

# SECTION

# 6

## Roof Plans





# Roof Plan Components

## INTRODUCTION

The design of the roof must be considered long before the roof plan is drawn. The architect or designer will typically design the basic shape of the roof as the floor plan and elevations are drawn in the preliminary design stage. This does not mean that the designer plans the entire structural system for the roof during the initial stages, but the general shape and type of roofing material to be used will be planned. By examining the structure in Figure 20.1, you can easily see how much impact the roof design has on the structure. Often the roof can present a larger visible surface area than the walls. In addition to aesthetic considerations, the roof can also be used to provide rigidity in a structure when wall areas are filled with glass, as seen in Figure 20.2. To ensure that the roof will meet the designer's criteria, a roof plan is usually drawn by the drafter to provide construction information. In order to draw the roof plan, a drafter should understand types of roof plans, various pitches, common roof shapes, and common roof materials.



## TYPES OF ROOF PLANS

The plan that is drawn of the roof area may be either a *roof plan* or a *roof framing plan*. For some types of roofs a roof drainage plan may also be drawn. Roof framing and drainage plans will be discussed in Chapter 30.



**FIGURE 20.1** ■ The shape of the roof can play an important role in the design of the structure as seen in this home by the architect Robert Roloson. *Photo Courtesy Elk Roofing.*



**FIGURE 20.2** ■ In addition to aesthetic considerations, the roof is often used to resist wind and seismic forces when walls of the structure contain large amounts of glass. *Courtesy of the California Redwood Association, Robert Corna architect, photo by Balthazar Korab.*

## Roof Plans

A roof plan is used to show the shape of the roof. Materials such as the roofing material, vents and their location, and the type of underlayment are also typically specified on the roof plan, as seen in Figure 20.3. Roof plans are typically drawn at a scale smaller than the scale used for the floor plan. A scale of  $\frac{1}{8}'' = 1'-0''$  or  $\frac{1}{16}'' = 1'-0''$  is commonly used for a roof plan. A roof plan is typically drawn on the same sheet as the exterior elevations.

## Roof Framing Plans

Roof framing plans are usually required for complicated residential roof shapes and for most commercial projects. A roof framing plan shows the size and direction of the construction

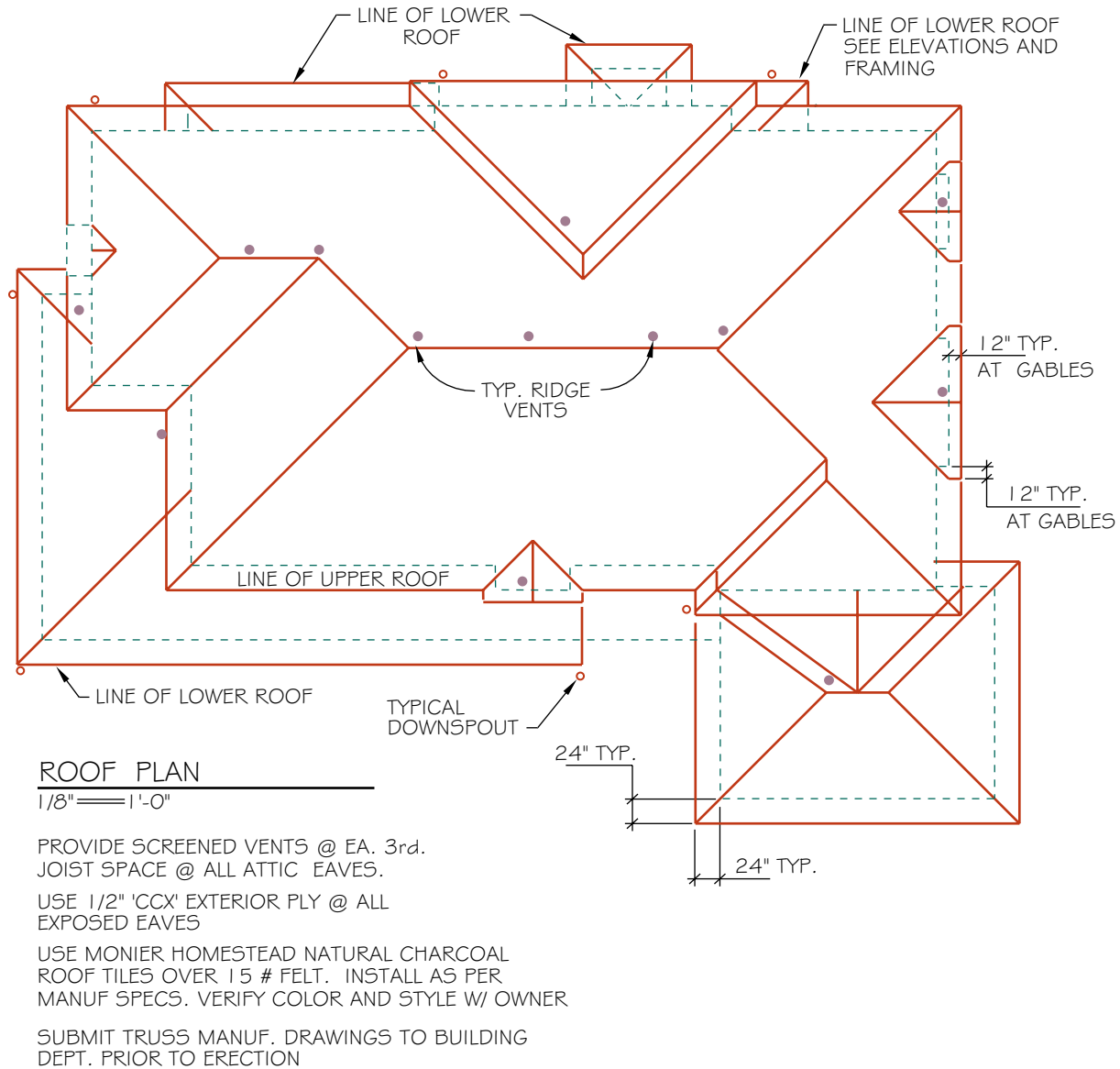


FIGURE 20.3 ■ A roof plan is drawn to show the shape of the roof.

members that are required to frame the roof. Figure 20.4 shows an example of a roof framing plan. On very complex projects, every framing member is shown, as seen in Figure 20.5. Framing plans will be discussed further in Chapter 30.



## ROOF PITCHES

*Roof pitch*, or *slope*, is a description of the angle of the roof that compares the horizontal run and the vertical rise. The slope, shown when the elevations and sections are drawn, will be dis-

cussed in Chapters 23 and 26. The intersections that result from various roof pitches must be shown on the roof plan. In order to plot the intersection between two roof surfaces correctly, the drafter must understand how various roof pitches are drawn. Figure 20.6 shows how the pitch can be visualized. The drafter can plot the roof shape using this method for any pitch. Adjustable triangles for plotting roof angles are available and save the time of having to measure the rise and run of a roof. The roof pitch can also be drawn if the drafter knows the proper angle that a certain pitch represents. Knowing that a  $\frac{7}{12}$  roof equals  $18\frac{1}{2}^\circ$  allows the drafter to plot the correct angle without having to plot the layout. Figure 20.7 shows angles for common roof pitches.

