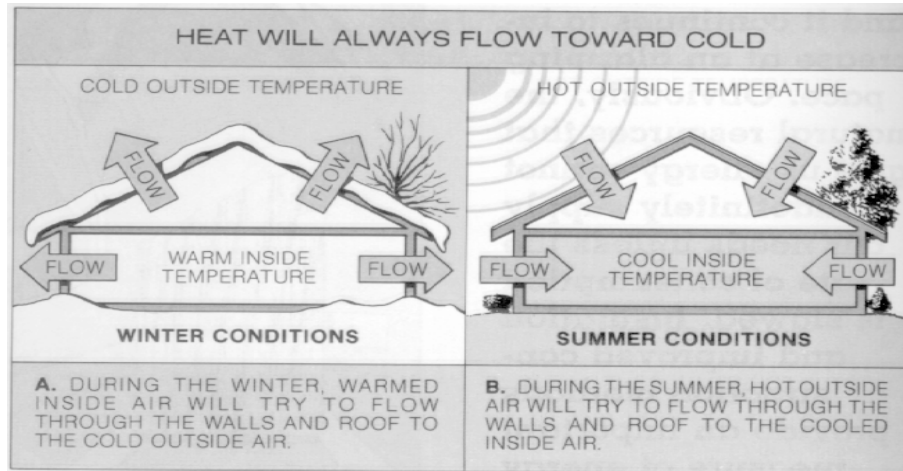


# Water Backup

# Ventilation & Insulation

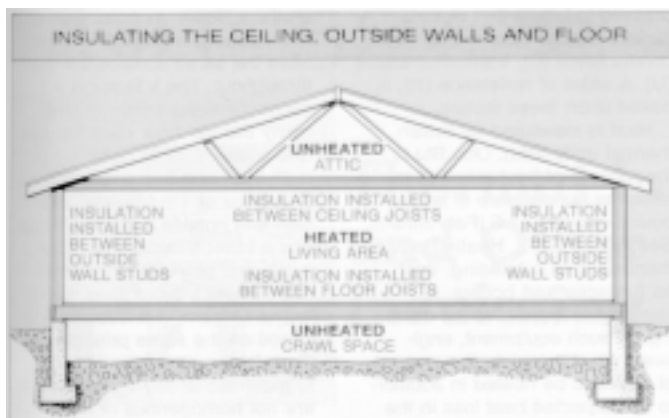


The two most important factors affecting the temperature inside a building are the degree of heat flow in and out of the dwelling and the amount of moisture resulting from condensation. These conditions can be controlled by insulation and proper ventilation. When these conditions are well controlled, less fuel is required for the furnace to warm the building, less chance of ice dams and water backup, and less electricity is required for air conditioners to cool the building in the summer.

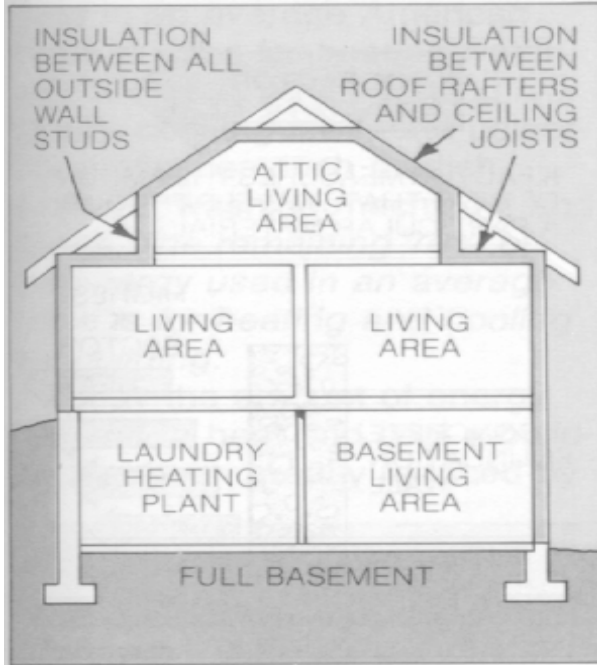


Heat always moves toward coldness. Consequently, in the winter the warm air inside a building escapes through the framework of the building, moving to the cooler air outside. In the summer the warm air outside a building flows toward the cooler air inside. The flow of heat is called **heat transfer**.

