Chapter C3
DEAD LOADS, SOIL LOADS, AND HYDROSTATIC PRESSURE

C3.1.2 Weights of Materials and Constructions

To establish uniform practice among designers, it is desirable to present a list of materials generally used in building construction, together with their proper weights. Many building codes prescribe the minimum weights for only a few building materials, and in other instances no guide whatsoever is furnished on this subject. In some cases the codes are so drawn up as to leave the question of what weights to use to the discretion of the building official, without providing any authoritative guide. This practice, as well as the use of incomplete lists, has been subjected to much criticism. The solution chosen has been to present, in this commentary, an extended list that will be useful to designer and official alike. However, special cases will unavoidably arise, and authority is therefore granted in the standard for the building official to deal with them.

For ease of computation, most values are given in terms of pounds per square foot (lb/ft^2) (kN/m^2) of given thickness (see Table C3-1). Pounds-per-cubic-foot (lb/ft^3) (kN/m^3) values, consistent with the pounds-per-square foot (kilonewtons per square meter) values, are also presented in some cases (see Table C3-2). Some constructions for which a single figure is given actually have a considerable range in weight. The average figure given is suitable for general use, but when there is reason to suspect a considerable deviation from this, the actual weight should be determined.

Engineers, architects, and building owners are advised to consider factors that result in differences between actual and calculated loads.

Engineers and architects cannot be responsible for circumstances beyond their control. Experience has shown, however, that conditions are encountered which, if not considered in design, may reduce the future utility of a building or reduce its margin of safety. Among them are

1. Dead Loads. There have been numerous instances in which the actual weights of members and construction materials have exceeded the values used in design. Care is advised in the use of tabular values. Also, allowances should be made for such factors as the influence of formwork and support deflections on the actual thickness of a concrete slab of prescribed nominal thickness.
2. Future Installations. Allowance should be made for the weight of future wearing or protective surfaces where there is a good possibility that such may be applied. Special consideration should be given to the likely types and position of partitions, as insufficient provision for partitioning may reduce the future utility of the building.

Attention is directed also to the possibility of temporary changes in the use of a building, as in the case of clearing a dormitory for a dance or other recreational purpose.

C3.2 SOIL LOADS AND HYDROSTATIC PRESSURE

C3.2.1 Lateral Pressures

Table 3.2-1 includes high earth pressures, 85 pcf (13.36 kN/m^2) or more, to show that certain soils are poor backfill material. In addition, when walls are unyielding the earth pressure is increased from active pressure toward earth pressure at rest, resulting in 60 pcf (9.43 kN/m^2) for granular soils and 100 pcf (15.71 kN/m^2) for silt and clay type soils (Terzaghi and Peck 1967). Examples of light floor systems supported on shallow basement walls mentioned in Table 3.2-1 are floor systems with wood joists and flooring, and cold-formed steel joists without a cast-in-place concrete floor attached.

Expansive soils exist in many regions of the United States and may cause serious damage to basement walls unless special design considerations are provided. Expansive soils should not be used as backfill because they can exert very high pressures against walls. Special soil testing is required to determine the magnitude of these pressures. It is preferable to excavate expansive soil and backfill with non-expansive, freely draining sands or gravels. The excavated back slope adjacent to the wall should be no steeper than 45° from the horizontal to minimize the transmission of swelling pressure from the expansive soil through the new backfill. Other special details are recommended, such as a cap of non-pervious soil on