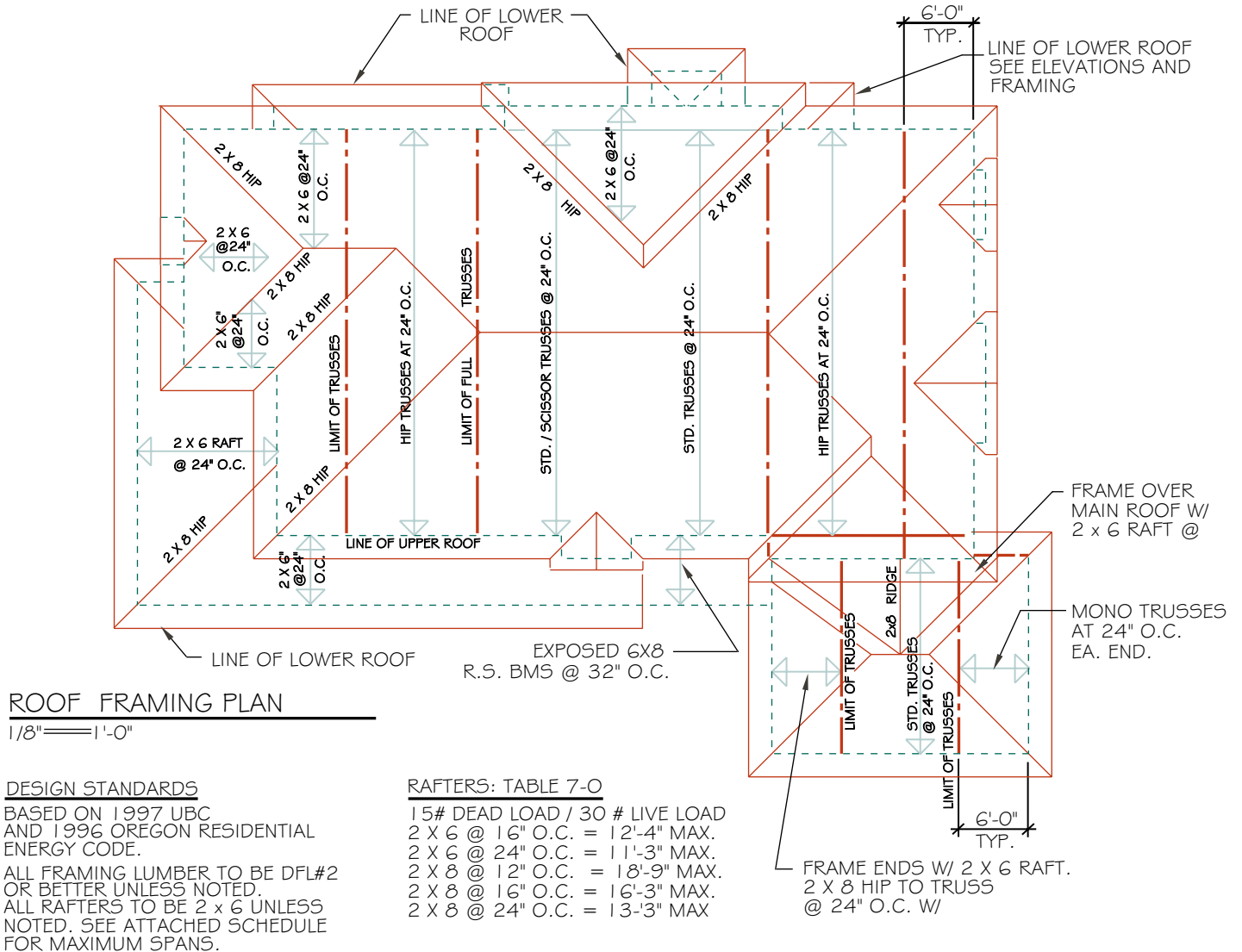


FIGURE 20.4 ■ A roof framing plan is used to show the framing members for the roof.



## ROOF SHAPES

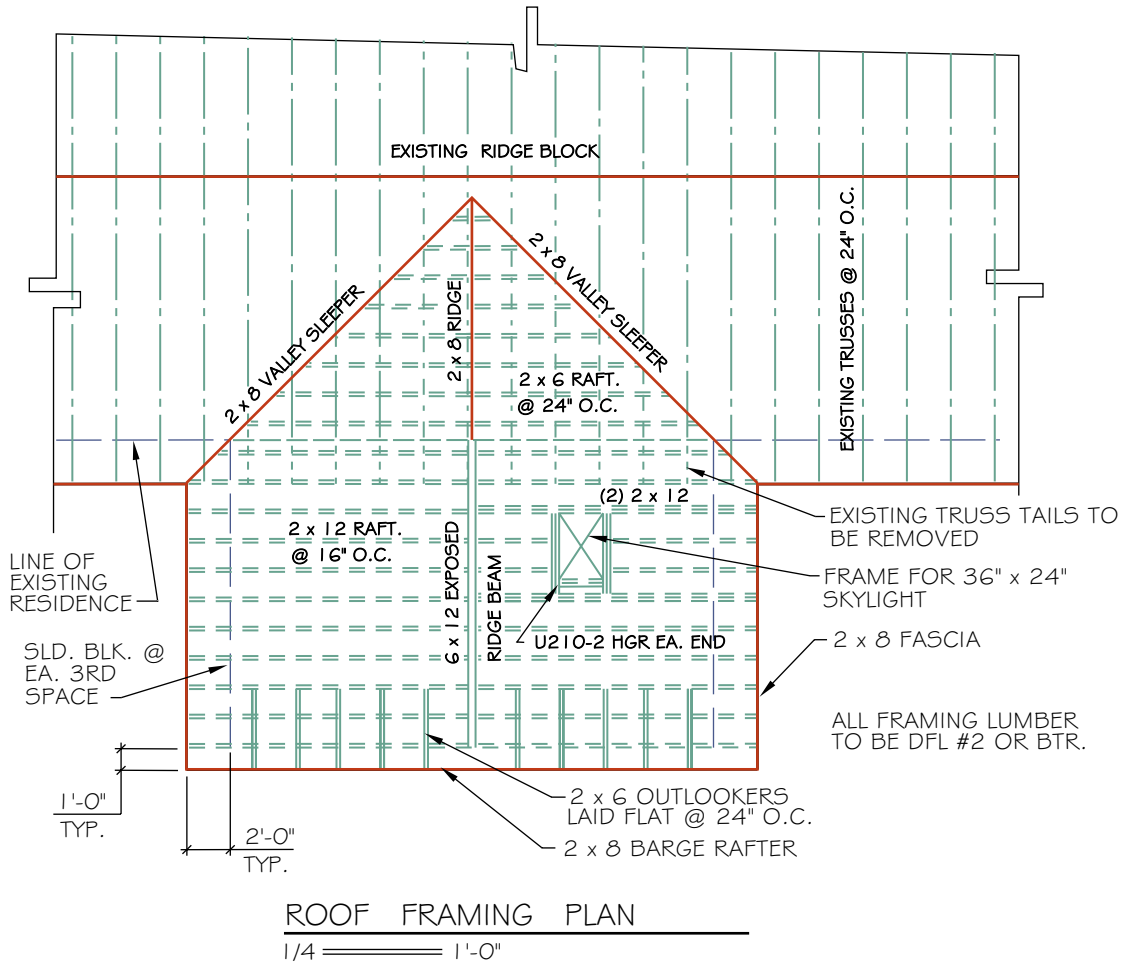
By changing the roof pitch, the designer can change the shape of the roof. Common roof shapes include flat, shed, gable, A-frame, gambrel, hip, Dutch hip, and mansard. See Chapter 26 for a complete discussion of roof framing terms.

### Flat Roofs

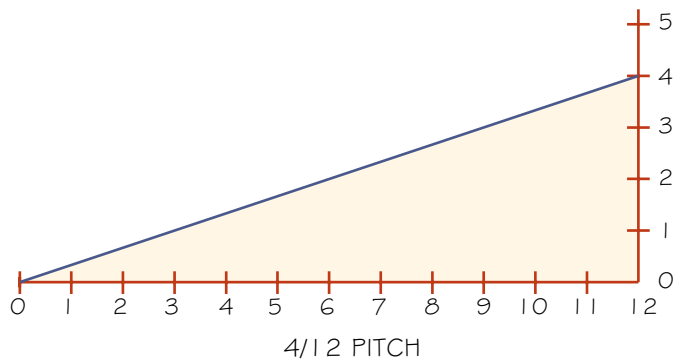
The flat roof is a very common style in areas with little rain or snow. In addition to being used in residential construction, the flat roof is typically used on commercial structures to provide a

platform for heating and other mechanical equipment. The flat roof is economical to construct because ceiling joists are eliminated and rafters are used to support both the roof and ceiling loads. Figure 20.8 shows the materials commonly used to frame a flat roof. Figure 20.9 shows how a flat roof could be represented on the roof plan.

