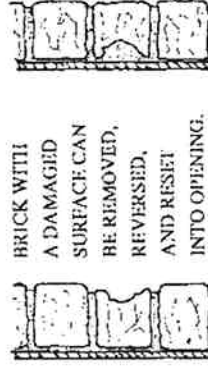
Concrete block, uniformly sized concrete pieces held together with cement mortar, is sometimes used as a replacement for poured concrete. However, exposed concrete block (as a wall surface) is not permitted; neither are artificial substances imitating stone or brick veneers although a layer of brick or stone as a facing is permitted in the construction of a new building or addition.

Stucco is a cementitious coating which can be applied over masonry, frame, or

wire mesh. It provides a continuous surface which can be flat or textured. Its use was functional—to cover deterioration—or decorative.

Soft brick is susceptible to major weather changes, expanding and contracting with seasonal heat-cold exchanges. Because of this reaction, cracking or chipping of the baked surface can occur.

This damage can be repaired by removing the mortar from around a damaged brick, removing the brick, reversing it, and replacing it in the opening. This treatment provides the closest match to the surface being repaired. If the brick is seriously deteriorated, a different brick is required. New brick is readily available commercially, and innumerable varieties exist. Old brick is handled by some salvagers, as is limestone. Many times, an unnecessary and nondecorative chimney can supply needed brick. In all cases, brick should be repaired with replacement brick which matches the original in size, color, texture, and consistency.



BRICK WITH A DAMAGED SURFACE CAN BE REMOVED, REVERSED, AND RESET INTO OPENING.

Limestone and sandstone repair is similar to that for brick. Limestone is an extremely dense substance and can withstand weather changes and impact without deteriorating. Its installation is comparable to that for brick and thus, an individual piece can be removed and replaced. Sandstone, however, is diffi-

cult to obtain due to its relative rarity as a building material.

Poured concrete's damage is due usually to cracking from uneven settling.

Repair requires chipping out a v-shaped area on the face of the building, filling this area with a concrete patch, and then smoothing the surface.

Stucco is repaired somewhat similarly to concrete. The loose stucco is removed, and the underlying surface is swept clean and repaired, if necessary. As an initial coat of stucco dries, it should be dampened to prevent its drying too quickly and shrinking. A second stucco coat should be applied after a few days, and it should be gently wire brushed to give the new surface the same texture as the original. Soft stucco consists of 1 part lime, 1 part portland cement, and 5 parts sand. The top coat should have 1 part pea gravel substituted for 1 part sand.

Mortar is the "glue" which bonds individual masonry units together into a homogeneous structure. Mortar, when mixed, is pliable allowing workability prior to curing to a hardened state.

Until late in the nineteenth century, mortar was composed of lime, sand, and water. The type of sand could control the color—from white to gray-brown.

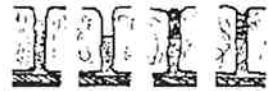
This mortar was referred to as soft mortar because it expanded and contracted with major weather changes. Soft mortar which is used with soft brick can be mixed by combining 1 part of portland cement with 5 parts of lime and 12-20 parts of sand. Water is added to achieve a workable consistency. Hard mortar, which should be used with limestone or hard-baked bricks, follows a similar mixture of equal parts of portland cement and lime.

Cement was developed in the late nineteenth century and was used to guarantee solidity in masonry substances. When added to mortar, a virtually unchangeable substance—hard mortar—was achieved. This worked quite well with limestone and hard-baked brick, the latter of which was developed during the same period near the turn of the twentieth century.

Color could be incorporated into the mortar through the inclusion of clay or another substance in powder form. Colored mortar added a decorative twist to a functional building element. Replacement mortar must match the original in color, composition, texture, and application in order for the joints to be unnoticeable.

Replacing deteriorated mortar is done by repointing. The process involves removing mortar to a depth of 3/4", dampening the joint, applying new mortar in the space, and smoothing the new joint with a small trowel. The new mortar joints should duplicate the original in appearance with the wet mortar being a shade darker since it will lighten as it dries. No mortar should remain on the surface of the bricks or stones between which it is applied.

