

4101:1-18-01 Soils and foundations.

Chapter 18 of the International Building Code, 2021 edition, as incorporated by reference and modified in Section 101.1.1 of this code, is further modified as follows:

(A) Replace section 1803.1 with the following:

1803.1 General. Geotechnical investigations are to be conducted in accordance with Section 1803.2 and reported in accordance with Section 1803.6. Where geotechnical investigations involve in-situ testing, laboratory testing or engineering calculations, such investigations are to be conducted by a *registered design professional*.

(B) Replace exception to section 1803.2 with the following:

Exception: A geotechnical investigation is not required where satisfactory data from adjacent areas is available that demonstrates an investigation is not necessary for any of the conditions in Sections 1803.5.1 through 1803.5.6 and Sections 1803.5.10 and 1803.5.11.

(C) Replace last sentence in section 1803.5.7 with the following:

Such support is to be provided by underpinning, bracing, excavation retention systems, or by other means determined by the *registered design professional*.

(D) Replace section 1803.5.10 with the following:

1803.5.10 Alternate setback and clearance. Where setbacks or clearances other than those required in Section 1808.7 are desired, a geotechnical investigation is to be performed by a *registered design professional* to demonstrate that the intent of Section 1808.7 would be satisfied. Such an investigation is to include consideration of material, height of slope, slope gradient, load intensity and erosion characteristics of slope material.

A copy of the report of the geotechnical investigation is to be submitted to the *building official*.

(E) Replace section 1807.3.2 with the following:

1807.3.2 Design criteria. The depth to resist lateral loads is to be determined using the design criteria established in Sections 1807.3.2.1 through 1807.3.2.3, or by other methods specified by the *registered design professional*.

(F) Replace exception to section 1808.3.2 with the following:

Exception: Minor grading for landscaping purposes is to be permitted where done with walk-behind equipment, where the grade is not increased more than 1 foot (305 mm) from original design grade.

(G) Replace section 1808.7.5 with the following:

1808.7.5 Alternate setback and clearance. Alternate setbacks and clearances are permitted, subject to the review of the *building official*. The *building official* may require a geotechnical investigation as set forth in Section 1803.5.10.

(H) Replace section 1808.8.3 with the following:

1808.8.3 Placement of concrete. Concrete is to be placed in such a manner as to ensure the exclusion of any foreign matter and to secure a full-size foundation. Concrete is not to be placed through water unless a tremie or other method specified by the *registered design professional* is used. Where placed under or in the presence of water, the concrete is to be deposited by approved means to ensure minimum segregation of the mix and negligible turbulence of the water. Where depositing concrete from the top of a *deep foundation* element, the concrete is to be chuted directly into smooth-sided pipes or tubes or placed in a rapid and continuous operation through a funnel hopper centered at the top of the element.

(I) Replace section 1808.8.5 with the following:

1808.8.5 Forming of concrete. Concrete foundations are permitted to be cast against the earth where soil conditions do not require formwork. Where formwork is used, the formwork is to be in accordance with Section 26.11 of ACI 318.

(J) Replace first paragraph of section 1810.2.2 with the following:

1810.2.2 Stability. *Deep foundation* elements are to be braced to provide lateral stability in all directions. Three or more elements connected by a rigid cap are to be considered braced, provided that the elements are located in radial directions from the centroid of the group not less than 60 degrees (1 rad) apart. A two-element group in a rigid cap is to be considered braced along the axis connecting the two elements. Methods used to brace *deep foundation* elements are to be as specified by the *registered design professional*.

(K) Replace section 1810.3.2.5 with the following:

1810.3.2.5 Protection of materials. Where boring records or site conditions indicate possible deleterious action on the materials used in deep

foundation elements because of soil constituents, changing water levels or other factors, the elements are to be adequately protected by materials, methods or processes as specified by the *registered design professional*. Protective materials are to be applied to the elements so as not to be rendered ineffective by installation. The effectiveness of such protective measures for the particular purpose are to have been thoroughly established by satisfactory service records or other evidence.