Often the flat roof has a slight pitch in the rafters. A pitch of 1/4" per foot (2 percent slope) is often used to help prevent water from ponding on the roof. As water flows to the edge, a metal diverter is usually placed at the eave to prevent dripping at walkways. A flat roof will often have a *parapet*, or false wall, surrounding the perimeter of the roof. Figure 20.10 provides an example of a parapet wall. This wall can be used for decoration or for protection of mechanical equipment. When used, it must be shown on the roof plan.



**FIGURE 20.5** ■ For complicated roofs, a roof framing plan may be drawn to show the size and location of every structural member.



**FIGURE 20.6** ■ In determining the roof slope, the angle is expressed as a comparison of equal units. Units may be inches, feet, meters, etc., as long as the horizontal and vertical units are of equal length.

COMMON ANGLES FOR DRAWING ROOF PITCHES	
ROOF PITCH	ANGLE
1/12	4°-30'
2/12	9°-30'
3/12	15°-0'
4/12	18°-30'
5/12	22°-30'
6/12	26°-30'
7/12	30°-0'
8/12	33°-45'
9/12	37°-0'
10/12	40°-0'
11/12	42°-30'
12/12	45°-0'

**FIGURE 20.7** ■ Common roof pitches and angles. Angles shown are approximate and are to be used for drawing purposes only.

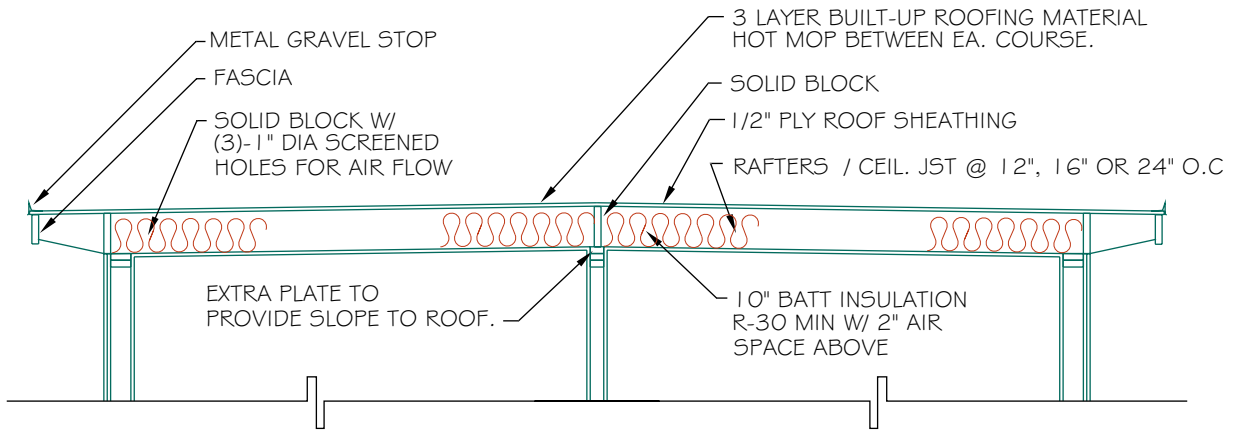


FIGURE 20.8 ■ Common construction components of a flat roof.

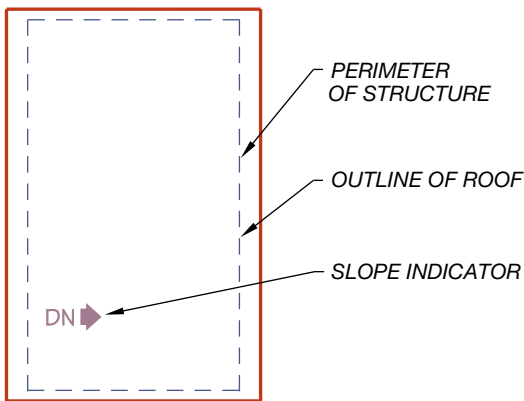


FIGURE 20.9 ■ Flat roof in plan view.

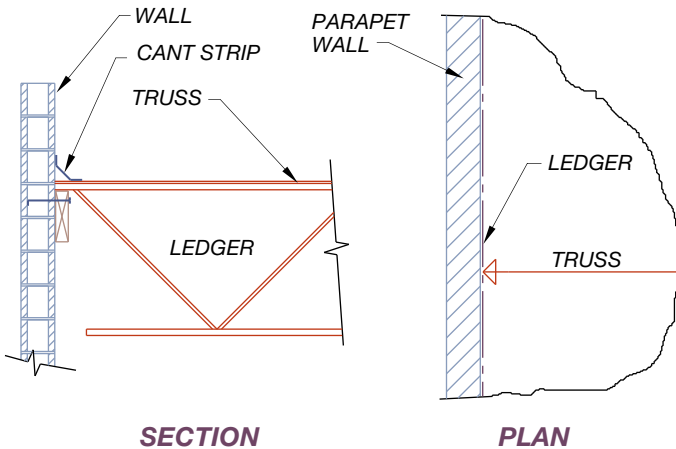


FIGURE 20.10 ■ A parapet wall is often placed around a flat roof to hide mechanical roof equipment. The thickness of the wall should be represented on the roof plan.

### Shed Roofs

The shed roof, as seen in Figure 20.11, offers the same simplicity and economical construction methods as a flat roof but does not have the drainage problems associated with a flat roof. Figure 20.12 shows construction methods for shed roofs. The shed roof may be constructed at any pitch. The roofing material and aesthetic considerations are the only factors limiting the pitch. Drawn in plan view, the shed roof will resemble the flat roof, as seen in Figure 20.13.

### Gable Roofs

A gable roof, as in Figure 20.14, is one of the most common types of roof in residential construction, uses two shed roofs that meet to form a ridge between the support walls. Figure 20.15 shows the construction of a gable roof system. The gable can be constructed at any pitch, with the choice of



FIGURE 20.11 ■ Many contemporary homes combine flat and shed roofs to create a pleasing design. Courtesy LeRoy Cook.