#### TUCKPOINTING DETERIORATED MORTAR JOINT



REMOVE 3/4 INCH OF OLD MORTAR

CLEAN JOINT, THEN DAMPEN MORTAR AND BRICKS

ADD NEW MORTAR

TROWEL SHAPE TO MATCH ORIGINAL JOINT

Cleaning masonry is a process which can be an acceptable step in a repair program if the cleaning is done using non-abrasive techniques. Generally, the cleaning method should be geared to the individual surface; however, a few standards apply in the case of any historic masonry surface.

Sandblasting, featherblasting, or any similar technique which removes the outer surface of the masonry is not permitted. These abrasive methods will leave a rough, pock marked face which provides an excellent surface for new dirt to locate and which can cause water/moisture infiltration. For soft brick or sandstone, the baked exterior can be completely removed, exposing the soft powder interior and promoting the complete deterioration of the material.

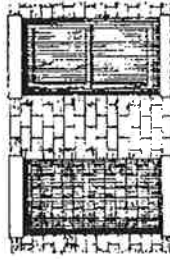
Similar problems can occur by using harsh chemicals. Hydrochloric (muriatic) acid leaves salt deposits on the building surface. These deposits can damage the surface long after the cleaning process has ended. Also, the acid most assuredly damages the soft mortar.

Some substances can be used effectively. A garden hose and bristle (never wire) brush will remove dirt. Lye and corn starch added to water is a gentle cleanser. Small percentages (four or less) of potassium chloride or hydrofluoric acid added to water and applied with a hose at no greater than 300 pounds of pressure at the nozzle (using a fan tip nozzle) is the strongest non-abrasive method permissible.

Analyze the surface prior to cleaning. Determine the type and condition of the

material and the substance(s) to be removed—dirt, stains, paint. Do test patches, small areas which can be observed through several weeks of weathering. Choose the cleaning method which removes the dirt but leaves the building surface unchanged.

Efflorescence, or salt residue, may appear. This is normal after water is sprayed on masonry. It can be removed easily by scrubbing with a bristle brush and rinsing with a garden hose.

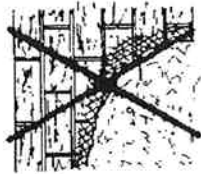


#### RECESSED BRICK MAINTAINS DIMENSIONS AND IMPRESSION WHILE A WINDOW HAS BEEN REMOVED

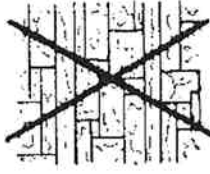
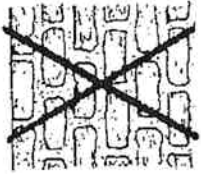
A masonry patch may be required where a building element has been altered, such as with the removal of a window. If the symmetry of the building would be interrupted by the complete elimination of the element, then the rhythm should remain intact. This can be done by recessing the patch to the location which the element occupied. Regardless of whether or not the impression is to be left in the masonry, the patch should feature materials duplicating those on the rest of the wall surface, and the rows should be aligned.

Tuck pointing or patching a masonry surface requires material of the same color, texture, composition, and application as the original.

STUCCO OVER BRICK OR STONE



SLOPPY TUCK POINTING



ARTIFICIAL STONE

CONCRETE BLOCK IN WINDOW OPENING

#### PROHIBITIONS

Because it changes the visual texture of the building, stucco or similar cement coatings are not permitted on historic masonry surfaces which have not had such materials applied previously nor are artificial substances imitating stone or brick veneers permitted. However, a layer of brick or stone as a facing is permitted in new construction if appropriate to the architecture. Exposed concrete block as a wall facing is not permitted.

Cleaning masonry by sand blasting, wire brushing, or using abrasive chemicals is prohibited.

## MORE INFORMATION

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"Repairing Stucco," Catherine and Donald Mimery, The Old House Journal Vol. VII, No. 7, July 1979.

"Specify the Correct . . . Masonry Sealers," James G. Diedrich, American Building Restoration, Inc., The Old House Journal Vol. V, No. 11, November 1975.