Heat transfer can be prevented by adding thermal insulation (the word thermal insulation describes materials that have high heat-transfer resistance).

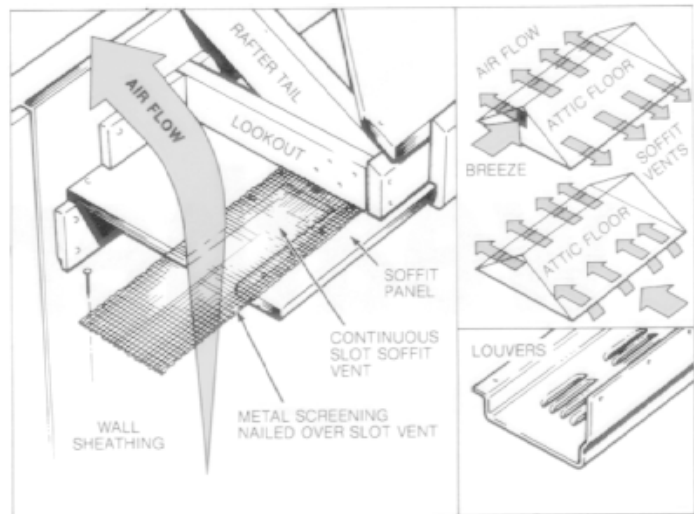


In a one-story house with an unheated attic and crawl space for example, insulation should be placed in the exterior walls, floor and ceiling. Non-living areas should be well vented.

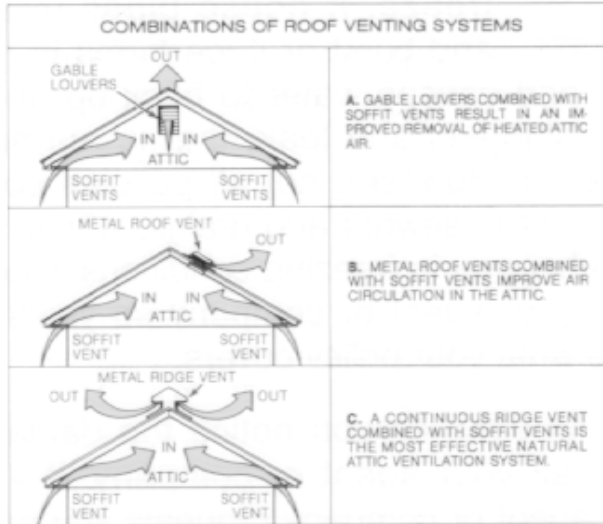


In a 1 1/2-story dwelling with a full basement, insulation should be placed in the exterior walls of all the living areas including the basement. Insulation should be placed along the rafter sections and in the walls and ceiling that encloses the living space in the attic. Non-living areas should be well vented.

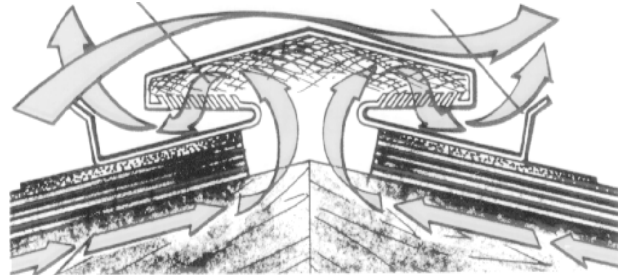
Ventilation is needed in closed-off areas, such as the attic space above the ceiling and below the roof. Ventilation is provided by openings that permit air to escape as well as by the circulation of air in the enclosed areas. Several venting methods are possible for attic areas of wood-framed buildings. Most have serious shortcomings when used alone but are effective when combined.