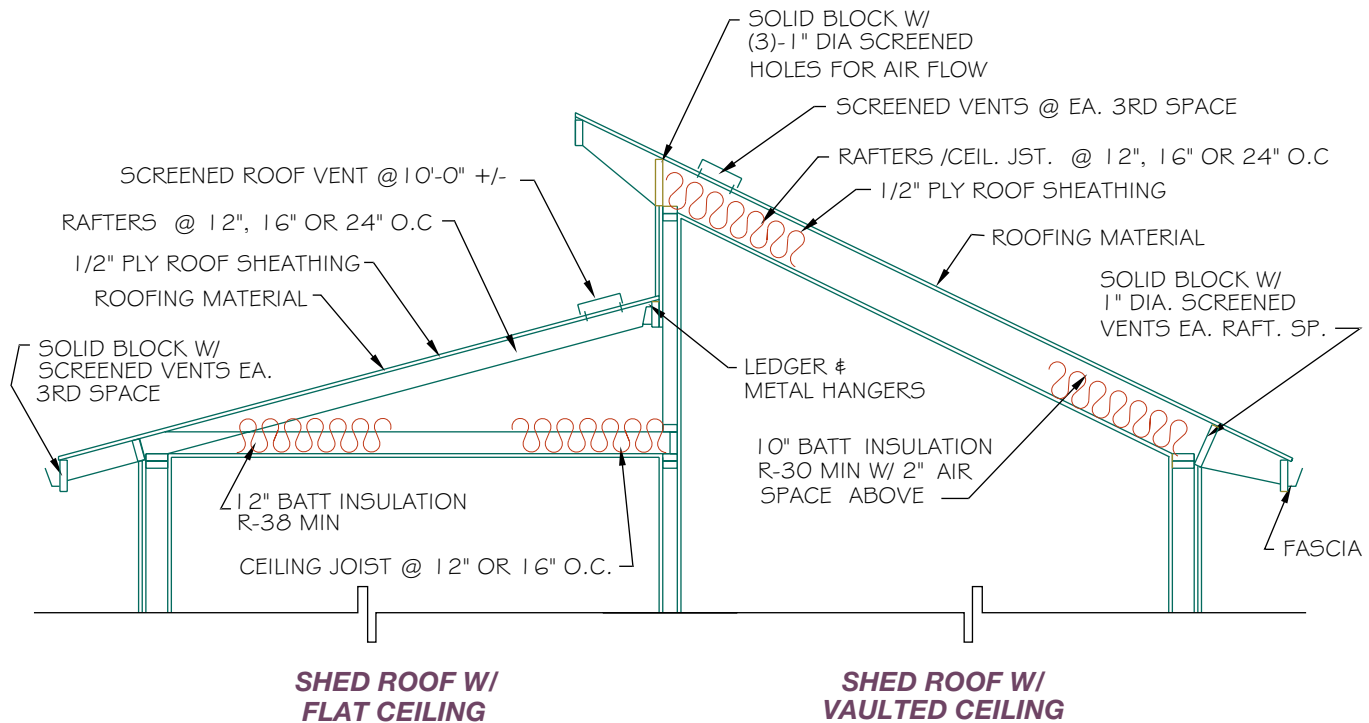


FIGURE 20.12 ■ Common construction components of shed roofs.

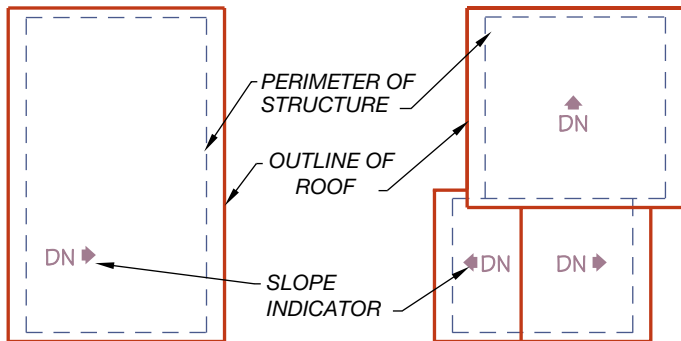


FIGURE 20.13 ■ Shed roof shapes in plan view.



FIGURE 20.14 ■ A gable roof is composed of two intersecting planes that form a peak (the ridge) between the planes.

pitch limited only by the roofing material and the effect desired. A gable roof is often used on designs seeking a traditional appearance and formal balance. Figure 20.16 shows how a gable roof is typically represented in plan view. Many plans use two or more gables at 90° angles to each other. The intersections of gable surfaces are called either hips or valleys. Typically, the valley and hip are specified on the roof plan.

### A-Frame Roofs

An A-frame is a method of framing walls, as well as a system of framing roofs. An A-frame structure uses rafters to form its supporting walls, as shown in Figure 20.17. The structure gets its name from the letter A that is formed by the roof and floor systems. See Figure 20.18. The roof plan for an A-frame is very similar to the plan for a gable roof. However, the framing materials are usually quite different. Figure 20.19 shows how an A-frame can be represented on the roof plan.

### Gambrel Roofs

A gambrel roof can be seen in Figure 20.20. The gambrel roof is a traditional shape that dates back to the colonial period. Figure 20.21 shows construction methods for a gambrel roof. The upper level is covered with a steep roof surface, which

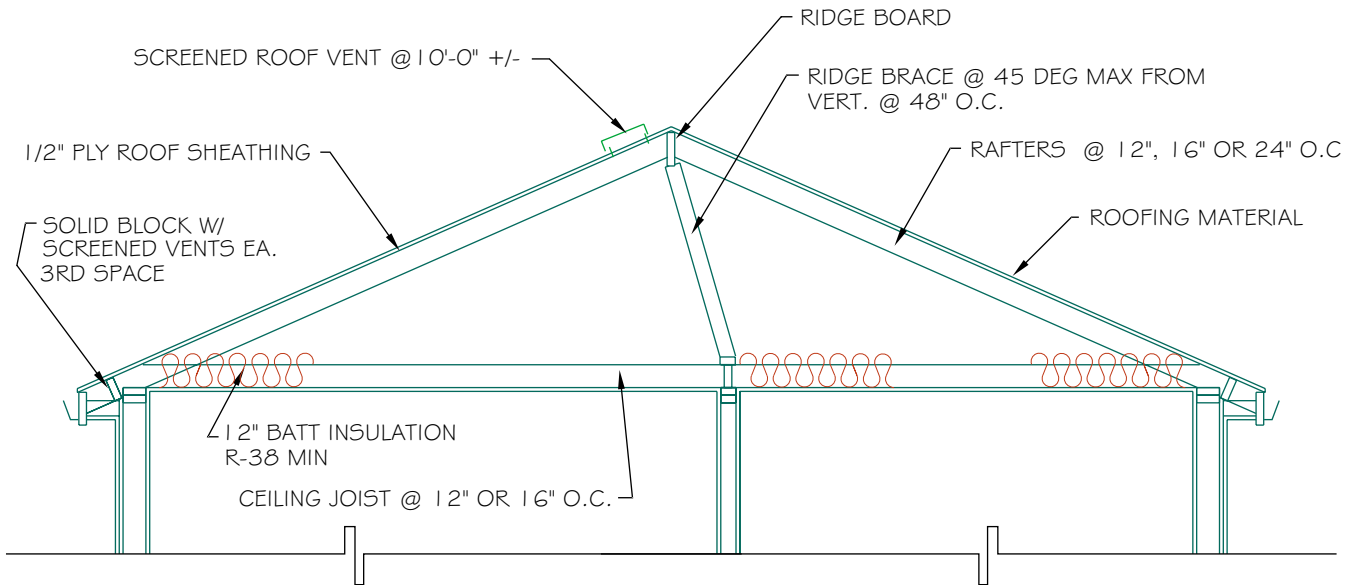


FIGURE 20.15 ■ Common construction components of a gable roof.

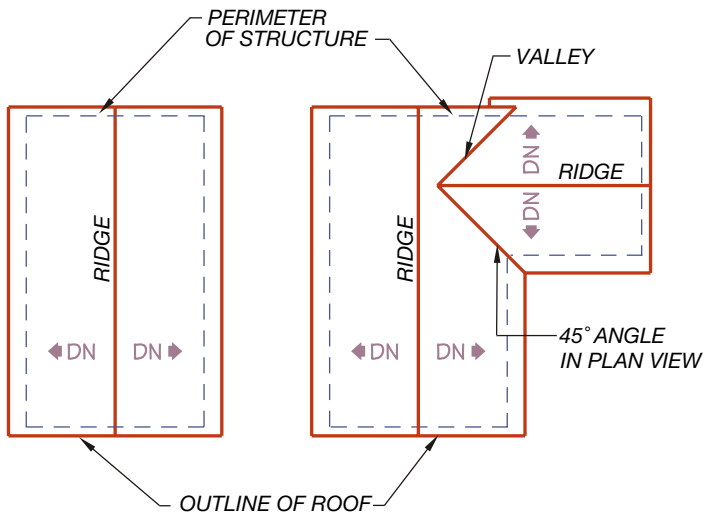


FIGURE 20.16 ■ Gable roof in plan view.



FIGURE 20.17 ■ An A-frame uses a steep roof to form the walls of the upper level. Courtesy Janice Jefferis.

connects into a roof system with a slighter pitch. By covering the upper level with roofing material rather than siding, the structure appears shorter than it actually is. This roof system can also reduce the cost of siding materials by using less expensive roofing materials. Figure 20.22 shows a plan view of a gambrel roof.