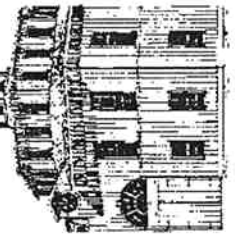
"Restoring Old Brickwork," Frederick Herman, The Old House Journal Vol. III, No. 3, March 1975.

"The Case Against Removing Paint from Brick Masonry," Theodore Prudon, The Old House Journal Vol. III, No. 2, February 1975.

"The Cleaning and Waterproof Coating of Masonry Buildings," Robert C. Mack, Preservation Briefs 1, Washington, D.C., 1975

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## FRAME



Wall surfaces made from wood were on the earliest of buildings. Simple hand hewn planks applied horizontally soon graduated to more uniform, but similarly designed, pieces—clapboards. The siding was usually lapped for better weatherization; tightly butted flush siding was used, too.

In the mid-nineteenth century, wood as a material began to be used decoratively. It was cut and sawn into numerous shapes for intricately patterned details. Wood sidings became more fanciful, and board and batten—a technique using flush vertical planks and narrow strips to cover the seams—was popularized at this time.

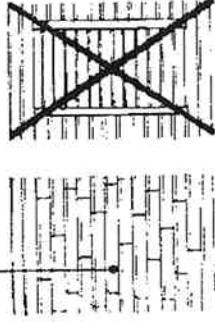
Differing widths of horizontal sidings, combined with vertically or diagonally laid flush boards or decorative wood shingles, were used throughout the late nineteenth and early twentieth centuries.

These varying textures provided imaginative rhythm and shadow effects, and paint served to play up the variations.

Replacing damaged wood siding requires pulling the nails in the deteriorated piece, removing the piece, and replacing it with a like piece. If the new piece is a little smaller in width, the horizontal joints should be caulked.

If entire sections of siding are to be replaced, the new siding should be aligned and toothed in with the old. This is true when installing a patch where a window or door has been removed. Vertical joints should be sanded smooth and caulked. This process is aesthetically appealing and functions as a sealer.

## NEW WOOD PATCH



Most of the wood sidings available historically are available today.

However, due to changes in lumber sizing—wood not being cut in true inches—these new sidings are approximately 1/4 to 1/2 inch narrower than previously manufactured historical materials. Careful installation is important when using new versions of siding in conjunction with existing siding.

Also available is hardboard siding which consists of pressed wood chips held together with a heat applied glue adhesive. Hardboard is manufactured in several widths and in sheets for a board and batten effect.

## PROHIBITIONS

Replacing wood siding or shingles with other than like materials is not permitted. The replacement must match in style, shape, and width to the existing.

Many wood sheathed buildings have been covered with replacement artificial sidings. These include insulbrick, asbestos block, aluminum, vinyl, and steel. While these replacements can be repaired in kind, another replacement covering cannot be added to the multiple wall sheathings if the covering is not

available. Replacement sidings are prohibited as original materials.

Wood and wood derivatives, such as hard board and masonite, are permitted with the following exceptions: reverse board and batten hardboard sheets, plywood sheets, and diagonal cedar planks.

When patching wood siding where a window or door has been removed, the vertical joints must be flush and staggered, often referred to as toothed-in. A batten strip may not be used to cover the seam.

## CLAPBOARD

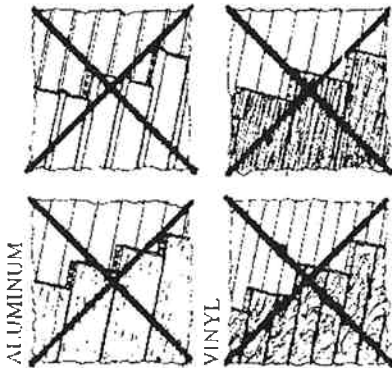
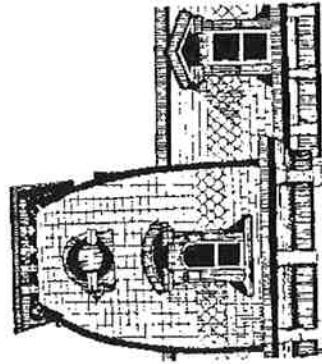


## DROP SIDING



## BOARD AND BATTEN

# ROOFS



ALUMINUM

VINYL

INSULBRICK

ASBESTOS BLOCK

REVERSE BOARD AND BATTEN LIKE MATERIALS OF DIFFERENT STYLES

As with any structural building element, a roof serves a functional purpose initially with its design aspects taking a secondary role. Wood shingles over a gabled or pitched style roof was a prevalent feature until well past the middle of the nineteenth century. Other early styles were gambrel, hip, and pyramid.