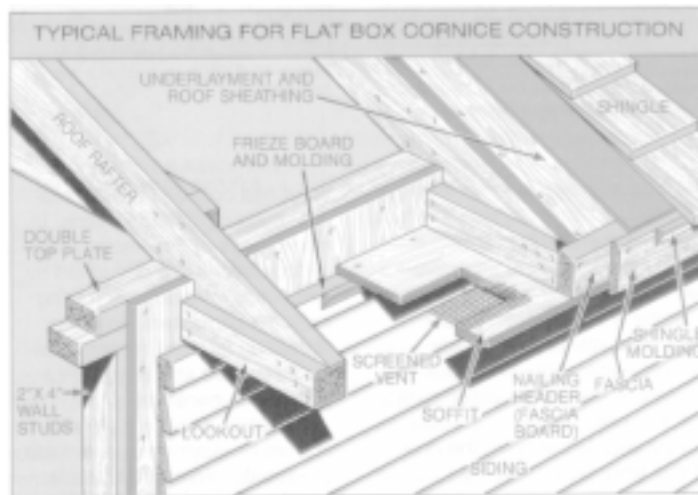
Soffit vents are located beneath the roof cornice (roof overhang above exterior walls). They may consist of a series of small openings or one continuous slot. With soffit vents, most of the ventilation occurs over the attic floor.



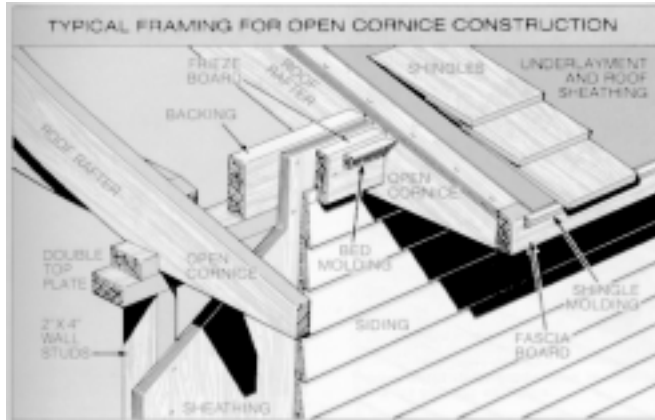
(C)



Gable Louvers (A) (located at the peak of outside walls) and Metal Roof Vents (B) allow warm air to escape, but do not allow much air flow in the attic space. Continuous-ridge vents (C) run along the ridge of the roof. They are unique in that their design provides some air flow resulting from temperature differences alone. Common combinations of these venting systems are: Roof-and-soffit, gable-louver-and-soffit, and ridge and soffit.

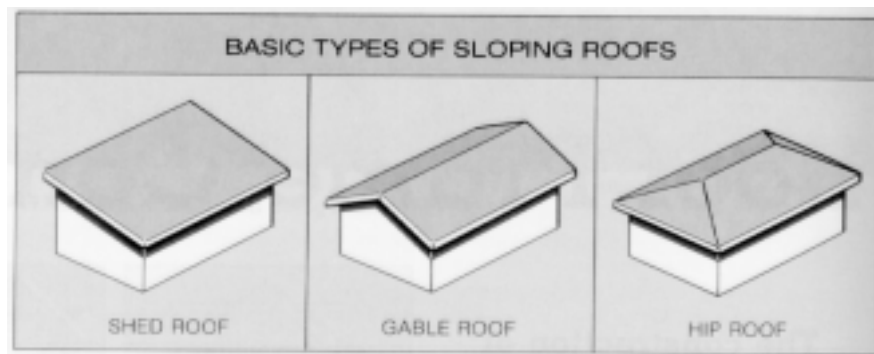


The above flat box cornice with a plywood soffit is the only method of construction to allow for continuous or individual soffit ventilation.



With open cornice construction there is no way to provide for proper ventilation. In an open cornice eave, the roof rafters are built into the walls and do not allow for any ventilation.

There are four basic types of sloping roofs are the **shed, gable, hip and gambrel**.