### Hip Roofs

The hip roof (Figure 20.23) is a traditional shape that can be used to help eliminate some of the roof mass and create a structure with a smaller appearance. A hip roof has many similarities to a gable roof but has four surfaces instead of

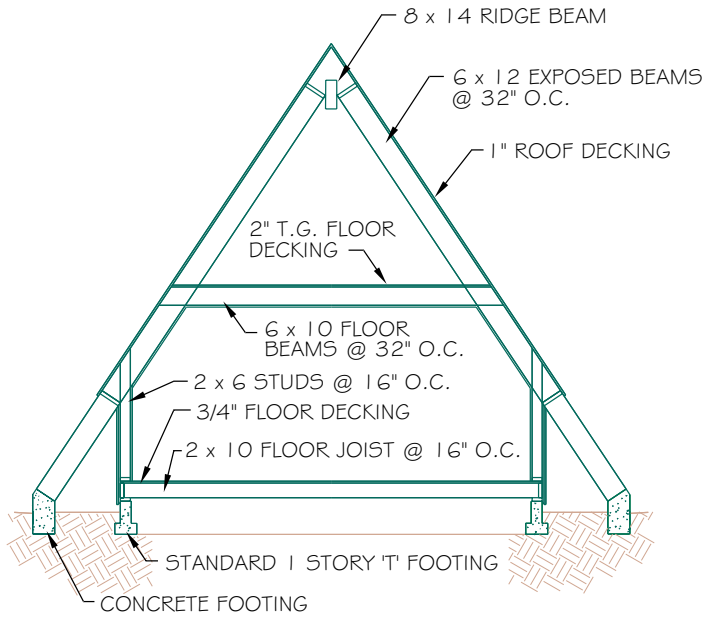


FIGURE 20.18 ■ Common components of A-frame construction.

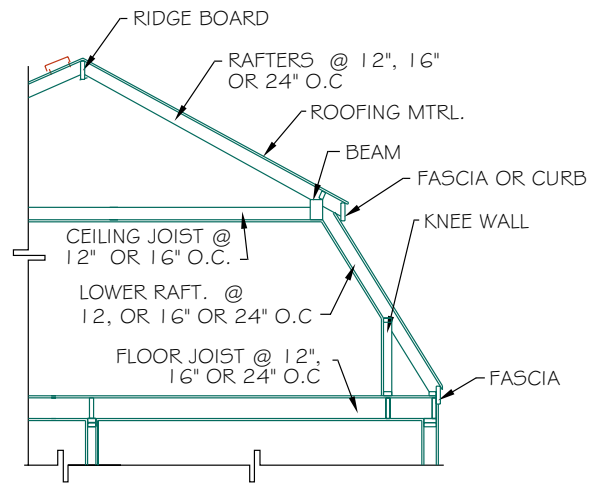
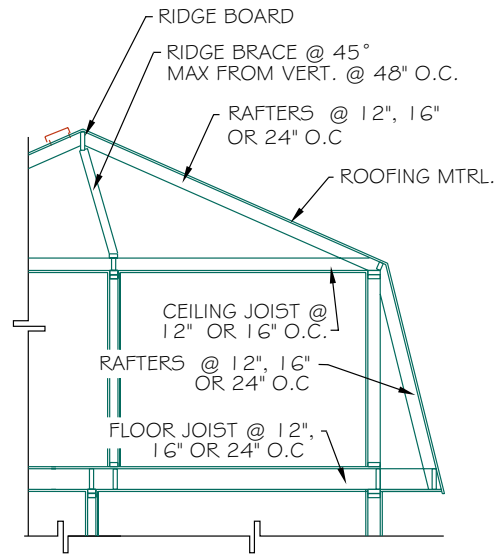


FIGURE 20.21 ■ A gambrel roof can be constructed with or without a fascia or curb between the upper and lower roofs. *Courtesy Michael Jefferis.*

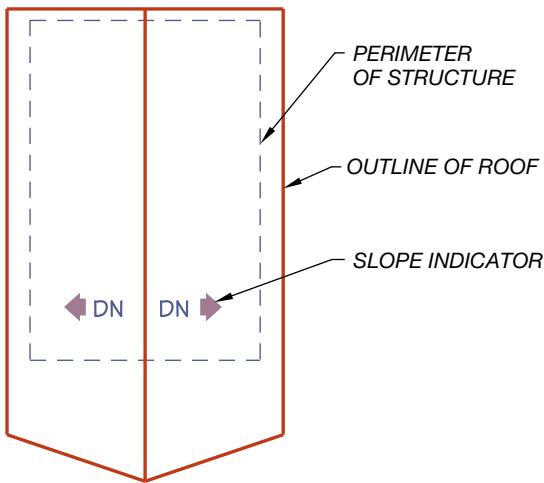


FIGURE 20.19 ■ A-frame in plan view.



FIGURE 20.20 ■ The gambrel roof is often used to enhance the traditional appearance of a residence. *Courtesy Michael Jefferis.*

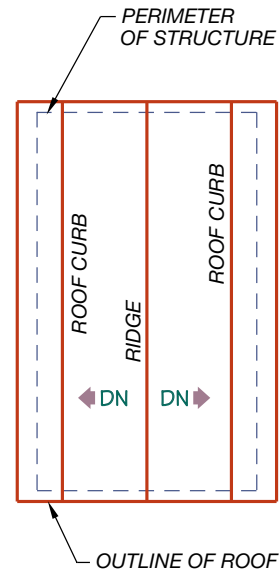
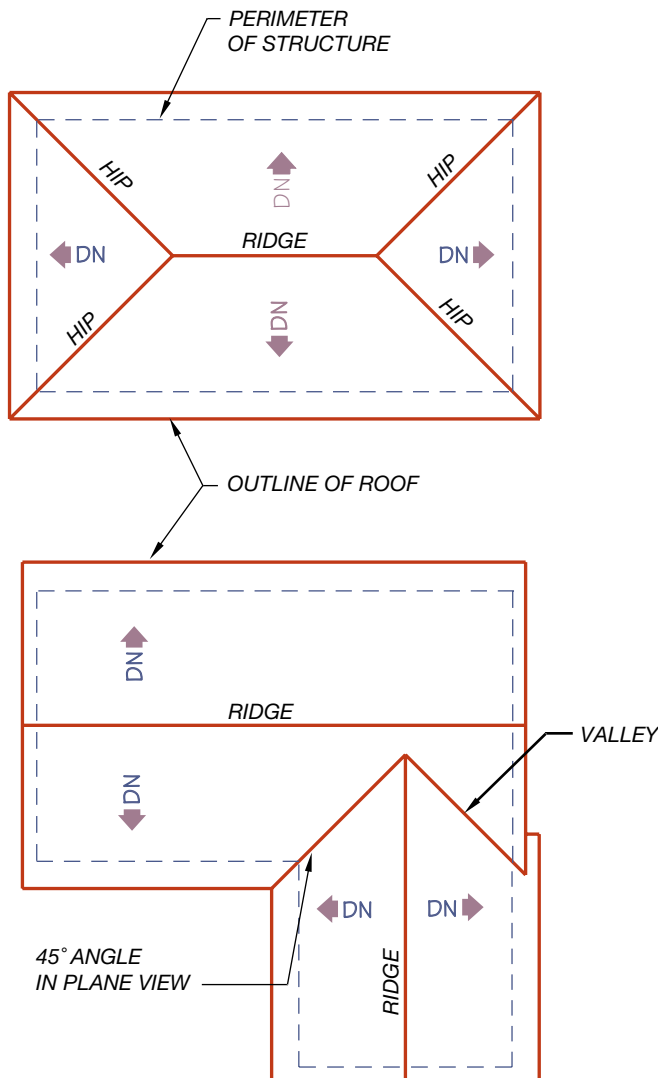


FIGURE 20.22 ■ Gambrel roof in plan view.



**FIGURE 20.23** ■ A hip roof is made of three or more intersecting planes. This home uses a combination of hip roofs with a gable roof over the entry area to create a pleasing roof structure. *Courtesy LeRoy Cook.*



**FIGURE 20.24** ■ Hips and valleys in plan view.

two. The intersection between surfaces is called a *hip*. If built on a square structure, the hips will come together to form a point. If built on a rectangular structure, the hips will form two points with a ridge spanning the distance between them. When hips are placed over an L- or T-shaped structure, an interior intersection will be formed; this is called a valley. The valley of a hip roof is the same as the valley of a gable roof. Hips and valleys can be seen in plan view as shown in Figure 20.24.

