PROTECTED VERSUS UNPROTECTED

As noted previously, many of the classifications for types of construction are divided into two subcategories, A or B. This designation identifies the overall fire protection of the building elements. As the sizes of buildings increase, it is more important to protect the structure from fire. Therefore, the IBC’s Table 601 (shown in Table 4-1 of this chapter) prescribes the fire protection of the essential portions of the building. The numbers in the table indicate what level of fire protection is required in hours. For example, an interior bearing wall in a Type VA building is required to be protected from fire for a time period of 1 hour, whereas the same wall in a Type IA building is required to be protected for 3 hours (Figure 4-3). The method for determining this protection is discussed later.

Type II, Type III, and Type V construction are similar in how they are divided into the two subcategories. With the exception of exterior walls in Type III construction, the building elements that are required to be protected for 1 hour in the A subcategory and are not required to be protected for the B subcategory. Exterior walls in Type III construction are required to be protected for 2 hours. The fire protection for Type I buildings is higher because they are typically much larger buildings. Type IA construction requires that the supporting structure portion of the building be provided with a minimum fire protection of 3 hours. The floors are permitted to have a 2-hour protection, and the roof is permitted a 1½-hour fire protection. The less restrictive Type IB construction requires 2-hour protection for the beams, columns, bearing walls, and floor construction. The roof construction is permitted to be protected for 1 hour. [Ref. 601]

Type IV construction is typically called “heavy timber construction.” The exterior bearing walls in this type of construction are required to be noncombustible materials with a 2-hour fire protection. The interior elements are then permitted to be solid or laminated wood without concealed construction. The fire protection in these types of buildings comes from the insulating capacity of the wood. When a fire impacts a thick piece of wood, it chars the first ¾ to ¾ inches of the member and then goes out. This leaves a significant portion of the member intact, which will continue to support the structure in a fire.
To provide this level of fire protection, the wood members are required to be a minimum size in a Type IV building. Columns are required to be a minimum of 8" X 8" when supporting floors and a minimum of 6" X 8" when supporting a roof. Wood beams and girders must be a minimum of 6" X 10". The members supporting the roof must also be similar large solid or laminated wood beams or arches. In addition, the floors and roof must be constructed of solid materials without any concealed spaces. Interior partitions are required to be solid wood construction formed by not less than two layers of 1-inch boards, or laminated construction 4 inches thick, or have a 1-hour fire protection. [Ref. 602.4]

Although few buildings are constructed of Type IV construction, individual elements of heavy timber construction are used in other types of construction. Several provisions in the IBC allow heavy timber construction in lieu of fire-resistant rated construction. For example, heavy timber construction can be used in roof construction of all types of construction requiring a 1-hour fire-resistance rating if the designer chooses (Figure 4-4). [Ref. Table 601, footnote c]

Small, single-story commercial buildings are typically constructed of Type VB construction. Type VA construction is commonly used in apartment and hotel buildings up to three or four stories in height. Type IV construction is not currently used except in very special cases. Many existing buildings in older portions of city downtown areas are constructed of Type IV construction. Type III construction is typically used in large educational buildings. Schools are also constructed of Type IIA or Type IIB construction. The most common use of Type IIB construction is in big box retail stores, warehouses, and industrial buildings. Type IA construction is used for mid-rise buildings that are between five and twelve stories. High-rise buildings over twelve stories in height and very large low-rise buildings are constructed of Type IA construction.