All of the early styles had one element in common: no valleys or low areas where water would concentrate. The roof slopes were uninterrupted so that water would be eliminated before it could deteriorate the wood shingle surface.

As building styles became more imaginative and technology advanced, roof designs became more complex. These roofs combined simpler slopes with more integral design elements.

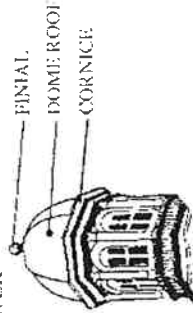
Queen Anne style structures, for example, nearly always included a tower or turret which had an angled or domed roof.

Wood shingles were eventually replaced by slate tiles or sheet metal. Both materials could withstand repeated weather changes and added interest to

the building. Slate, in particular, was used during the late nineteenth century and was applied in a variety of shapes and patterns. Less common were tin or copper shingles.

During the Victorian era of the mid to late nineteenth century, metal ornamentation was applied to roof ridges. Windows' walks--lockouts atop a flat section of roofing--included iron cresting, decorative metal work which gave the appearance of a low railing. Many a Queen Anne's tower had a cap or finial.

TOWER



Skylights were introduced in the late nineteenth century, also. They provided light and aesthetic interest to a building's interior in a manner previously unavailable. These lights were mounted flush into the roofs and had wood or metal frames.

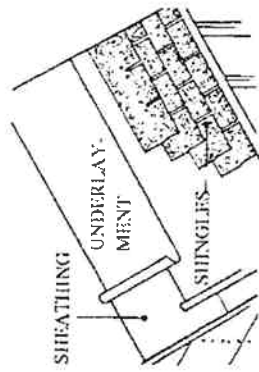
The turn of the twentieth century brought a return to simple, practical building designs with functional roofing materials. Clay tile was favored due to its textural interest and durability.

Asphalt and asbestos shingles began to be used, although their major importance came later following further technological progress.

Both a roof's shape and its material had become integrated into a building's overall design theme, making the roof a significant style element.

Roofs of most historic buildings were constructed over rafters—supports which defined the shape of the roof and were tied into the building walls; some were constructed with additional trusses. Trusses are rafters with additional cross supports to better withstand the weight of the roof's surface. Because not all buildings have these additional supports, no more than three layers of roofing surface materials—tiles or shingles—are permitted.

If a fourth layer of roofing is necessary, the first three must be removed. Once this is accomplished, the roof rafters or trusses can be examined. Also, roof sheathing may need to be replaced. Sheathing consists of wood strips—now plywood sheets—placed across the rafters or trusses to which the shingles are nailed.



Three-in-one shingles are manufactured in strips which are overlapped and held in place with nails. The exposed part of the shingle may be uniformly rectangular or vary minimally in size and shape, giving the appearance of wood shingles. French lock shingles are individual diamond shaped pieces which interlock. These strips can be removed and replaced individually.

Slate, a common historic roofing material, requires careful repair. The

existing slate should never be walked on as the pieces are brittle and will crack easily. Walking should be done only along the roof valleys with soft soled shoes. Repair requires an L-shaped ladder placed across a roof ridge to evenly distribute the weight of the roofer. A damaged piece of slate can be replaced by inserting a slate nail cutter under the piece, clipping the nails, and removing the slate tile. A metal tab is slid under the intact shingles immediately above the area where replacement is being made. The tab is then nailed down. A new shingle is laid over it, but under the other slates, and the tab is bent up and over the new slate tile, holding it in place.