### Dutch Hip Roofs

The Dutch hip roof is a combination of a hip and a gable roof. See Figure 20.25. The center section of the roof is framed using a method similar to a gable roof. The ends of the roof are framed with a partial hip that blends into the gable. A small wall is formed between the hip and the gable roofs, as seen in Figure 20.26. On the roof plan, the shape, distance, and wall location must be shown, as in the plan in Figure 20.27.

### Mansard Roofs

The mansard roof is similar to a gambrel roof but has the angled lower roof on all four sides rather than just two. A mansard roof is often used as a parapet wall to hide mechanical equipment on the roof or to help hide the height of the upper level of a structure. An example can be seen in Figure 20.28. Mansard roofs can be constructed in many different ways. Figure 20.29 shows



**FIGURE 20.25** ■ A Dutch hip is a combination of a hip and a gable roof. *Courtesy CertainTeed Roofing.*

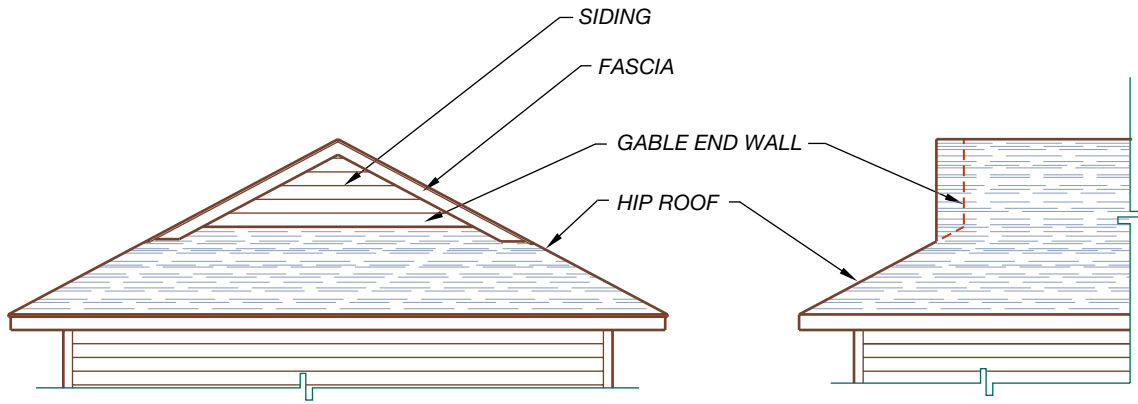


FIGURE 20.26 ■ A wall is formed between the hip and gable roof.

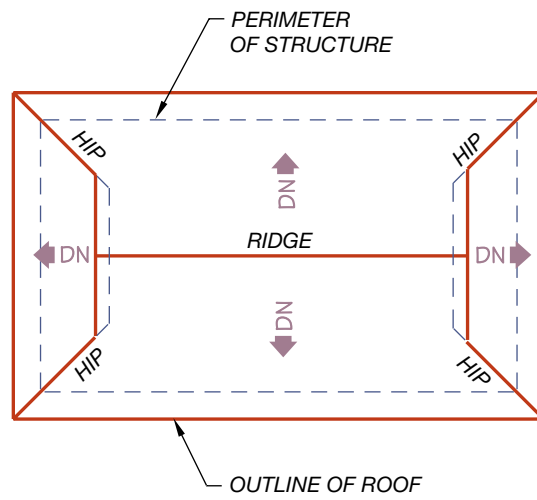


FIGURE 20.27 ■ Dutch hip roof in plan view.



FIGURE 20.28 ■ Mansard roofs are used to help disguise the height of a structure.

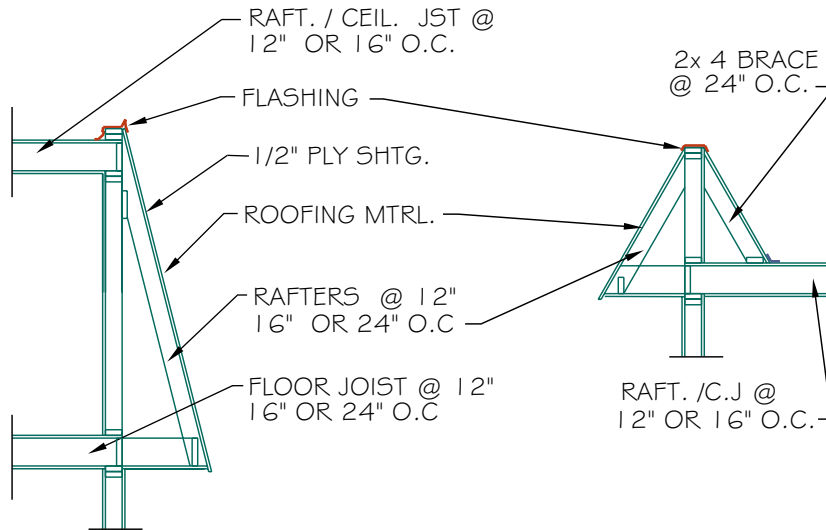


FIGURE 20.29 ■ Common methods of constructing a mansard roof.

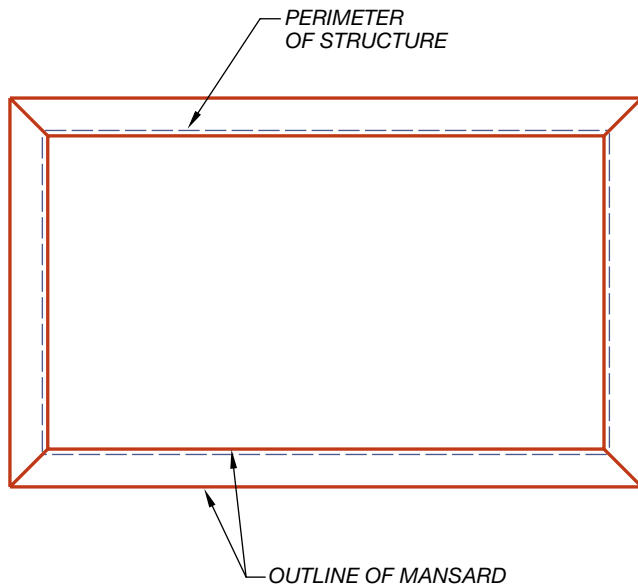


FIGURE 20.30 ■ Mansard in plan view.

two common methods of constructing a mansard roof. The roof plan for a mansard roof will resemble the plan shown in Figure 20.30.

### Dormers

A dormer is an opening framed in the roof to allow for window placement. Figure 20.31 shows a dormer that has been added to provide light and ventilation to rooms in what would have been attic space. Dormers are most frequently



FIGURE 20.31 ■ Dormers allow windows to be added to attic areas. Courtesy LeRoy Cook.

used on traditional roofs such as the gable or hip. Figure 20.32 shows one of the many ways that dormers can be constructed. Dormers are usually shown on the roof plan as seen in Figure 20.33.

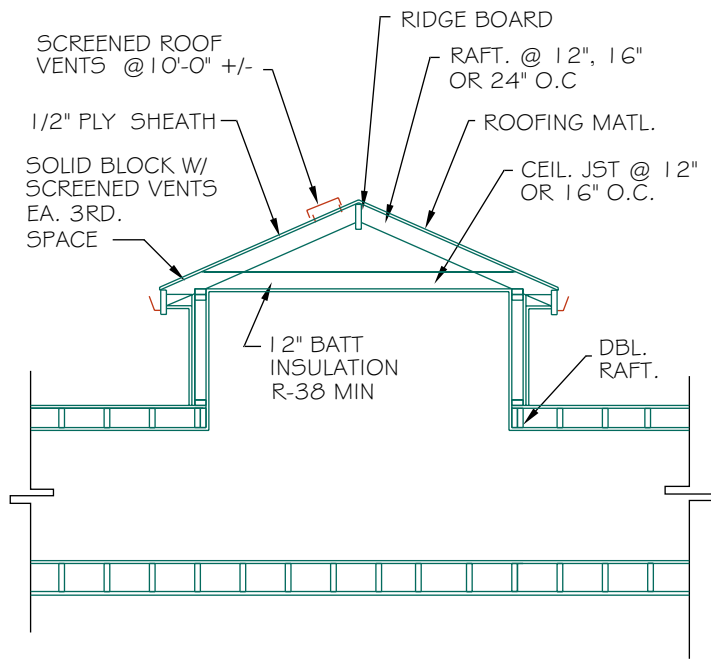


FIGURE 20.32 ■ Typical components of dormer construction.

