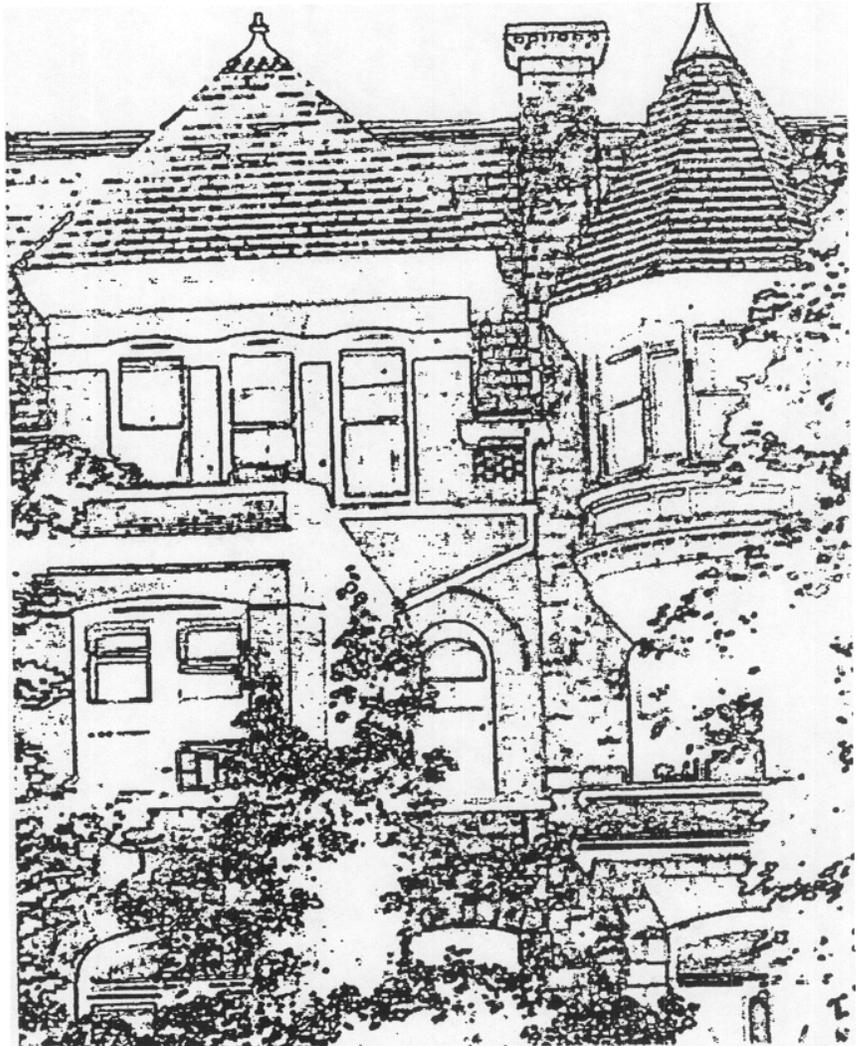


# District of Columbia Historic Preservation Guidelines

## ROOFS ON HISTORIC BUILDINGS



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# Design of Roofs

Roofs are one of the most important features of historic buildings. Functionally they shelter buildings from the weather. Visually their shape, elements, details and materials can significantly contribute to the appearance of buildings. In addition, roofs may also be subject to change, such as when heating and air conditioning (HVAC) systems, decks, mechanical penthouses and the like, are added to them.

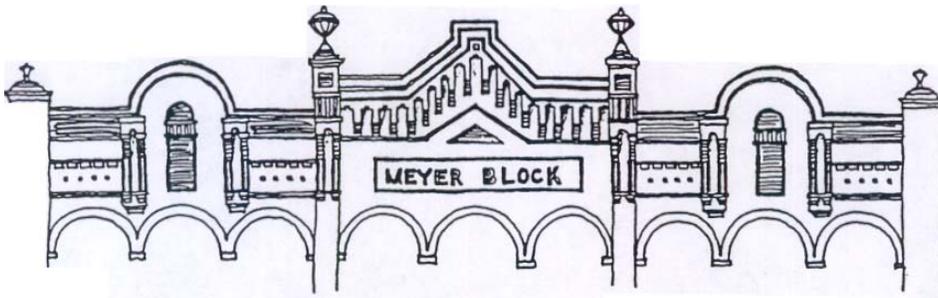
## Roof Shapes

The two primary shapes of roofs on historic buildings in Washington are flat and sloped. The design of a roof shape is based on a number of considerations including the building's height, use, wall materials and structural elements.

## Flat Roofs

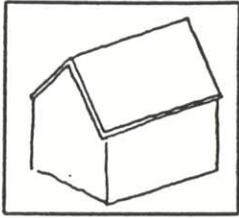
Most rowhouses, semi-attached residential buildings and commercial buildings have flat roofs. Flat roofs also are often found on institutional, government and other types of buildings. The term flat roof is somewhat misleading. Flat roofs are rarely absolutely flat, they usually slope toward the rear of the building to drain water.

Since a flat roof is typically not visible from the ground, its design does not normally contribute to the character of the building. However, the cornice, parapet, pent roof or other feature at the edges of a flat roof is almost always visible. Therefore, its design often significantly contributes to the character of a building.