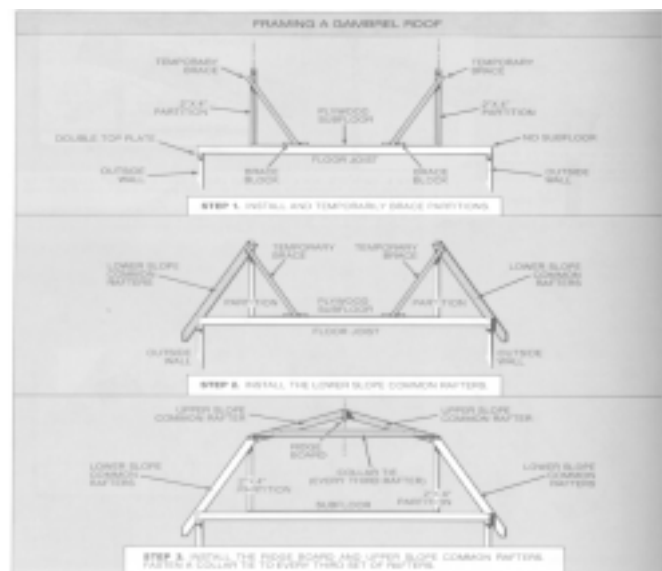


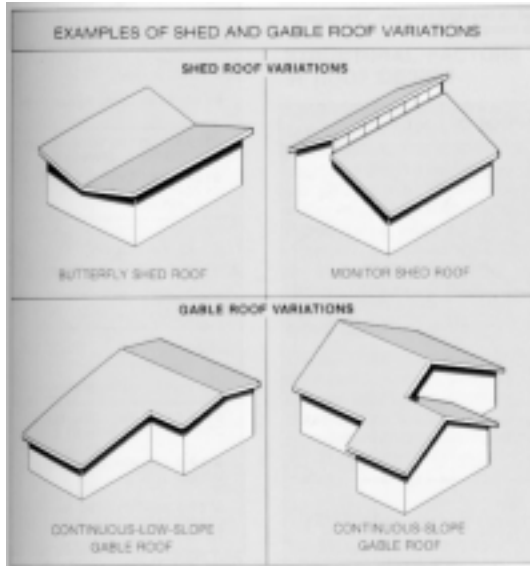
**Shed:** Also known as a lean-to, is simple, as it slopes in one direction.

**Gable:** Has a ridge at the center and slopes in two directions. Some gable roof lines allow for living space in the attic. These are 1 1/2- or 2 1/2-story homes.

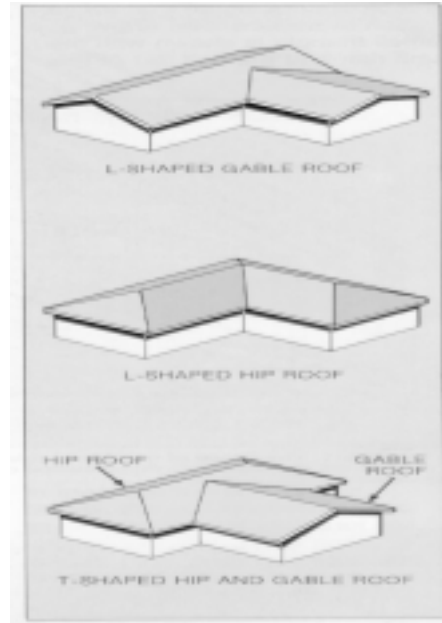
**Hip:** Has four sloping sides. The strongest type of roof because it is braced by four hip rafters.

**Gambrel:** Provides additional living space directly underneath or within the roof structure. These are 1 1/2- or 2 1/2-story homes.





Roof pitch refers to the angle (slope) of the roof.

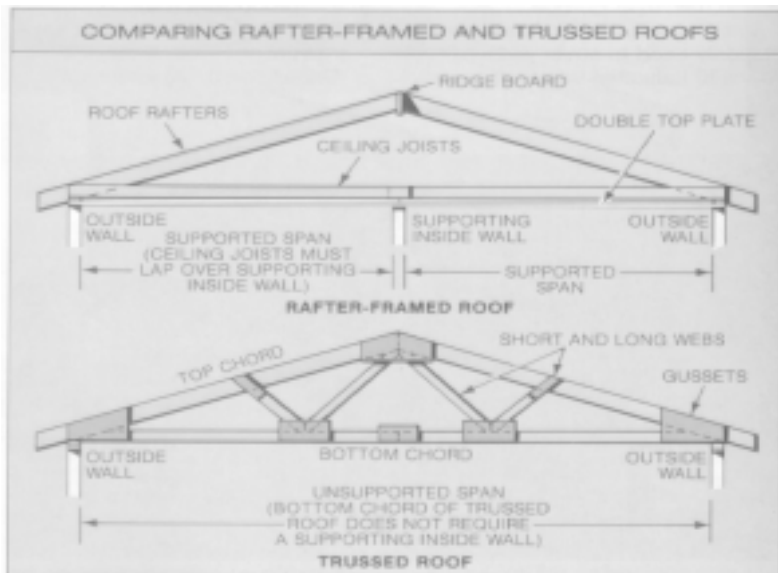


A roof must withstand a great deal of weight and stress. To guarantee structural strength, the dead load and live load that a roof will bear must be considered in roof design and construction.