Other damage to a slate roof may be the result of rusted nails although this is an infrequent problem. Correcting this requires removal of the slate roof and reattaching the slate pieces with slating nails carefully so as to not drive them in too tightly into the slate.

Tile is a substantial roof material but can be easily damaged by direct pressure. A fallen tree limb striking a tile roof can cause cracking or breaking of the tiles. Repair of tile roofing is similar to slate. Both share the same problems of damaged pieces or rusted nails, and neither should be walked on. Individual replacement of pieces is usually much less expensive than removal of the surface and replacement with modern shingles.

Sheet metal's damage is due to corrosion, fostered by weather exposure. Acids carried through the air or present in rain can initiate the corrosion process. However, keeping the surface painted should prevent this damage.

Undoubtedly, the most common roofing problem is damaged flashing. Since it is

found in all of the joints—the most common areas for water damage—flashing must be maintained, and it should be covered by a minimum of four inches (4") of roofing material. Also, it should be painted with a metal preservative, the most popular of which is "roofer's red."

Asphalt and fiberglass shingles are the most commonly available roofing materials. Slate and clay tile are available, although installation is more difficult. Stancing seam sheet metal, including copper, may be used though it was much less common historically.

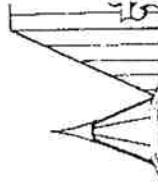
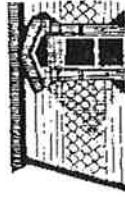
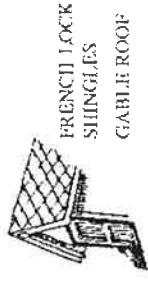
Flat roofs require single membrane roofs, such as tar and gravel, sheet metal with flush seams, or fiberglass sheeting. A wood deck can be constructed over the roof if it is to serve as the floor for a second story balcony. Fiberglass sheeting is quite satisfactory as a deck covering, also.

Flashing is available in metal sheets, the most common being tin or aluminum. Copper is also available. Flashing other than copper should be painted black, red, or the roof color.

Skylights are quite popular in a variety of sizes and shapes. They can be of clear or bronze tinted glass with wood or metal frames, flush mounted on non streetside elevations.

#### PROHIBITIONS

Aluminum or plastic roofing is prohibited as is rolled roofing. Neither type adds to the design, character, or significance of a historic structure. The first type is an attempt to imitate wood shingles. The second type is a material with a short period of effectiveness.

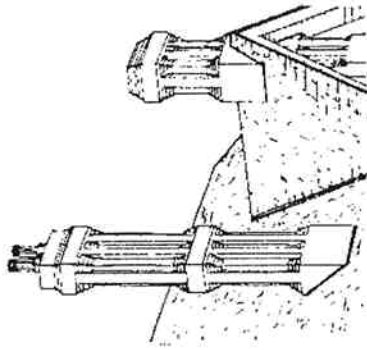


Shingle colors should be medium to dark, preferably shades of black, brown, or gray; also permitted in some cases are green or red. The last two colors are appropriate to late nineteenth and early twentieth century buildings only. White or light gray roofing or a shingle with white in it is prohibited.

Three-in-one tab or French lock shingles are appropriate. Unexaggerated asphalt or fiberglass shake shingles are permitted.

Every effort should be made to repair rather than replace slate or clay tile roofing because these are significant building elements.

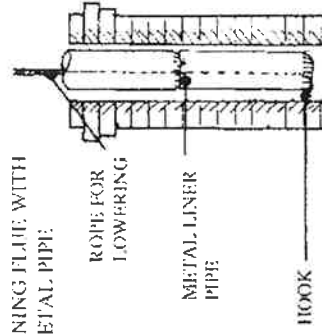
# CHIMNEYS & FLUES



chimneys should be repaired and capped. This eliminates drafts, reduces deterioration, and maintains a chimney's important decorative role. Furthermore, retention of the chimney permits future operation of its fireplace(s).