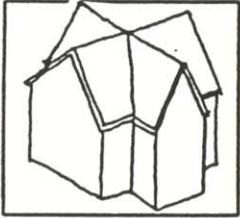


**A cornice often contributes to the appearance of a building.**

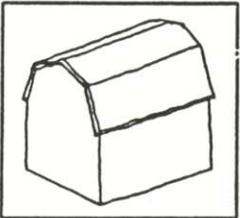
## Types of Sloped Roofs



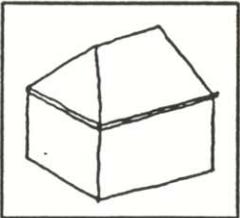
**Gable**



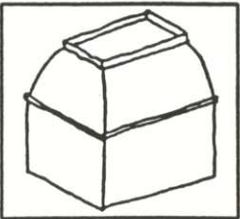
**Cross Gable**



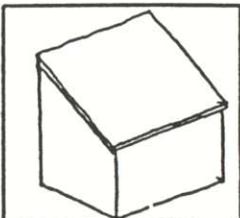
**Gambrel**



**Hipped**



**Mansard**



**Shed**

## Sloping Roofs

Historic free-standing buildings typically have sloped roofs which are found in a wide variety of shapes.

### Gable

The most commonly found sloping roof on residential buildings is a gable roof. This type of roof is formed by two sloping planes rising from the side walls, meeting at a central ridge. The junction between the sloping planes and the walls often contains overhanging eaves. The roof's gable ends are sometimes finished with wood bargeboards or other decorative features.

### Cross Gable

A cross gable is formed by the intersection of two gables, usually at the center of the roof. Typically, this type of roof is found on residential buildings that have T-shaped, l-shaped or cross-shaped floor plans.

### Gambrel

A gambrel roof is similar in design to a gable roof. However, rather than having a single ridge at the peak, a gambrel roof has three ridges, one at the peak and two along the sloping sides. This roof form is often found on residential buildings with finished attics.

### Hipped

A hipped roof is formed by four sloping roof planes extending from the walls to a ridge. Hipped roofs will often have overhanging eaves on all four sides.

### Mansard

A Mansard roof has steeply sloping planes extending from in a flat roof. Named after the French architect Francois Mansard, the roof provides a large amount of usable space in the attic.

### Shed

Shed roofs are formed by a single sloping plane rising from one wall to the opposite wall. Typically, shed roofs are found on secondary buildings, such as residential garages or sheds.

# Roof Elements and Details

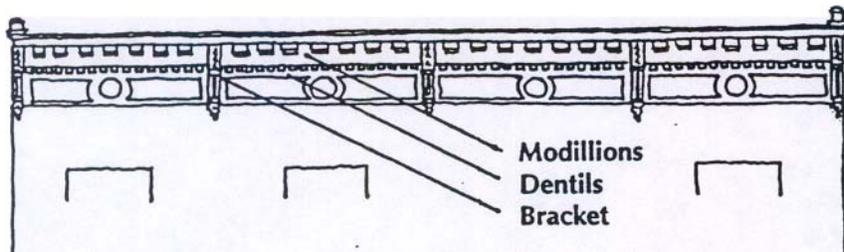
In addition to its shape, the elements and details found on a historic roof significantly contribute to its design. Some of the most commonly found roof elements and details include cornices, parapets, pent roofs, eaves, dormers, towers, chimneys, finials, cresting, gutters and downspouts.

## Cornice

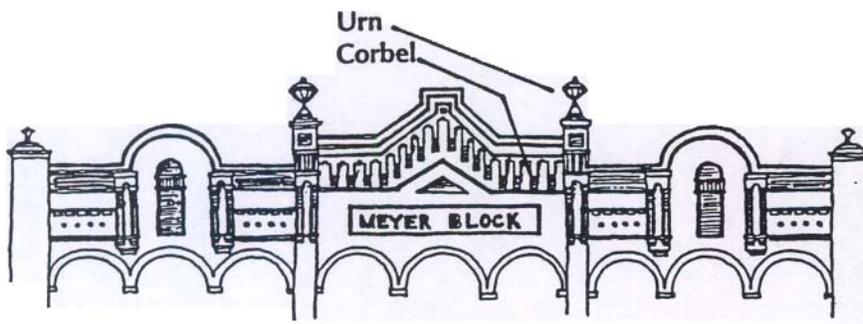
The front elevation of rowhouses and other attached, flat roof buildings usually contain a cornice. On free-standing flat roof buildings, the cornice may extend around all sides of the building. In addition to providing a visual terminus to the top of the wall, a cornice helps to make the junction between the wall and roof weather-tight.

Cornices are commonly designed in a number of styles, employing different details and materials. For example, Italianate cornices contain elaborate brackets, modillions and rows of dentils constructed of wood or sheets of tin, zinc or other metal. Cornices on Queen Anne style buildings commonly contain elaborate brick corbels and sheet metal finials or sometimes urns. Classical and Romanesque cornices may be made of metal, stone or brick and sometimes employ terra cotta details.

