(i.e., ring shank), helical, or longitudinal deformations rolled onto the shank, creating ridges and depressions. Flutes are helical or vertical deformations rolled onto the shank. Threaded nails are most often used to connect wood to wood while fluted nails are used to connect wood to concrete (i.e., sill plate to concrete slab or furring strip to concrete or masonry). Shank diameter and surface condition both affect a nail's capacity.

The *nail tip*, as illustrated in Figure 7.1, is the end of the shank–usually tapered–that is formed during manufacturing to expedite nail driving into a given material. Among the many types of nail points, the *diamond point* is most commonly used in residential wood construction. The diamond point is a symmetrical point with four approximately equal beveled sides that form a pyramid shape. A *cut point* used for concrete cut nails describes a blunt point. The point type can affect nail drivability, lumber splitting, and strength characteristics.

The *material* used to manufacture nails may be steel, stainless steel, heat-treated steel, aluminum, or copper, although the most commonly used materials are steel, stainless steel, and heat-treated steel. *Steel* nails are typically formed from basic steel wire. *Stainless steel* nails are often recommended in exposed construction near the coast or for certain applications such as cedar siding to prevent staining. Stainless steel nails are also recommended for permanent wood foundations. *Heat-treated* steel includes annealed, case-hardened, or hardened nails that can be driven into particularly hard materials such as extremely dense wood or concrete.

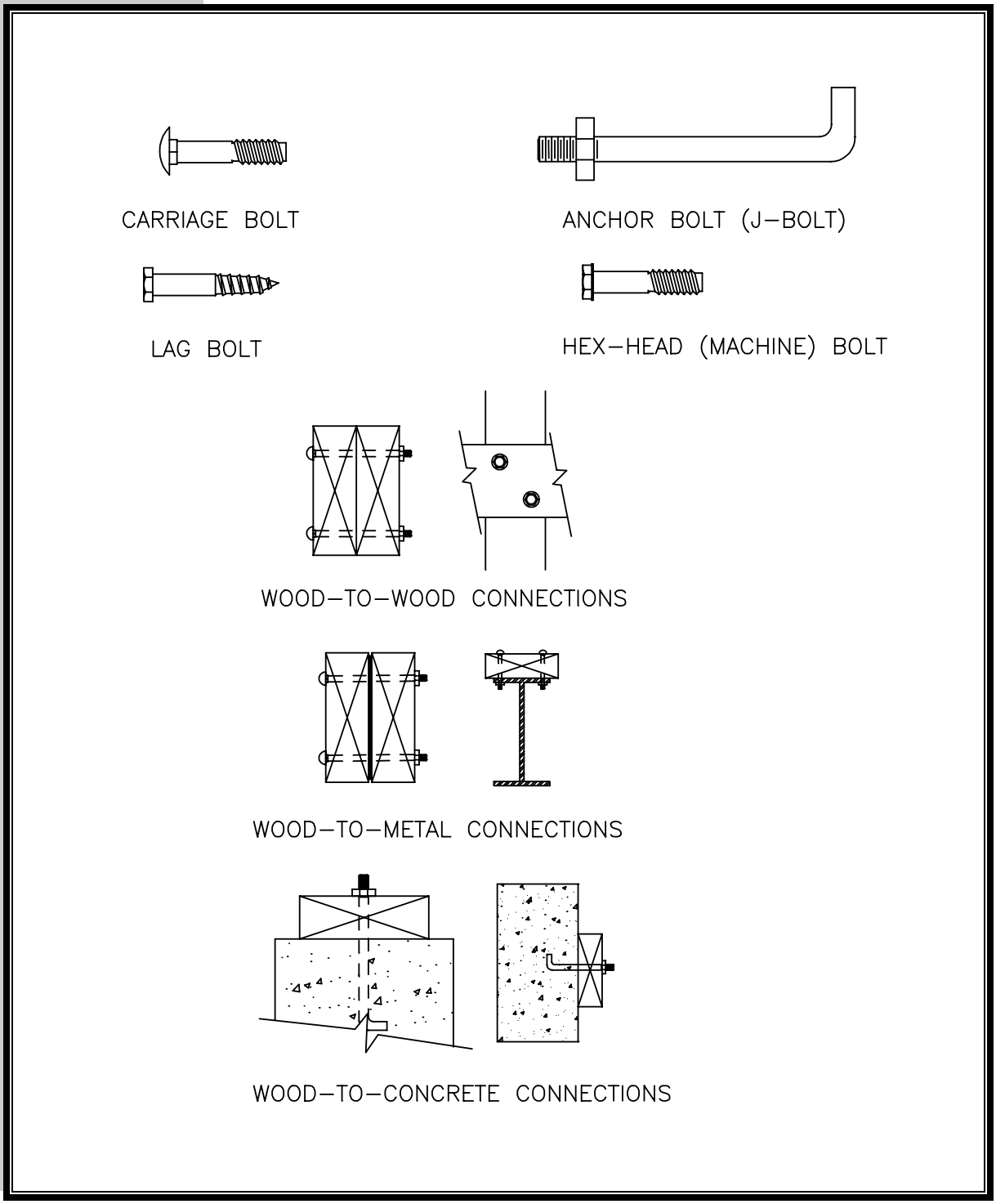
Various nail *coatings* provide corrosion resistance, increased pullout resistance, or ease of driving. Some of the more common coatings in residential wood construction are described below.

- *Bright*. Uncoated and clean nail surface.
- *Cement-coated*. Coated with a heat-sensitive cement that prevents corrosion during storage and improves withdrawal strength depending on the moisture and density of the lumber and other factors.
- *Galvanized*. Coated with zinc by barrel-tumbling, dipping, electroplating, flaking, or hot-dipping to provide a corrosion-resistant coating during storage and after installation for either performance or appearance. The coating thickness increases the diameter of the nail and improves withdrawal and shear strength.

7.2.2 Bolts

Bolts are often used for "heavy" connections and to secure wood to other materials such as steel or concrete. In many construction applications, however, special power-driven fasteners are used in place of bolts. Refer to Figure 7.2 for an illustration of some typical bolt types and connections for residential use.

FIGURE 7.2 Bolt and Connection Types



In residential wood construction, bolted connections are typically limited to wood-to-concrete connections unless a home is constructed in a high-hazard wind or seismic area and hold-down brackets are required to transfer shear wall overturning forces (see Chapter 6). Foundation bolts, typically embedded in concrete or grouted masonry, are commonly referred to as *anchor bolts, J-bolts,*