**Dead Load:** Weight of the materials used to construct the roof.

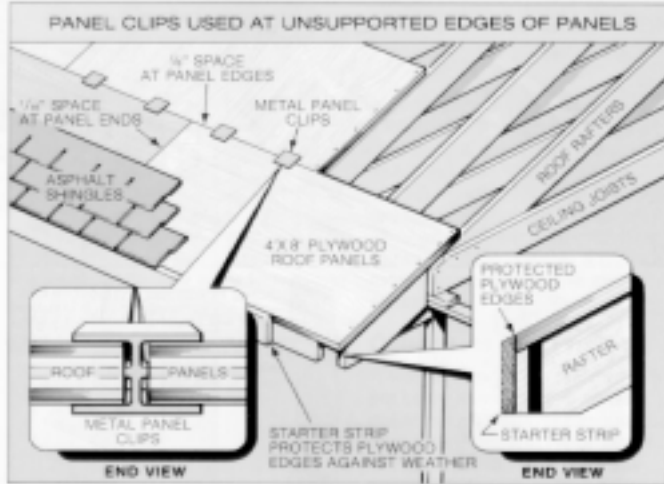
**Live Load:** Weight and pressure of wind and snow to which the roof will be subjected. The current BOCA code calls for the combined wind and snow load for a sloped roof to be 40 pounds per square foot.

Trussed roofs are pre-constructed and delivered to the construction site. They are a framed unit and much stronger to support a “live load”. An example of a trussed roof rafter is compared to a rafter-framed roof and the additional strength is obvious.



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Plywood panels are the most widely used material for roof sheathing.



Plywood panels 3/8” or 1/2” thick are usually used while the recommended thickness for waferboard is 1/2”.