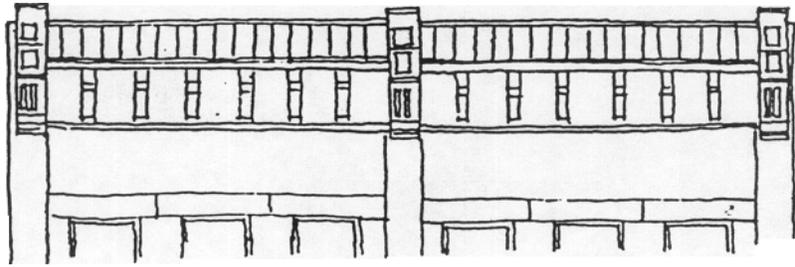
### Examples of Cornices found on Historic Flat Roof Buildings



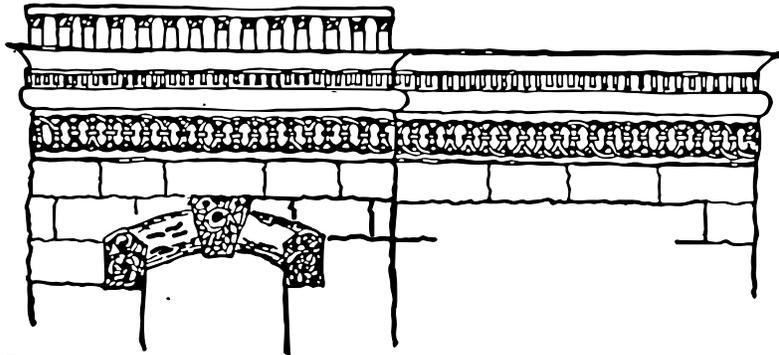
Italianate wood cornice



Queen Anne brick cornice



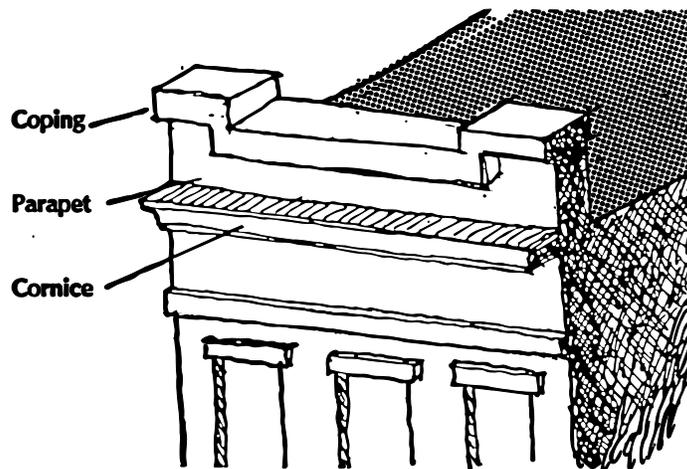
Classical metal cornice



Romanesque stone cornice

## Parapet

Parapets are commonly found on flat roof commercial and residential buildings. Far less elaborate in design and detail than cornices, parapets give a building greater visual height, as well as helping to provide a weather-tight junction between the roof and wall. Parapets often have plain or decorative caps, called copings, made of stone, pre-cast concrete, metal or tile.



Parapets are commonly found on flat roof commercial or residential buildings.

## Pent Roofs

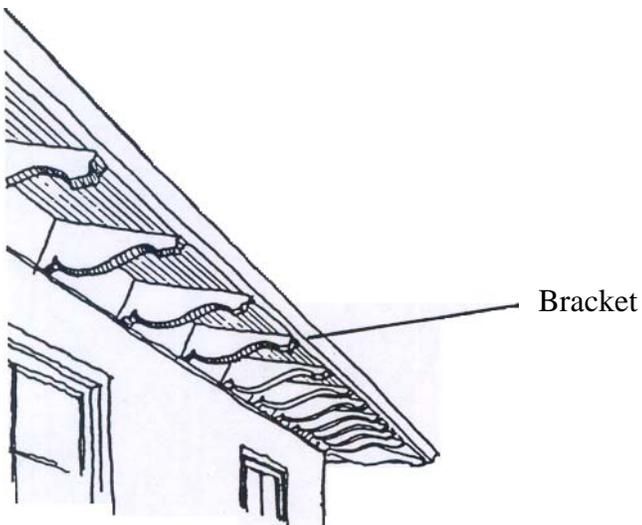
Pent roofs are prevalent on rowhouses and other flat roof buildings. A pent roof that encloses usable attic space often contains dormer windows or attic vents. Other pent roofs visually increase the height of the front elevation but do not enclose usable attic space. Pent roofs are commonly covered with slate, asphalt shingles or clay tile.



**Pent roofs are prevalent on historic rowhouses and other flat roof buildings. They may or may not enclose usable attic space.**

## Eave

The portion of a sloped roof extending beyond a wall is called an eave. Functionally it serves to protect the upper wall from rain and snow and provides a place to attach gutters. Visually, the eave creates a transition between the vertical wall and the sloping planes of a roof. Eaves are usually made of wood, sometimes decorated with brackets or other details.



