

tinctly different soil and/or rock layers shall be subdivided into those layers designated by a number that ranges from 1 to n at the bottom where there is a total of n distinct layers in the upper 100 feet (30 480 mm). The symbol i then refers to any one of the layers between 1 and n .

where:

v_{si} = The shear wave velocity in feet per second (m/s).
 d_i = The thickness of any layer between 0 and 100 feet (30 480 mm).

where:

$$\bar{v}_s = \frac{\sum_{i=1}^n d_i}{\sum_{i=1}^n \frac{d_i}{v_{si}}} \quad \text{(Equation 16-41)}$$

$$\sum_{i=1}^n d_i = 100 \text{ feet (30 480 mm)}$$

N_i is the Standard Penetration Resistance (ASTM D 1586) not to exceed 100 blows/foot (328 blows/m) as directly measured in the field without corrections. When refusal is met for a rock layer, N_i shall be taken as 100 blows/foot (328 blows/m).

$$\bar{N} = \frac{\sum_{i=1}^n d_i}{\sum_{i=1}^n \frac{d_i}{N_i}} \quad \text{(Equation 16-42)}$$

where N_i and d_i in Equation 16-42 are for cohesionless soil, cohesive soil and rock layers.

$$\bar{N}_{ch} = \frac{d_s}{\sum_{i=1}^m \frac{d_i}{N_i}} \quad \text{(Equation 16-43)}$$

where:

$$\sum_{i=1}^m d_i = d_s$$

Use d_i and N_i for cohesionless soil layers only in Equation 16-43.

d_s = The total thickness of cohesionless soil layers in the top 100 feet (30 480 mm).

m = The number of cohesionless soil layers in the top 100 feet (30 480 mm).

s_{ui} = The undrained shear strength in psf (kPa), not to exceed 5,000 psf (240 kPa), ASTM D 2166 or D 2850.

$$\bar{s}_u = \frac{d_c}{\sum_{i=1}^k \frac{d_i}{s_{ui}}} \quad \text{(Equation 16-44)}$$

where:

$$\sum_{i=1}^k d_i = d_c$$

d_c = The total thickness of cohesive soil layers in the top 100 feet (30 480 mm).

k = The number of cohesive soil layers in the top 100 feet (30 480 mm).

PI = The plasticity index, ASTM D 4318.

w = The moisture content in percent, ASTM D 2216.

Where a site does not qualify under the criteria for Site Class F and there is a total thickness of soft clay greater than 10 feet (3048 mm) where a soft clay layer is defined by: $s_u < 500$ psf (24 kPa), $w \geq 40$ percent, and $PI > 20$, it shall be classified as Site Class E.

The shear wave velocity for rock, Site Class B, shall be either measured on site or estimated by a geotechnical engineer or engineering geologist/seismologist for competent rock with moderate fracturing and weathering. Softer and more highly fractured and weathered rock shall either be measured on site for shear wave velocity or classified as Site Class C.

The hard rock category, Site Class A, shall be supported by shear wave velocity measurements either on site or on profiles of the same rock type in the same formation with an equal or greater degree of weathering and fracturing. Where hard rock conditions are known to be continuous to a depth of 100 feet (30 480 mm), surficial shear wave velocity measurements are permitted to be extrapolated to assess v_s .

The rock categories, Site Classes A and B, shall not be used if there is more than 10 feet (3048 mm) of soil between the rock surface and the bottom of the spread footing or mat foundation.

1613.5.5.1 Steps for classifying a site.

1. Check for the four categories of Site Class F requiring site-specific evaluation. If the site corresponds to any of these categories, classify the site as Site Class F and conduct a site-specific evaluation.
2. Check for the existence of a total thickness of soft clay > 10 feet (3048 mm) where a soft clay layer is defined by: $s_u < 500$ psf (24 kPa), $w \geq 40$ percent and $PI > 20$. If these criteria are satisfied, classify the site as Site Class E.
3. Categorize the site using one of the following three methods with v_s , \bar{N} , and s_u and computed in all cases as specified.
 - 3.1. \bar{v}_s for the top 100 feet (30 480 mm) (\bar{v}_s method).
 - 3.2. \bar{N}_{ch} for the top 100 feet (30 480 mm) (\bar{N} method).
 - 3.3. \bar{N} for cohesionless soil layers ($PI < 20$) in the top 100 feet (30 480 mm) and average, s_u for cohesive soil layers ($PI > 20$) in the top 100 feet (30 480 mm) (s_u method).

1613.5.6 Determination of seismic design category. Occupancy Category I, II or III structures located where the mapped spectral response acceleration parameter at 1-second period, S_b , is greater than or equal to 0.75 shall be assigned to Seismic Design Category E. Occupancy Cate-