

INTERPRETATIONS & APPLICATIONS
OF BUILDING CODES & REGULATIONS #21-3



CODE SECTION: 2021 IBC Retaining Walls

Old 96-6; Rev. 9/16/2003; 0/29/2007; 2/12/2013; 12/2/2014; 01/06/2017; 01/20/2023

SUBJECT: MINIMUM DESIGN REQUIREMENTS FOR RETAINING WALLS

General Note

1. This document **shall not** be used in design and review of flood walls, culvert walls, head walls, containment walls, and similar site structures.
 2. This document **shall not** be used where Questionable soil per Section 1803.5.2 and 1803.5.3 is present. Soil report is required for all Questionable soil including compressible and expansive soil.
 3. Owner, professional in charge of design and contractor shall assume all liabilities for performance of the soil and use of these recommendations herein. City of Scottsdale does not accept any liability for suitability of the soil condition and for any specific site.
 4. City of Scottsdale highly recommends geotechnical investigation by a registered design professional, for foundation design.
- A. The following soil parameters shall be used in review of all retaining walls, unless a soil report for the site is submitted. Soil parameters shown below are for soil class of materials 4 in Table 1806.2 which is typical of soil found in the Scottsdale area.
1. Soil density: 110 pcf
 2. Active pressure: 30 pcf (Table 1610.1)
 3. Active pressure for restrained walls: 60 pcf (Table 1610.1)
 4. Passive pressure: 250 pcf, 750 pcf max.
 5. Base friction coefficient:
 - When passive force is utilized: 0.25
 - Independent of passive force: 0.40
 6. Allowable bearing pressure: 1500 psf.
A 1/3 increase in bearing pressure at toe is allowed in conjunction with wind and seismic loads.
- B. Footings shall bear minimum of 18" below undisturbed soil or engineer certified fill.
1. Where horizontal distance from face of footing to slope of grade is less than 1/3 of retaining wall height, and where soil at toe side is not compacted passive force shall not be used to provide support for retaining wall.
 2. Depth of footing above bottom reinforcing shall not be less than 6 inches.
 3. Minimum temperature reinforcing per ACI-318, but in no case shall be less than .0014 x gross concrete area.
- C. Surcharge at driveways or adjacent to roadways: 2 feet of added depth of fill as recommended by AASHTO or actual loads as calculated by the engineer.
- D. Safety factors (IBC 1807.2.3)
- Overturning1.5
 - Sliding.....1.5

- E. Wind load (2021-IBC Sec. 1609.1.1 references ASCE 7 for calculating wind loads):
1. Effects of wind load shall be considered in design of retaining wall structure.
 2. ASCE 7-16 Section 29.3 shall be used to determine wind load on all walls.
 3. Use wind speed for Risk Category I, 2021-IBC Figure 1609.3(4), and ASCE 7-16 Figure 26.5-1A with Basic Wind Speed of 95 MPH.
 4. Retaining Wall height shall be measured from top of footing for determining wind loads.
- F. Retaining wall design calculations are required where retaining wall height at heel exceeds 4'-0" from bottom of footing to finished grade.
- G. Retaining wall calculations are required where surcharge is present, and/or retaining wall is supporting solid fence wall.
- H. Positive drainage shall be provided at all retaining walls. Where weep holes are utilized use minimum of 2" diameter pipe at 4'-0" spacing maximum, and provide continuous gravel pocket behind retaining wall, wrapped in geo-fab to prevent clogging of pipes. Where perforated pipes are used, pipe shall be wrapped in geo-fab and placed in continuous gravel bedding. Site plan shall show location of daylight for the pipe.
- I. Retaining wall calculations shall be accompanied by a civil site plan. Retaining wall construction details and specifications shall be on drawings and where schedules are used, each elevation of wall shall be keyed to the schedule. All other structures including, buildings, driveways, walkways, hardscapes, barbecues, swimming pools, gazebos, landscape elements, etc., shall be shown on site plans. Landscape elements shall include boulders, earth piles, trees, etc.
- J. Refer to Civil Plan Review requirements and Planning Review requirements for additional site specific requirements that may be needed on your plan.