**An eave visually terminates the top of a wall.**

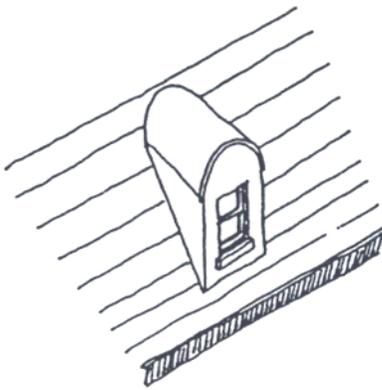
## Dormer

A dormer is a small projection above a sloping roof consisting of a window or vent and a small roof. Windows in dormers are commonly double-hung or casement and less commonly diamond, round and half-round. Vents are commonly rectangular, round or half-round in shape.

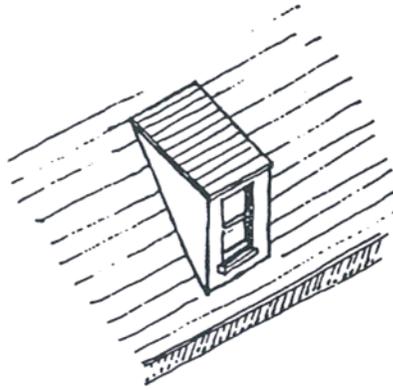
1) See **Windows and Doors for Historic Buildings** for more information on dormers and vents.

Both dormer windows and vents are capped with a variety of roof shapes: typically gable, hipped, shed, or round. A particular type of dormer, commonly found on residential buildings, is called an engaged dormer. The front of the dormer is designed as an extension of the wall below, almost always using the same materials as the wall.

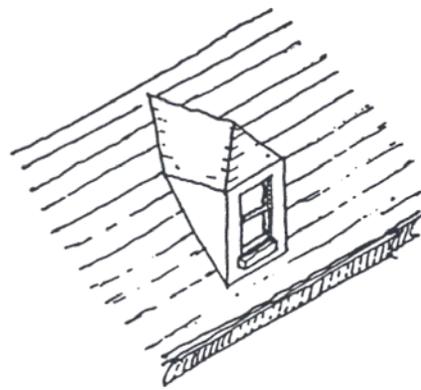
## Examples of Dormer Windows



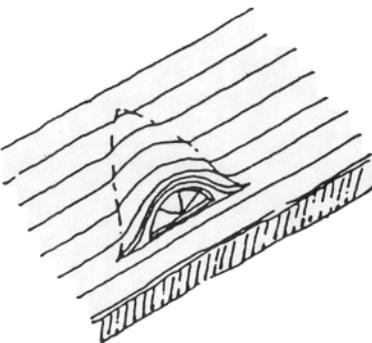
**Rounded**



**Shed**



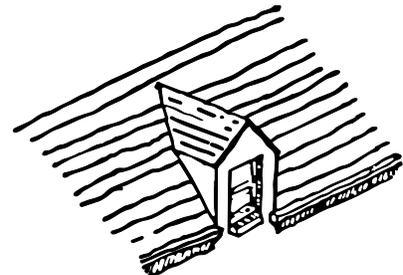
**Front Gable**



**Eyebrow**



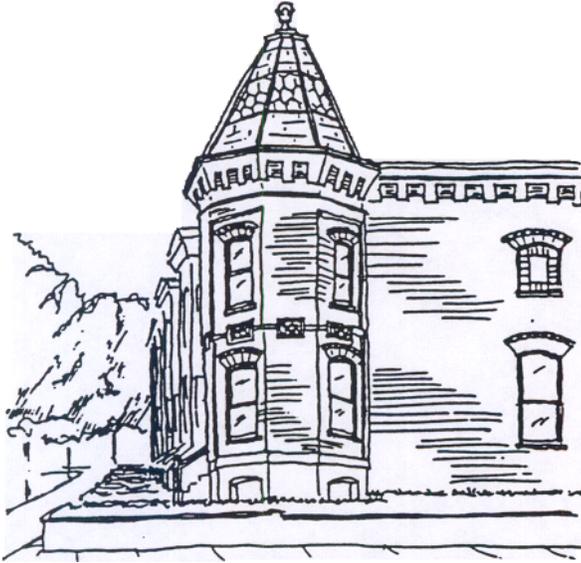
**Hipped**



**Engaged**

# Towers

Towers are prominent character-defining features of many roofs in Washington's historic districts. On rowhouses, towers are often located on top of projecting bays to provide rhythm along the street, or to accentuate the end of a block. Towers are often terminated by pedimented, Mansard, conical, pyramidal or flat roofs.



**Towers are often used to accentuate the end of a block of rowhouses.**

# Chimney

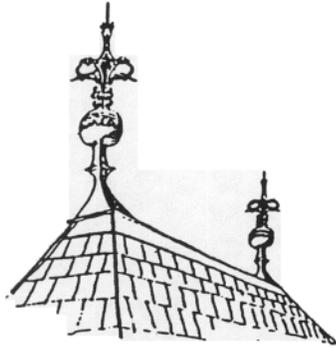
Chimneys are often prominent character-defining elements on free-standing residential buildings. Chimneys are commonly made of brick, although stone and stucco are sometimes used. A chimney may be located on the front, side or rear walls projecting above the eave, or through roof slopes or ridges.



