

2021 Virginia Construction Code

CHAPTER 16 STRUCTURAL DESIGN

SECTION 1610 SOIL LOADS AND HYDROSTATIC PRESSURE

1610.1 Lateral pressures.

Foundation walls and retaining walls shall be designed to resist lateral soil loads from adjacent soil. Soil loads specified in Table 1610.1 shall be used as the minimum design lateral soil loads unless determined otherwise by a geotechnical investigation in accordance with Section 1803. Foundation walls and other walls in which horizontal movement is restricted at the top shall be designed for at-rest pressure. Retaining walls free to move and rotate at the top shall be permitted to be designed for active pressure. Lateral pressure from surcharge loads shall be added to the lateral soil load. Lateral pressure shall be increased if expansive soils are present at the site. Foundation walls shall be designed to support the weight of the full hydrostatic pressure of undrained backfill unless a drainage system is installed in accordance with Sections 1805.4.2 and 1805.4.3.

Exception: Foundation walls extending not more than 8 feet (2438 mm) below grade and laterally supported at the top by flexible diaphragms shall be permitted to be designed for active pressure.

**TABLE 1610.1
LATERAL SOIL LOAD**

| DESCRIPTION OF BACKFILL MATERIAL ^c | UNIFIED SOIL CLASSIFICATION | DESIGN LATERAL SOIL LOAD ^a (pound per square foot per foot of depth) | |
|---|-----------------------------|--|------------------|
| | | Active pressure | At-rest pressure |
| Well-graded, clean gravels; gravel-sand mixes | GW | 30 | 60 |
| Poorly graded clean gravels; gravel-sand mixes | GP | 30 | 60 |
| Silty gravels, poorly graded gravel-sand mixes | GM | 40 | 60 |
| Clayey gravels, poorly graded gravel-and-clay mixes | GC | 45 | 60 |
| Well-graded, clean sands; gravelly sand mixes | SW | 30 | 60 |
| Poorly graded clean sands; sand-gravel mixes | SP | 30 | 60 |
| Silty sands, poorly graded sand-silt mixes | SM | 45 | 60 |
| Sand-silt clay mix with plastic fines | SM-SC | 45 | 100 |
| Clayey sands, poorly graded sand-clay mixes | SC | 60 | 100 |
| Inorganic silts and clayey silts | ML | 45 | 100 |
| Mixture of inorganic silt and clay | ML-CL | 60 | 100 |
| Inorganic clays of low to medium plasticity | CL | 60 | 100 |
| Organic silts and silt clays, low plasticity | OL | Note b | Note b |
| Inorganic clayey silts, elastic silts | MH | Note b | Note b |
| Inorganic clays of high plasticity | CH | Note b | Note b |
| Organic clays and silty clays | OH | Note b | Note b |

For SI: 1 pound per square foot per foot of depth = 0.157 kPa/m, 1 foot = 304.8 mm.

- Design lateral soil loads are given for moist conditions for the specified soils at their optimum densities. Actual field conditions shall govern. Submerged or saturated soil pressures shall include the weight of the buoyant soil plus the hydrostatic loads.
- Unsuitable as backfill material.
- The definition and classification of soil materials shall be in accordance with ASTM D2487.

1610.2 Uplift loads on floor and foundations.

Basement floors, slabs on ground, foundations, and similar approximately horizontal elements below grade shall be designed to resist uplift loads where applicable. The upward pressure of water shall be taken as the full hydrostatic pressure applied over the entire area. The hydrostatic load shall be measured from the underside of the element being evaluated. The design for upward loads caused by expansive soils shall comply with Section 1808.6.

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