

of this Code and shall be designed to minimize differential settlement.

**Footings  
(Continued)**

(e) **Foundation Plates or Sills.** Foundation plates or sills shall be bolted to the foundation or foundation wall with not less than one-half-inch ( $\frac{1}{2}$ " ) bolts embedded at least seven inches (7") into the masonry or concrete and spaced not more than six feet (6') apart. Foundation plates and sills shall be the kind of wood specified in Section 2517 (c).

(f) **Designs Employing Lateral Bearing.** Construction employing posts or poles as columns embedded in earth or embedded in concrete footings in the earth may be used to resist both axial and lateral loads. The depth to resist lateral loads shall be determined by means of the design criteria established herein or other methods approved by the Building Official.

1. **Design criteria—nonconstrained.** The following formula may be used in determining the depth of embedment required to resist lateral loads where no constraint is provided at the ground surface, such as rigid floor or ground surface pavement.

$$d = \frac{A}{2} \left( 1 + \sqrt{1 + \frac{4.36h}{A}} \right)$$

WHERE:

$$A = \frac{2.34P}{S_1 b}$$

$P$  = Applied lateral force in pounds.

$S_1$  = Allowable lateral soil-bearing pressure as set forth in Table No. 28-C based on a depth of one-third the depth of embedment.

$S_3$  = Allowable lateral soil-bearing pressure as set forth in Table No. 28-C based on a depth equal to the depth of embedment.

$b$  = Diameter of round post or footing or diagonal dimension of square post or footing (feet).

$h$  = Distance in feet from ground surface to point of application of "P."

$d$  = Depth of embedment in earth in feet but not over twelve feet (12') for purpose of computing lateral pressure.

**Constrained.** The following formula may be used to determine the depth of embedment required to resist lateral loads where constraint is provided at the ground surface, such as a rigid floor or pavement.

$$d^2 = 4.25 \frac{Ph}{S_3 b}$$

Footings  
(Continued)

TABLE NO. 28-C—ALLOWABLE LATERAL SOIL PRESSURE

| CLASS OF MATERIAL                                                                                                                             | ALLOWABLE VALUES<br>PER FOOT OF<br>DEPTH BELOW<br>NATURAL GRADE <sup>1</sup><br>(Pounds per<br>Square Foot) | MAXIMUM<br>ALLOWABLE VALUES<br>(Pounds per<br>Square Foot) |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Good — compact well-graded<br>sand and gravel<br>Hard Clay<br>Well-graded fine and coarse<br>sand<br>(All drained so water will not<br>stand) | 400                                                                                                         | 8000                                                       |
| Average—Compact Fine Sand<br>Medium Clay<br>Compact sandy loam<br>Loose Coarse sand and gravel<br>(All drained so water will not<br>stand)    | 200                                                                                                         | 2500                                                       |
| Poor—Soft Clay<br>Clay Loam<br>Poorly compacted sand<br>Clays containing large amounts<br>of silt<br>(Water stands during wet sea-<br>son)    | 100                                                                                                         | 1500                                                       |

<sup>1</sup>Isolated poles, such as flagpoles, or signs, may be designed using lateral bearing values equal to two times tabulated values.

**Vertical load.** The resistance to vertical loads is determined by the allowable soil-bearing pressure set forth in Table No. 28-B.

2. **Construction requirements—backfill.** The backfill in the annular space around columns not embedded in poured footings shall be by one of the following methods:

- Backfill shall be of concrete with an ultimate strength of 2000 pounds per square inch at 28 days. The hole shall be not less than four inches (4") larger than the diameter of the column at its bottom or four inches (4") larger than the diagonal dimension of a square or rectangular column.
- Backfill shall be of clear sand. The sand shall be thoroughly compacted by tamping in layers not more than eight inches (8") in depth.

3. **Limitations.** The design procedure outlined in this Subsection shall be subject to the following limitations:

The frictional resistance for retaining walls and slabs on silts and clays shall be limited to one-half of the normal force imposed on the soil by the weight of the footing or slab.

Posts embedded in earth shall not be used to provide lateral support for structural or nonstructural materials such as plas-

ter, masonry or concrete unless bracing is provided that develops the limited deflection required.

**Sec. 2807.** When grillage footings of structural steel shapes are used on soils, they shall be completely embedded in concrete with at least six inches (6") on the bottom and at least four inches (4") at all other points.

**Grillage  
Footings**

**Sec. 2808. (a) General.** The use of types of piles not specifically mentioned in this Chapter, and the use of piles under conditions not specifically covered herein, shall be permitted, subject to the approval of the Building Official, upon submission of acceptable test data, calculations, or other information relating to the properties and load-carrying capacity of such piles.

**Piles**

**(b) Column Action.** All piles standing unbraced in air, water, or material not capable of lateral support, shall conform with the applicable column formula as specified in this Code. Such piles driven into firm ground may be considered fixed and laterally supported at five feet (5') below the ground surface and in soft material at ten feet (10') below the ground surface unless otherwise prescribed by the Building Official after a foundation investigation by an approved agency.

**(c) Group Action.** Consideration shall be given to the reduction of allowable pile load when piles are placed in groups. Where soil conditions make such load reductions advisable or necessary, the allowable axial load determined for a single pile shall be reduced by any rational method or formula approved by the Building Official.

**(d) Piles in Subsiding Areas.** Where piles are driven through subsiding fills or other subsiding strata and derive support from underlying firmer materials, consideration shall be given to the downward frictional forces which may be imposed on the piles by the subsiding upper strata.

Where the influence of subsiding fills is considered as imposing loads on the pile, the allowable stresses specified in this Chapter may be increased if satisfactory substantiating data are submitted.

**(e) Jetting.** Jetting shall not be used except where and as specifically permitted by the Building Official. When used, jetting shall be carried out in such a manner that the carrying capacity of existing piles and structures shall not be impaired. After withdrawal of the jet, piles shall be driven down until the required resistance is obtained.

**(f) Protection of Pile Materials.** Where the boring records of site conditions indicate possible deleterious action on pile materials because of soil constituents, changing water levels, or other factors, such materials shall be adequately protected by methods or processes approved by the Building Official. The effectiveness of such methods or processes for the particu-