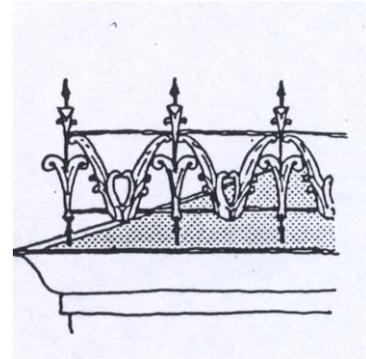
**Chimneys are character-defining elements of many historic residential buildings.**

## Finials and Cresting

Finials and cresting, sometimes found on historic buildings, provide important decorative elements for roofs. Both are usually made of metal, although finials of stone and other materials are also found.



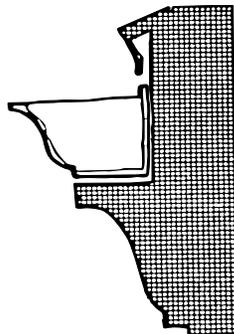
Finials are usually located on roof ridges or towers.



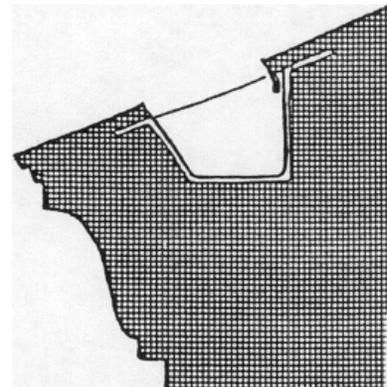
Cresting is used to add character to a cornice or ridge.

## Gutters and Downspouts

Gutters and downspouts are the primary means of channeling water from the roof to the ground or directly into storm sewers. Properly maintained gutters and downspouts are critical to providing a watertight building. Their design is often important to the appearance of a building. Historically, exterior gutters and downspouts were made of copper and galvanized steel. Internal gutters are often constructed of terne plate, lead or copper.



External gutters are attached to eaves of sloping roofs.



Internal gutters are located within eaves of sloping roofs.

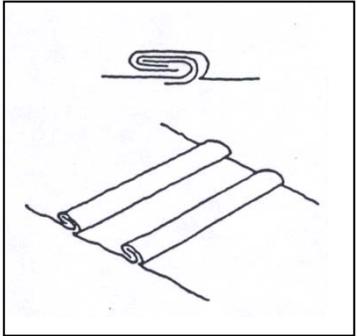
# Roof Materials

In addition to the shape, elements and details, the materials used to cover sloping roofs are important to defining the character of a historic building. The most commonly found sloping roof materials are metal, slate, clay tile, asphalt shingles, wood shingles and wood shakes.

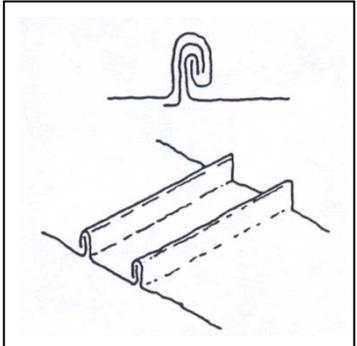
On the other hand, the appearances of materials used to cover flat roofs are usually not character defining. They include built-up roofing and rubber roofing.

## Metal

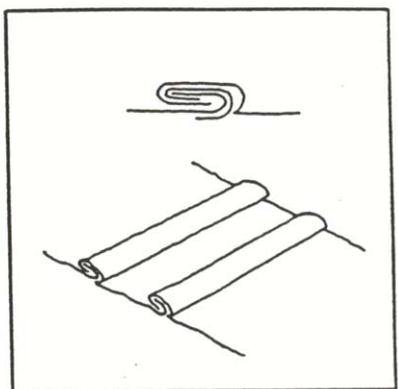
Copper, lead and terne plate (2) were common metal roof materials in the nineteenth century. In the early twentieth century, zinc and galvanized steel were also used to cover sloping roofs. The appearance of a metal roof is primarily derived from the type of metal used, how it is finished and the method by which sections are joined together. For example, copper is usually left unpainted, naturally weathering to a green patina. Similarly, lead is usually unpainted, weathering to a soft gray. All other types of metal roofing are painted to resist



A flat seam metal roof gives a uniform appearance.



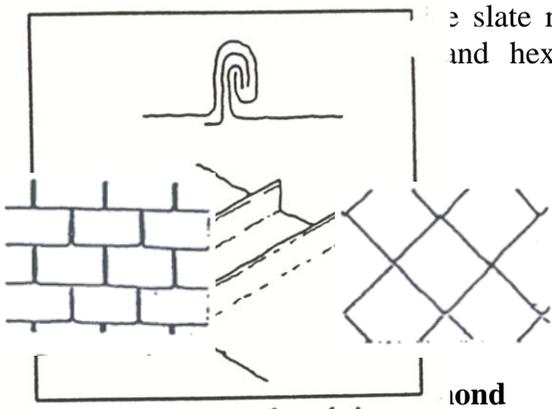
A raised-seam metal roof gives a distinctive ribbed appearance.



A flat-seam metal roof gives a uniform appearance.