Chimneys serving operating fireplaces or furnaces should be cleaned regularly. The flue must not become blocked or lined with residue, either of which could contribute to a fire. Old flues were originally lined with mortar instead of tile. If mortar is deteriorating and dropping down the flue, this lining is probably no longer protecting the chimney brick from the fire's hot exhaust. Metal or ceramic pipe is available in a variety of diameters to line flues. Lining the flue with protect original bricks and mortar while still allowing fireplace usage.

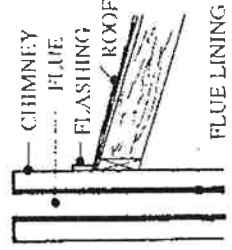
LINING FLUE WITH METAL PIPE



Unpainted chimney brick should not be painted. Furthermore, chimneys should not be succeeded as a means of repair. The great temperature differences which a chimney experiences will crack a stucco coating and eliminate its effectiveness.

Historically, a chimney is a chute for smoke, fumes, and heat from a fireplace or furnace, thereby serving as an integral part of a structure. In addition to its function, a chimney frequently acts as a design element, incorporating unusual brick patterns and details. Also, some featured embellishments such as chimney caps and pots which improved heat production and reduced drafts in the fireplace.

Masonry chimneys can be a source of leaks if either the cap at the top or the flashing at the base has deteriorated. Cracking mortar joints can emit water, loosening and eroding bricks. In extreme cases, a chimney can crumble or lean and require rebuilding. Unused



Removal of ornamental ridge caps, cresting, or roof finials is prohibited. These items are metal and must be painted with a metal preserving paint. Red is historically accurate for historic roof metal other than cresting- which should be painted black. If roof vents are installed, they must be painted to match the roof color.

No more than three layers of shingles are permitted on a roof. Removal of the existing roofing is required if the top of the three layers merits replacement.

Removal of decorative fascia or soffit is prohibited. Continuous aluminum sheathing with baked color finish or painted to match the trim color(s) is permitted in place of an unadorned fascia and soffit. It must have flush seams and run parallel with the building. Perpendicular or ridged aluminum is prohibited.

Bubble or flush mounted skylights are permitted. The frames must be bronze or painted the roof color and should not be located on a prominent roof slope.

## FOR MORE INFORMATION

"Roofing for Historic Buildings," Sarah M. Sweetser, Preservation Briefs 4, Washington, D.C., 1978.

"Roofing with Wood Shingles," C. R. Meyer, The Old House Journal, Vol. I, No. 1, October 1973.

"Flat-Roof Repairs," The Old House Journal, Vol. 1, No. 1, October 1973.

"Roofing: Repair or Replacement?" R. A. Clem Labine, The Old House Journal Vol. IX, No. 2, February 1981.

"Repairing State Roofs," R. A. Clem Labine, The Old House Journal Vol. III, No. 12, December 1975.

New chimneys built for old or new fireplaces should be of the same material and design as existing, original chimneys. Details and proportions should be similar to existing chimneys.

In addition to masonry chimneys, metal stacks boxed with wood and painted are appropriate. A metal and wood chimney must maintain the proportions of a masonry chimney and reflect the design of the structure to which it is attached.

Stovepipes accompanying wood stoves shall be treated as metal chimneys. The exception to this requirement is a stovepipe located on a one story house and protruding 3' or less through the addition's roof. A raw stovepipe of this type must be painted a dark brown, green, gray, or black corresponding to the roof color.

Chimney pots handcrafted from fired terra cotta clay in historically accurate designs are readily available. Less common chimney caps are obtainable.

#### PROHIBITIONS

Destroying the stylistic contribution of chimneys is prohibited. Removal of chimneys may be permitted if the chimney does not contribute architecturally to the building. Imitation stone or brick and metal formed to look like stone or brick are not permitted, and fake or false chimneys and flues may not be added to a structure. Unsheathed stovepipes or metal chimneys are prohibited on primary structures or visible facades.

#### FOR MORE INFORMATION

"Repairing Old Chimneys," Matt Hoff, The Clean Sweep, The Old House Journal Vol. V, No. 5, May 1977.

"Chimney Sweeping," Eva Horton, Kristia Associates, The Old House Journal Vol. VI, No. 8, August 1978.