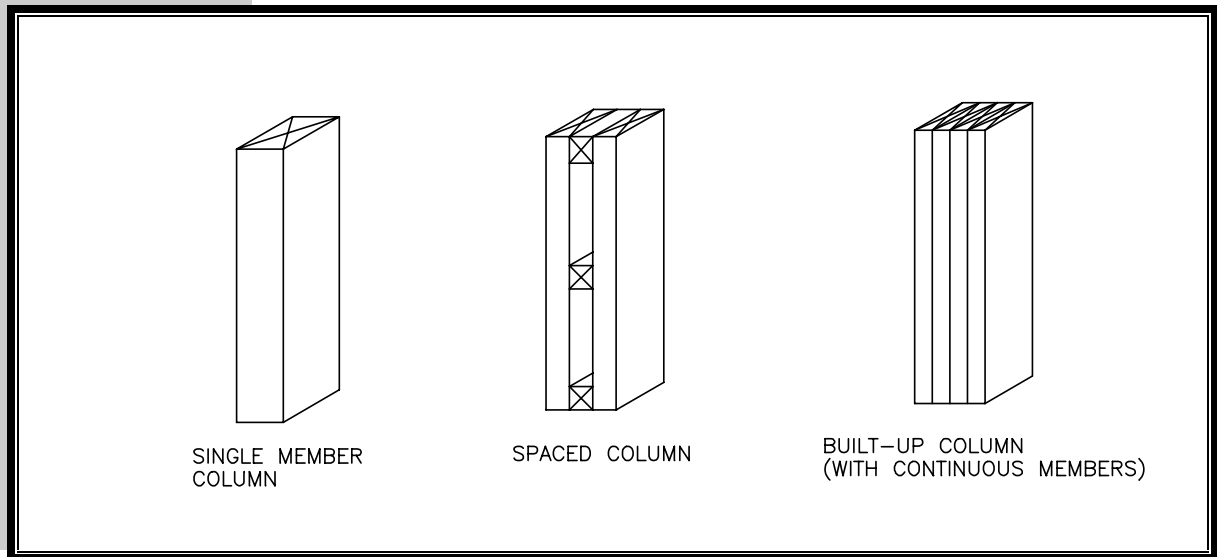




effect on bending capacity (see Table 5.4). However, when the members in the built-up column are staggered or spliced, the column bending strength is reduced. While the NDS•15.3 provisions apply only to built-up columns with all members extending the full height of the column, design methods for spliced columns are available (ASAE, 1997).

FIGURE 5.6 *Wood Column Types*



5.6 Roofs

The objectives of roof framing design are

- to support building dead and snow loads and to resist wind and seismic forces;
- to resist roof construction and maintenance loads;
- to provide a thermal and weather barrier;
- to provide support for interior ceiling finishes; and
- to provide attic space and access for electrical and mechanical equipment or storage.

5.6.1 General

A roof in residential construction is typically a sloped structural system that supports gravity and lateral loads and transfers the loads to the walls below. Generally, the four options for wood roof construction are

- roof trusses;
- rafters and cross-ties;
- rafters with ridge beams (i.e. cathedral ceiling); and
- timber framing.



By far the most common types of residential roof construction use light-frame trusses, rafters, or a mix of these depending on roof layout. Figure 5.7 depicts conventional roof construction and roof framing elements. Rafters are repetitive framing members that support the roof sheathing and typically span from the exterior walls to a nonstructural ridge board (i.e., reaction plate). Rafter pairs may also be joined at the ridge with a gusset, thereby eliminating the need for a ridge board. Rafters may also be braced at or near mid-span using intermittent 2x vertical braces and a 2x runner crossing the bottom edges of the rafters. Ceiling joists are repetitive framing members that support ceiling and attic loads and transfer the loads to the walls and beams below. They are not normally designed to span between exterior walls and therefore require an intermediate bearing wall. Overhangs, where used, are framed extensions of the roof that extend beyond the exterior wall of the home, typically by 1 to 2 feet. Overhangs protect walls and windows from direct sun and rain and therefore offer durability and energy efficiency benefits.

Ceiling joists are typically connected to rafter pairs to resist outward thrust generated by loading on the roof. Where ceiling joists or cross-ties are eliminated to create a cathedral ceiling, a structural ridge beam must be used to support the roof at the ridge and to prevent outward thrust of the bearing walls. Ceiling joists and roof rafters are bending members that are designed similarly; therefore, this chapter groups them under one section.

FIGURE 5.7 *Structural Elements of a Conventional Roof System*