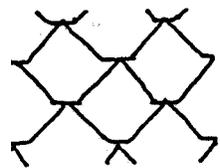
tions joined together on site. The two types of m and raised- seam. (3) The first gives a roof a am give a roof a distinctive ribbed appearance. shingles of varying shapes, sizes and textures d early twentieth century buildings.

of material in both the nineteenth and twentieth uses with pent roofs as well as some free- e slate roofs. Slate is found in many shapes, and hexagonal, and in a variety of colors



A raised-seam metal roof gives a distinctive ribbed appearance.

ond



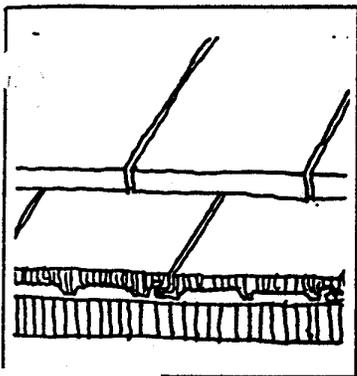
Hexagonal

ning feature of many sloping roofs.

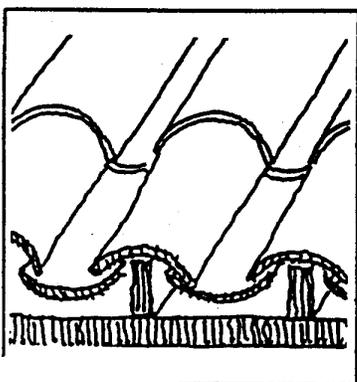
2) A terne place roof is commonly referred to as a "tin" roof, after the principal metal used in its manufacture.

3) Also called standing-seam.

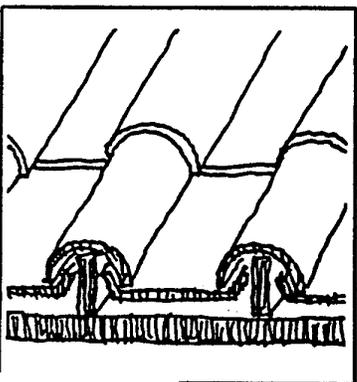
## Examples of Clay Tiles



English



Mission



Roman

4) The number of layers, or plies, of felt gives a built-up roof its common name. Thus, one made of two layers is called a “two-ply” built-up roof while one made of three layers of felt is called a “three-ply” roof.

## Clay Tile

Clay tile is commonly found in a variety of shapes including English, mission, French, Roman, rounded and barrel. It’s also found in a variety of colors with red, green and gray being the most common. Tile is often found on sloping roofs of turn-of-the-century free-standing residential buildings and pent roofs of rowhouses. It may also be found on commercial, institutional and government buildings.

## Asphalt Shingles

In the late nineteenth century, asphalt shingles were introduced as an inexpensive roofing material. By the mid-twentieth century, asphalt shingles became the most commonly used material for sloping roofs. Asphalt shingles come in a variety of shapes with rectangular, diamond and hexagonal being the most common. Asphalt shingles may be red, green, gray or black

## Wood Shingles and Shakes

Less common, but still found on sloping roofs of historic buildings, are wood shingles and shakes. Wood shingles are machine cut and thus have a smooth surface. Shakes are split by hand or machine and have a rougher texture. Typically made from cedar, wood shakes and shingles are left unpainted, weathering to a silver-gray.

## Built-up and Rubber Roofing

Built-up and rubber roofing are used to cover flat roofs. Built-up roofing is traditionally made of two or three layers of felt, tar and gravel. (4) The felt and tar act as the watertight barrier while the gravel functions as ballast to ensure that the roof does not lift during high winds. Modern flat roofs may use a single membrane system commonly referred to as a rubber roof. Because flat roofs are normally not seen, their materials are usually not considered to be character defining.

## Roof Alterations

Altering roof shapes, materials, elements and details will affect their design. Thus, any alterations must be undertaken with extreme care to ensure that the character of the roof is retained. Before proceeding with any roof alteration the owner of a historic building should consult with the Historic Preservation Office.

## Changing the Shape of a Roof

Rarely is it appropriate to change the shape of an existing roof. To do so almost always drastically alters the character of a historic building. If, for compelling functional or economic reasons, the shape of the roof must be changed, it should be done in such a manner as to retain the historic character of the building.

## Insulating a Roof

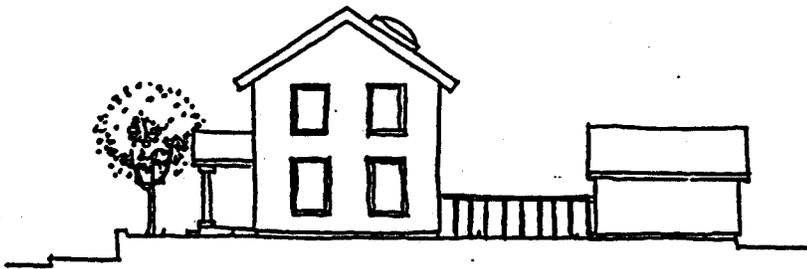
Roofs are sometimes insulated to reduce energy consumption. The location of roof insulation rarely affects the appearance of a building and thus will usually not alter its character. However, adding insulation may cause roof materials to deteriorate if it is not properly installed.

## Adding TV Antennas and Satellite Dishes

Adding television antennas and satellite dishes to a roof will almost always be incompatible with its historic character. Thus, if they must be added, they should be located so they are not visible from a public street.