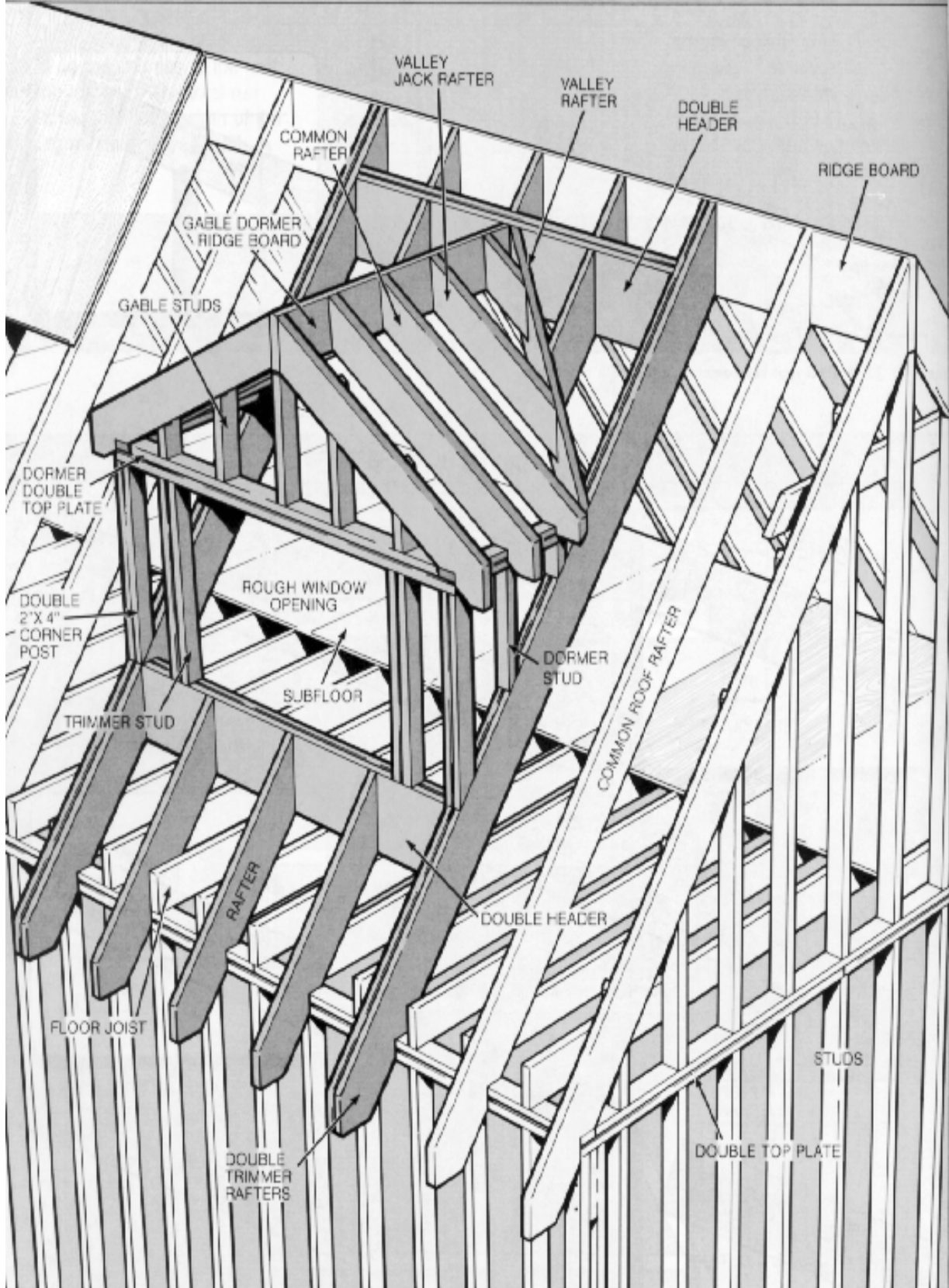
Metal panel clips should be used between roof rafters to add strength to the roof sheathing.



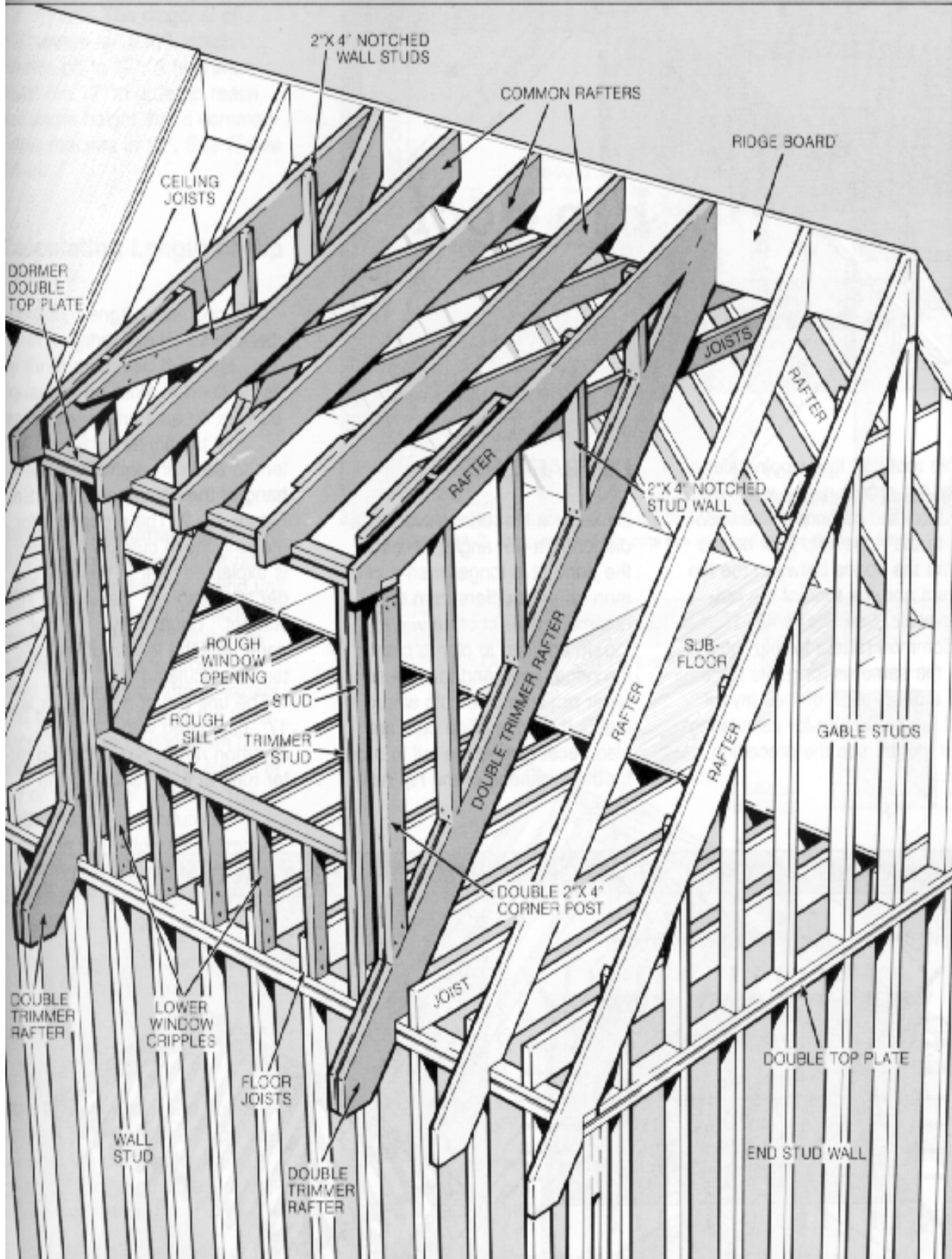
Dormers add space, light and ventilation to the living area of 1 1/2- and 2 1/2-story dwellings. Most dormers are of gable or shed design.