(L) Replace section 1810.3.3.1.2 with the following:

1810.3.3.1.2 Load tests. Where design compressive *loads* are greater than those determined using the allowable stresses specified in Section 1810.3.2.6, where the design *load* for any deep foundation element is in doubt, or where cast-in-place deep foundation elements have an enlarged base formed either by compacting concrete or by driving a precast base, control test elements are to be tested in accordance with ASTM D1143 or ASTM D4945. One element or more are to be load tested in each area of uniform subsoil conditions. Where required by the *registered design professional*, additional elements are to be load tested where necessary to establish the safe design capacity. The resulting allowable *loads* are not to be more than one-half of the ultimate axial load capacity of the test element as assessed by one of the published methods listed in Section 1810.3.3.1.3 with consideration for the test type, duration and subsoil. The ultimate axial load capacity is to be determined by a *registered design professional* with consideration given to tolerable total and differential settlements at design *load* in accordance with Section 1810.2.3. In subsequent installation of the balance of deep foundation elements, all elements are to be deemed to have a supporting capacity equal to that of the control element where such elements are of the same type, size and relative length as the test element; are installed using the same or comparable methods and equipment as the test element; are installed in similar subsoil conditions as the test element; and, for driven elements, where the rate of penetration (for example, net displacement per blow) of such elements is equal to or less than that of the test element driven with the same hammer through a comparable driving distance.

(M) Replace section 1810.3.3.1.4 with the following:

1810.3.3.1.4 Allowable shaft resistance. The assumed shaft resistance developed by any uncased cast-in-place *deep foundation* element is to not exceed one-sixth of the bearing value of the soil material at minimum depth as set forth in Table 1806.2, up to 500 psf (24 kPa), unless a greater value is allowed by the *registered design professional* on the basis of a

geotechnical investigation as specified in Section 1803 or a greater value is substantiated by a load test in accordance with Section 1810.3.3.1.2. Shaft resistance and end-bearing resistance are not to be assumed to act simultaneously unless determined by a geotechnical investigation in accordance with Section 1803.

(N) Replace exception #3 to section 1810.3.9.3 with the following:

3. For Group R-3 and U occupancies not exceeding two stories of *light-frame construction*, reinforcement is permitted to be placed after concreting, while the concrete is still in a semifluid state, and the concrete cover requirement is permitted to be reduced to 2 inches (51 mm), provided that the construction method can be demonstrated to the satisfaction of the *registered design professional*.

(O) Replace exception to section 1810.3.13 with the following:

Exception: In Group R-3 and U occupancies of *light-frame construction*, *deep foundation* elements supporting foundation walls, isolated interior posts detailed so the element is not subject to lateral *loads* or exterior decks and patios are not subject to interconnection where the *registered design professional* demonstrates that the soils are of adequate stiffness.

(P) Replace section 1810.4.1.3 with the following:

1810.4.1.3 Driving near uncased concrete. Deep foundation elements are not to be driven within six element diameters center to center in granular soils or within one-half the element length in cohesive soils of an uncased element filled with concrete less than 48 hours old unless otherwise specified by the *registered design professional*. If driving near uncased concrete elements causes the concrete surface in any completed element to rise or drop significantly or bleed additional water, the completed element is to be replaced.

(Q) Replace section 1810.4.1.4 with the following:

1810.4.1.4 Driving near cased concrete. *Deep foundation* elements are not to be driven within four and one-half average diameters of a cased element filled with concrete less than 24 hours old unless otherwise specified by the *registered design professional*. Concrete is not to be placed in casings within heave range of driving.

(R) Replace section 1810.4.8 with the following:

1810.4.8 Hollow-stem augered, cast-in-place elements. Where concrete or grout is placed by pumping through a hollow-stem auger, the auger is to

be permitted to rotate in a clockwise direction during withdrawal. As the auger is withdrawn at a steady rate or in increments not to exceed 1 foot (305 mm), concreting or grouting pumping pressures are to be measured and maintained high enough to offset hydrostatic and lateral earth pressures at all times. Concrete or grout volumes are to be measured to ensure that the volume of concrete or grout placed in each element is equal to or greater than the theoretical volume of the hole created by the auger. Where the installation process of any element is interrupted or a loss of concreting or grouting pressure occurs, the element is to be redrilled to 5 feet (1524 mm) below the elevation of the tip of the auger when the installation was interrupted or concrete or grout pressure was lost and reformed. Augered cast-in-place elements are not to be installed within six diameters center to center of an element filled with concrete or grout less than 12 hours old, unless otherwise specified by the *registered design professional*. If the concrete or grout level in any completed element drops due to installation of an adjacent element, the element is to be replaced.

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