## Adding Skylights and Dormers

Adding skylights or dormers to existing roofs is often considered by building owners who wish to finish an attic. If dormers are added to sloping roofs, they should be located on non-character-defining slopes and be designed to be compatible with the character of the building. Skylights added to sloping or flat roofs should be located so that they are not visible from a public street.



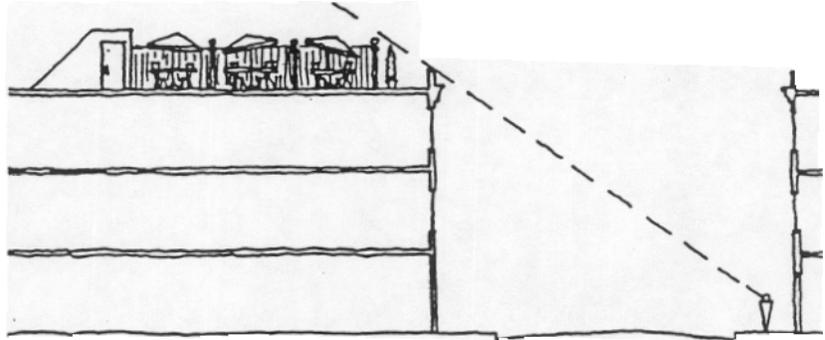
If a skylight is added it should be located on a non-character-defining slope.

## Adding Solar Panels

Owners sometimes consider adding solar panels as part of an overall energy efficiency plan for their building. If installed on a flat roof, solar panels should be located so they are not visible from the public street. If located on a sloping roof building, they should only be installed on rear slopes that are not visible from a public street.

## Adding Roof Decks

Adding a deck to the roof of a historic building is very difficult without altering its character. Adding a deck will also affect the roof's drainage and structure. If a roof deck must be added, it should be located so it is not visible from the street. If this is not possible, the design of the portion of the deck visible from the street should be compatible with the proportion, scale, materials, color and other character-defining elements of the building.



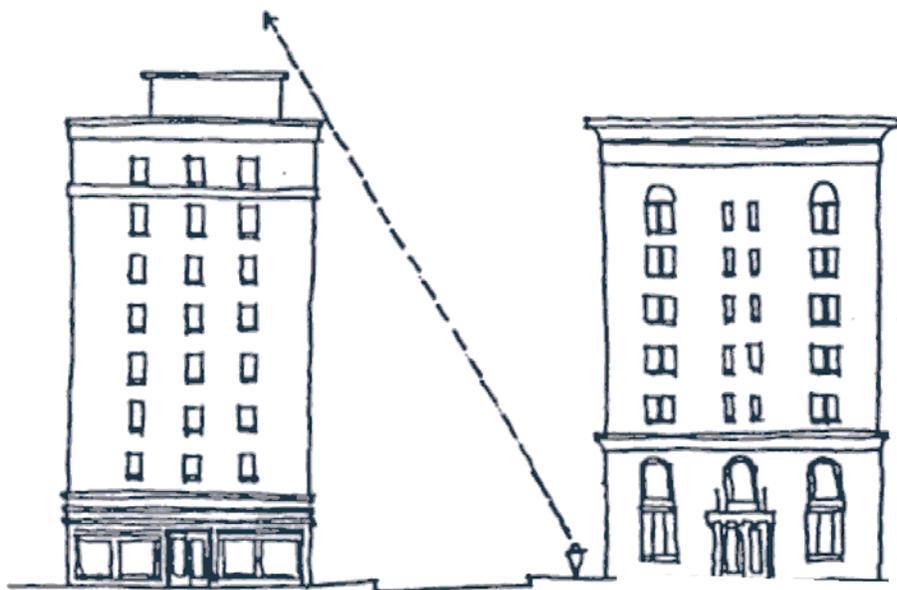
**Decks should be located so they cannot be seen from the street.**

## Adding HVAC Equipment

Heating, ventilating and air conditioning (HVAC) equipment is often added to roofs of existing historic buildings during rehabilitation. Typically the roof is the most economical and technically appropriate location for the equipment. HVAC equipment should be located so that it is not visible from a public street. If this is not possible, the equipment should be screened from view. The screen should be designed to be compatible with the proportion, scale, materials, color and other character defining elements of the building.

## Altering or Adding Mechanical Penthouses

Mechanical penthouses are found primarily on multi-story residential, commercial, institutional and government buildings. They are designed to enclose elevator and other building equipment. Alterations to existing penthouses should be compatible with the original design if they can be seen from a street. If a new mechanical penthouse is added, it should be located as far as possible behind the primary facade, so that it is not visible from the street. If this is not possible, the penthouse should be designed to be compatible with the proportion, scale, materials, color and other character defining elements of the building.



Mechanical penthouses added to historic buildings should not be visible from the street.

## Maintaining, Repairing and Replacing Roofs

Roof materials, elements and details are subject to many forms of deterioration caused by rain, snow, hail, wind or pollutants. Sometimes roofs are also subject to deterioration caused by insects, foot-traffic, vegetation, birds, squirrels and other animals.

Building owners should regularly inspect and maintain existing roof materials, elements and details. Inspecting a sloping roof can easily be accomplished from the ground with binoculars. Most flat roofs are accessible and thus can be closely inspected. When deterioration is detected, the building owner should consult with a roofer or an architect knowledgeable in historic roofs, or with the Historic Preservation Office, to determine the best course of action.