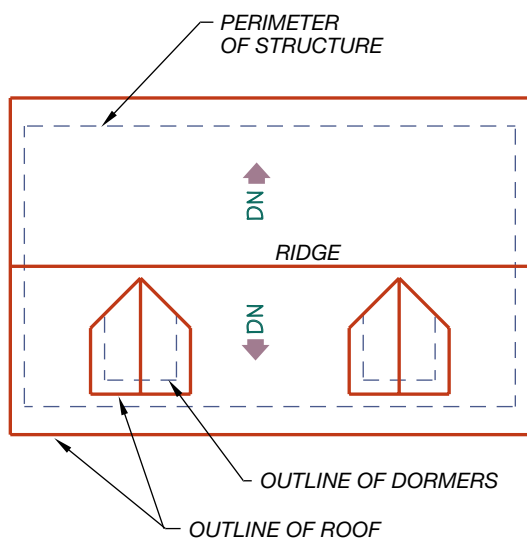


FIGURE 20.33 ■ Dormers in plan view.



## ROOFING MATERIALS

The material to be used on the roof depends on pitch, exterior style, the cost of the structure, and the weather. Common roofing materials include built-up roofing, composition and wood shingles, clay and cement tiles, and metal panels. In ordering or specifying these materials, the term *square* is often used. A square is used to describe an area of roofing that covers 100 sq. ft. (9.3 m<sup>2</sup>). The drafter will need to be aware of the weight per square and the required pitch as the plan is being drawn. The weight of the roofing material will affect the size of the framing

members all the way down to the foundation level. The material will also affect the required pitch and the appearance that results from the selected pitch.

## Built-Up Roofing

Built-up roofing of felt and asphalt is used on flat or low-sloped roofs below a  $\frac{3}{12}$  pitch. When the roof has a low pitch, water will either pond or drain very slowly. To prevent water from leaking into a structure, built-up roofing is used because it has no seams. On a residence, a built-up roof may consist of three alternate layers of felt and hot asphalt placed over solid roof decking. The decking is usually plywood. In commercial uses, a four- or five-layer roof is used to provide added durability. Gravel is often used as a finishing layer to help cover the felt. On roofs with a pitch over  $\frac{3}{12}$ , course rocks 2" or 3" (50–75 mm) in diameter are used for protecting the roof and for appearance. When built-up roofs are to be specified on the roof plan, the note should include the number of layers, the material to be used, and the size of the finishing material. A typical note would be:

- LAYER BUILT UP ROOF WITH HOT ASPHALTIC EMULSION BETWEEN LAYERS WITH  $\frac{1}{4}$ " (6 mm) PEA GRAVEL.

Other roofing materials suitable for low-sloped ( $\frac{1}{4}$  /12 minimum pitch) roofs and typical specifications include:

- Modified bitumen—Modified bitumen sheet roofing by John Manville or equal over 2 layers of underlayment per ASTM D226 Type I cemented together.
- Single-ply thermoplastic—Thermoplastic single-ply roof system by Sarnafil or equal installed per ASTM D4434.
- Sprayed polyurethane foam—SPF roofing by Mainland Industrial Coatings, Inc. applied per ASTM 1029.
- Liquid applied coating—Greenseal liquid waterproofing membrane or equal installed per manufacturer's specifications.

Each material can be applied to a roof with minimum pitch of  $\frac{1}{4}$  /12. Mineral surface roll roofing can be used on roofs with a minimum pitch of  $\frac{1}{12}$ .

## Shingles

Asphalt, fiberglass, and wood are the most typical types of shingles used as roofing materials. Most building codes and manufacturers require a minimum roof pitch of  $\frac{3}{12}$  with an underlayment of one layer of 15-lb. felt. Asphalt and fiberglass shingles can be laid on roofs as low as  $\frac{3}{12}$  if two layers of 15-lb felt are laid under the shingles and if the shingles are sealed. Wood shingles must usually be installed on roofs having a pitch of at least  $\frac{3}{12}$ . Asphalt and fiberglass are similar in appearance and application.

Asphalt shingles come in a variety of colors and patterns. Also known as composition shingles, they are typically made of fiberglass backing and covered with asphalt and a filler



**FIGURE 20.34** ■ Composition or three-tab shingles are a common roofing material on high sloped roofs. *Courtesy Elk Roofing.*

with a coating of finely crushed particles of stone. The asphalt waterproofs the shingle, and the filler provides fire protection. The standard shingle is a three-tab rectangular strip weighing 235 lb per square. The upper portion of the strip is coated with self-sealing adhesive and is covered by the next row of shingles. The lower portion of a three-tab shingle is divided into three flaps that are exposed to the weather. See Figure 20.34.

Composition shingles are also available in random width and thickness to give the appearance of cedar shakes. These shingles weigh approximately 300 lb per square. Both types of shingles can be used in a variety of conditions on roofs having a minimum slope of  $\frac{3}{12}$ . The lifetime of shingles varies from twenty- to forty-year guarantees. See Figure 20.35. Asbestos cement shingles are also available; they weigh approximately 560 lb per square, depending on the manufacturer and the pattern used.

Shingles are typically specified on drawings in note form listing the material, the weight, and the underlayment. The color and manufacturer may also be specified. This information is often omitted in residential construction to allow the contractor



**FIGURE 20.35** ■ 300-lb composition shingles are made with tabs of random width and length. *Courtesy Elk Roofing.*

to purchase a suitable brand at the best cost. A typical call-out would be:

- 235-lb composition shingles over 15-lb felt.
- 300-lb composition shingles over 15-lb felt.
- Architect 80 “Driftwood” class A fiberglass shingles by Genstar with  $5\frac{5}{8}$ ” exposure over 15-lb felt underlayment with thirty-year warranty.

Wood is also used for shakes and shingles. Wood shakes are thicker than shingles and are also more irregular in their texture. See Figure 20.36. Wood shakes and shingles are generally installed on roofs with a minimum pitch of  $\frac{3}{12}$  using a base layer of 15-lb felt. An additional layer of 15 lb by 18” (457 mm) wide felt is also placed between each courses or layers of shingles. Wood shakes and shingles can be installed over solid or spaced sheathing. The weather, material availability, and labor practices affect the type of underlayment used.

Depending on the area of the country, shakes and shingles are usually made of cedar, redwood, or cypress. They are also produced in various lengths. When shakes or shingles are specified on the roof plan, the note should usually include the thickness, the material, the exposure, the underlayment, and the type of sheathing. Other materials such as Masonite and metal are also used to simulate shakes. These materials are typically specified on plans in note form listing the material, underlayment, and amount of shingle exposed to the weather. A typical specification for wood shakes would be:

- Medium cedar shakes over 15# felt w/15# × 18” wide felt between each course. Lay with 10  $\frac{1}{2}$ ” exposure.

Metal is sometimes used for roof shingles on roofs with a  $\frac{3}{12}$  or greater pitch. Metal provides a durable, fire-resistant roofing material. Metal shingles are usually installed using the same precautions applied to asphalt shingles. Metal is typically specified on the roof plan in a note listing the manufacturer, type of shingle, and underlayment.



**FIGURE 20.36** ■ Cedar shakes are a rustic but elegant roofing material. *Courtesy Tim Taylor.*

## Clay and Cement Tiles

Tile is the material most often used for homes on the high end of the price scale or where the risk of fire is extreme. Although tile may cost twice as much as the better grades of asphalt shingle, it offers a lifetime guarantee. Tile is available in a variety of colors, materials, and patterns. Clay, concrete, and metal are the most common materials. See Figure 20.37a and 20–37b.