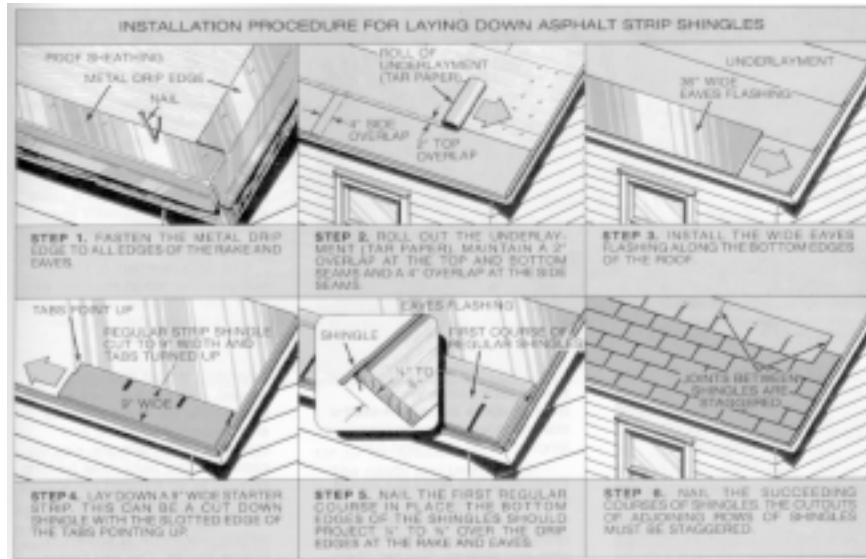
The gable dormer consists of a level ridge board, common rafters, valley rafters and valley jack rafters. The front wall of a shed dormer is usually directly over the exterior wall of the building. The rafters extend from the main ridge. The roof must be pitched enough to shed water and snow.

# CONSTRUCTING A GABLE DORMER



# CONSTRUCTING A SHED DORMER





The very construction of any dormer leads to extensive heat loss and during heavy snow years, will result in serious water back-up losses as evidenced in the continuation of this report.

A new product replacing flashing as a roofing underlayment is called an **ICE and Water Shield**. One manufacturer of this product is Grace Construction products. Install the drip edge, if being used, and then roll out a 3' wide strip of ice and water shield onto the roofing sheathing. Most companies recommend two 36" layers providing nearly 6' of water and ice protection.