In most cases consideration should first be given to maintaining the existing material, element or detail. If this proves not to be technically or economically feasible, repairing only the deteriorated areas, using in-kind materials should next be considered. If the deterioration is more extensive, replacing the entire roof material, element or detail in-kind may then be considered. Only after repair or replacement in-kind has been determined not to be technically or economically feasible should the owner consider using a substitute material.

## **Metal**

Metal is subject to pitting and abrasion due to wind-born grit and pollutants. Painted metal roofs, such as terne plate, zinc, and galvanized steel are subject to the same problems, as well as to corrosion caused by improperly maintained paint. Minor corrosion may be removed by wire brushing and repainting. More extensive corrosion, as well as pitting and abrasion may require replacing the deteriorated sections with the same type of metal. If the deterioration is extensive, the entire roof membrane should be replaced by a metal roof that duplicates the character of the existing.

## **Slate**

Slate is one of the most robust roof materials. Typically, a slate roof will last fifty years or more. However, slate is subject to cracking, usually caused by hail or falling tree limbs. Slate may also become detached from its decking due to corrosion of its anchors. Replacement slate can be obtained readily in a wide range of shapes and colors to match an existing roof.

## **Clay Tile**

Clay tile is also a long-wearing roof material. However, it may crack or anchors may deteriorate. Replacement clay tile, to match an existing roof, is readily available in many shapes and colors, or it may be made to order.

## **Asphalt Shingles**

Asphalt shingles are subject to abrasion and lifting from wind, as well as puncture from hail and falling tree limbs. Typically, good quality asphalt shingles will last twenty years before they require replacement. Fortunately, except for some early twentieth century asphalt shingles, most of the sizes, shapes and colors of asphalt shingles found on historic roofs can be obtained today.

## **Wood Shingles and Shakes**

Wood shingles and shakes are subject to rot, detachment and insect infestation. Deteriorated sections should be removed and replaced in-kind.

## **Built-up Roofing**

Built-up roofing is subject to cracking, delamination of the felt layers and thinning of the gravel ballast.(5) Minor cracking can often be

5) Cracking is also known as alligatoring.

repaired by applying roofing tar to the affected area. More extensive cracking may require that the affected section be removed and new built-up roofing installed. If the gravel is thin, a new layer of tar and gravel should be applied. If the built-up roofing is extensively deteriorated, or is more than twenty years old, the building owner should investigate replacing the entire membrane.

## **Brick and Stone Cornices, Elements and Details**

Brick and stone may erode because of wind-borne grit or pollutants. If the erosion is not extensive, the affected brick or stone should be left in place. A consolidate may be used to halt or slow further deterioration. If the deterioration is pronounced, particularly if it threatens the structural integrity of the cornice, element or detail, the brick or stone should be replaced in-kind.

The mortar joints of brick and stone may also deteriorate. If this occurs, the joints should be repainted using mortar of the same sand, lime and cement content as the existing mortar. The new mortar should also match existing in color and profile. (6)

## **Metal and Wood Cornices, Elements and Details**

Metal cornices, elements and details may be pitted or abraded by wind-borne grit or pollutants, corrode or become detached due to deterioration of anchors and connectors. Brushing and repainting can repair light corrosion. Heavy corrosion and pitting may require that the affected area be removed and replaced in-kind.

Wood cornices, elements and details often deteriorate because paint is not maintained. They are also subject to rot and insect infestation. Minor rot or damage by insects maybe repaired by using epoxy or another suitable injected material, or scabbing- in new wood. In both cases, the repair should be detailed in the same manner as the existing. In cases of extensive deterioration, the entire cornice, eave or detail may need to be replaced in-kind or in a compatible substitute material.

**6) For further information on brick, stone and mortar, see *Walls and Foundations for Historic Buildings.***

# Substitute Materials

If it is not technically or economically feasible to repair or replace existing roofing materials, elements or details in-kind, than a compatible substitute material should be used. When selecting a substitute material, building owners should pay particular attention to the material's expansion, contraction and weathering properties as well as its chemical properties. Since materials expand and contract at different rates due to temperature changes and sunlight falling on surfaces, installing a new material with very different expansion and contraction properties than the original may cause joints between the new and existing materials to fail. A substitute material also may react chemically with adjacent historic materials causing the substitute or historic material to rapidly deteriorate.

## Substitute Materials

The following substitute materials may be appropriate for replacement of historic roofing materials. Before proceeding with a substitute material, building owners should consult with the Historic Preservation Office.

<u>Historic Material</u>	<u>Substitute Material</u>
<b>Flat Roof Membrane</b> -Built-up (felt, tar, and gravel)	-Single-ply (rubber)
<b>Sloping Roof Membrane</b> -Copper, lead, terne plate- -Zinc, steel -Slate	-Aluminum  -Synthetic slate
<b>Eaves, Cornice and Parapet</b> -Wood -Metal -Stone	-Fiberglass -Fiberglass -Pre-cast concrete
<b>Flashing</b> -Copper, lead, galvanized steel	-Aluminum
<b>Gutters and Downspouts</b> -Copper, lead	-Aluminum
<b>Dormers</b> -Wood	-Fiberglass

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