Roof tiles are manufactured in both curved and flat shapes. Curved tiles are often called Spanish tiles and come in a variety of curved shapes and colors. Flat, or barr, tiles are also produced in many different colors and shapes.

Tiles are typically installed on roofs having a pitch of  $2\frac{1}{2}/12$  or greater. Tiles can be placed over either spaced or solid sheathing. If solid sheathing is used, wood strips are generally added on top of the sheathing to support the tiles.

When tile is to be used, special precautions must be taken with the design of the structure. Tile roofs weigh between 850 and 1,000 lb per square. These weights require rafters, headers, and other supporting members to be larger than normally required for other types of roofing material. Tiles are generally



**FIGURE 20.37** ■ (a) Tile is an excellent choice for a roofing material because of its durability. *Courtesy Tim Taylor.* (b) Many tile patterns are made to simulate Spanish clay tiles. *Courtesy Tim Taylor.*

specified on the roof plan in a note, which lists the manufacturer, style, color, weight, fastening method, and underlayment. A typical note on the roof plan might be:

- Monier burnt terra cotta mission's roof tile over 15# felt and 1 × 3 skip sheathing. Use a 3" minimum head lap and install as per manufacturer's specifications.

## Metal Panels

Metal roofing panels often provide savings because of the speed and ease of installation. Metal roof panels provide a water- and fireproof material that comes with a warranty for a protected period that can range from twenty to fifty years. Panels are typically produced in either 22- or 24-gage metal in widths of either 18" or 24". See Figure 20.38. The length of the panel can be specified to meet the needs of the roof in lengths up to 40'. Metal roofing panels typically weigh between 50 and 100 lb per square. Metal roofs are manufactured in many colors and patterns and can be used to blend with almost any material. Steel, stainless steel, aluminum, copper, and zinc alloys are most typically used for metal roofing. Steel panels are heavier and more durable than other metals but must be covered with a protective coating to provide protection from rust and corrosion. A baked-on acrylic coating typically provides both color and weather protection. Stainless steel does not rust or corrode but is more expensive than steel. Stainless steel weathers to a natural matte-gray finish. Aluminum is extremely lightweight and does not rust. Finish coatings are similar to those used for steel. Copper has been used for centuries as a roofing material. Copper roofs weather to a blue-green color and do not rust. In specifying metal roofing on the roof plan, the note should include the manufacturer, the pattern, the material, the underlayment, and the trim and flashing. A typical note would be:

- Amer-X-9 ga. 36" wide, kodiak brown metal roofing by American Building Products or equal. Install over 15# felt as per manufacturer's specifications.



**FIGURE 20.38** ■ Metal is often selected for its durability and pleasing appearance. *Courtesy LeRoy Cook.*



## ROOF VENTILATION AND ACCESS

As the roof plan is drawn, the drafter must determine the size of the attic space. The attic is the space formed between the ceiling joists and the rafters. The attic space must be provided with vents that are covered with 1/8" (3.2 mm) screen mesh. These vents must have an area equal to 1/150 of the attic area. This area can be reduced to 1/300 of the attic area if a vapor barrier is provided on the heated side of the attic floor or if half of the required vents but not more than 80% of the vents are placed in the upper half of the roof area.

The method used to provide the required vents varies throughout the country. Vents may be placed in the gabled end walls near the ridge. This allows the roof surface to remain vent-free. In some areas, a continuous vent is placed in the eaves, or

a vent may be placed in each third rafter space. The drafter needs to specify the proper area of vents that are required and the area in which they are to be placed.

The drafter must also specify how to get into the attic space. The actual opening into the attic is usually shown on the floor plan, but its location must be considered when the roof plan is being drawn. The size of the access opening is 22" × 30" (560 × 760 mm) with 30" (760 mm) minimum of headroom. While planning the roof shape, the drafter must find a suitable location for the attic access that meets both code and aesthetic requirements. The access should be placed where it can be easily reached but not where it will visually dominate a space. Avoid placing the access in areas such as the garage; areas with high moisture content, such as bathrooms and utility rooms; or in bedrooms that will be used by young children. Hallways usually provide an area to place the access that is easily accessible but not a focal point of the structure.

## Chapter 20 Additional Reading

The following Web sites can be used as a resource to help you keep current with changes in roof materials.

ADDRESS	COMPANY OR ORGANIZATION
<a href="http://www.asphaltroofing.org">www.asphaltroofing.org</a>	Asphalt Roofing Manufacturers
<a href="http://www.calredwood.org">www.calredwood.org</a>	California Redwood Association
<a href="http://www.cedarbureau.org">www.cedarbureau.org</a>	Cedar Shake & Shingle Bureau
<a href="http://www.certainteed.org">www.certainteed.org</a>	Certainteed Corporation Asphalt Shingles
<a href="http://www.elkcorp.com/index.htm">www.elkcorp.com/index.htm</a>	Elk Corporation Asphalt Shingles
<a href="http://www.gaf.com">www.gaf.com</a>	GAF Corporation Asphalt Shingles
<a href="http://www.jm.com">www.jm.com</a>	Johns Manville (roofing)
<a href="http://www.lpcorp.com">www.lpcorp.com</a>	Louisiana Pacific (hardboard and wood siding)
<a href="http://www.ludowici.com">www.ludowici.com</a>	Ludowici Roof Tile
<a href="http://www.mca-tile.com">www.mca-tile.com</a>	MCA, Inc. (tile roofing)
<a href="http://www.malarkey-rfg.com">www.malarkey-rfg.com</a>	Malarkey Corporation High Wind Asphalt Shingles
<a href="http://www.monier.com">www.monier.com</a>	Monier Lifetile Concrete Roofing
<a href="http://www.owenscorning.com/ow">www.owenscorning.com/ow</a>	Owens-Corning Corporation Asphalt Shingles
<a href="http://www.riei.org">www.riei.org</a>	Roofing Industry Educational Institute
<a href="http://www.solatube.com">www.solatube.com</a>	Solatube (skylights)
<a href="http://www.spri.org">www.spri.org</a>	Single Ply Roofing Institute
<a href="http://www.stone-slate.com">www.stone-slate.com</a>	Slate/Select Inc.
<a href="http://www.sunoptic.com">www.sunoptic.com</a>	Sunoptics (skylights)
<a href="http://www.velux.com">www.velux.com</a>	Velux (skylights)
<a href="http://www.zappone.com">www.zappone.com</a>	Zappone Manufacturing (copper shingles)

## CHAPTER

## 20

*Roof Plan Components Test***DIRECTIONS**

1. Letter your name, Chapter 20 Test, and the date at the top of the sheet.
2. Letter the question number and provide the answer. You do not need to write out the question.
3. Do all lettering with vertical uppercase architectural letters. If the answer requires line work, use proper drafting tools and technique.

Answers may be prepared on a word processor if course guidelines allow this.

**QUESTIONS**

**Question 20-1** List and describe three different types of roof plans.

**Question 20-2** In describing roof pitch, what do the numbers 4/12 represent?

**Question 20-3** What angle represents a 6/12 pitch?

**Question 20-4** Is a surface built at a 28° angle from vertical a wall or a roof?

**Question 20-5** What are two advantages of using a flat roof?

**Question 20-6** What is the major disadvantage of using a flat roof?

**Question 20-7** List three traditional roof shapes.

**Question 20-8** Sketch and define the difference between a hip and a Dutch hip roof.

**Question 20-9** What are the two uses for a mansard roof?

**Question 20-10** List two common weights for asphalt or fiberglass shingles.

**Question 20-11** What are two common shapes of clay roof tiles?

**Question 20-12** What advantage do metal roofing panels have over other roofing materials?

**Question 20-13** What is the minimum headroom required at the attic access?

**Question 20-14** What is the minimum size of an attic access opening?

**Question 20-15** What type of roof is both a roof system and a framing system?