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 1803.5.1 and 1803.5.2 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 for any site.
4. City of Scottsdale highly recommends geotechnical investigation by a registered design professional, for foundation design. Refer to 2015-IBC Section 1803 for more information.

A. The following soil parameters will be used in review of retaining walls, unless a site specific soil report is submitted. Soil parameters shown below are for soil class type 4 in Table 1806.2 which is typical of soil found in the Scottsdale area (Exception: Maximum vertical foundation pressure is reduced to 1500 psf). For other classes of soil and design lateral soil load refer to Table 1610.1 for Active earth pressure. Soil classification and description of backfill material shall be noted on construction drawings.

1. Soil density: 110pcf
2. Active pressure: 30pcf (Table 1610.1)
3. At-rest pressure (restrained walls): 60pcf (Table 1610.1)
4. Passive pressure: 250 pcf, 750 pcf max. (or as specified in Soil report)
5. Base friction coefficient:
   - When passive force is utilized: 0.25 (Table 1806.2)
   - Independent of passive force: 0.40
6. Allowable bearing pressure: 1500 psf. A 1/3 increase in bearing pressure at toe is allowed when permitted in soil report or when Alternative Basic load combinations of Section 1605.3.2 is used in conjunction with wind and seismic loads (Sec 1806.1 & 1605.3.2).

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 (ACI 318-14, Section 13.3.1.2)
3. Minimum shrinkage/ temperature reinforcing per ACI-318-14, Sections 24.4, 13.3.2 (One-way shallow foundation), 9.6.1.2, and 7.6.1.1 (Minimum area of flexural reinforcing), but in no case shall be less than .0018 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)

- Overturning: 1.5
- Sliding: 1.5

Refer to 2015-IBC Section 1806.3.2 for sliding safety factor for soil class 5 (Table 1806.2)
E. Wind load (2015-IBC Sec. 1609.1.1 references ASCE 7-10 for calculating wind loads):
   1. Effects of wind load shall be accounted in design of retaining wall structure.
   2. ASCE 7-10 Section 29.4 shall be used to determine wind load on all walls.
   3. Use wind speed for Risk Category I, 2015-IBC Figure 1609.3(3), and ASCE 7-10 Figure 26.5-1c with Basic Wind Speed of 105 MPH, unless otherwise required by the Building Official.

F. Retaining Wall height shall be measured from top of the grade at toe side for determining wind loads and from top of the footing for calculating lateral soil pressure.

G. Retaining wall design calculations are required where retaining height at heel exceeds 4’-0” from bottom of footing to finished grade.
   1. In addition design calculations are required where surcharge is present, and/or retaining wall is supporting solid fence wall.

H. Special inspections by a qualified professional are required for concrete construction, masonry construction and soils. Refer to 2015-IBC Sections 1705.3, 1705.4 and 1705.6 for required special inspections, tests and exceptions.
   1. Add list of the special inspection work to construction drawings.
   2. Submit special inspection form.

I. Positive drainage to drain saturated zone within active earth pressure envelope shall be provided at all retaining walls. Refer to 2015-IBC Section 1805.4.2 Foundation Drain for additional information. Where weep holes are utilized use minimum of 2” diameter pipe at 6’-0” spacing maximum, and provide continuous gravel pocket behind retaining wall, wrapped in geo-fab to prevent clogging of pipes. Where other methods are used, drawings shall show and detail methods used.

J. Retaining wall calculations shall be accompanied by a civil site plan. Retaining wall construction details and specifications shall be on drawings. Where retaining wall 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.

K. Refer to Civil Plan Review and Planning Review for additional site specific requirements that may be needed on your plan.