



**CITY OF NEWPORT BEACH**  
**COMMUNITY DEVELOPMENT DEPARTMENT**  
**BUILDING DIVISION**

**BUILDING CODE POLICY**

<b>Effective Date</b>	<b>Subject</b>	<b>Policy No.</b>
10/20/1998 Revised: 04/18/2005 Revised: 02/15/2012 Revised: 03/18/2014	Geotechnical Investigation	CBC 1803.5 <i>(formerly NBMC 15.10.010)</i>

The objective of this policy is to provide uniformity in requiring Geotechnical Investigations. Investigated conditions shall comply with California Building Code (CBC) Section 1803.5 and shall include exposure categories and class per Section 4.2 of the ACI code. Reporting shall comply with CBC 1803.6.

Geotechnical Investigations are required for the following conditions:<sup>1</sup>

- I. New Construction (Residential or Commercial);
- II. Structures with grading  $\geq$  50 cu. yd. (Includes total cut and fill moved within, on to, and/or off site);
- III. Retaining walls and/or temporary shoring greater than 6 ft. of cut or level fill or supporting a surcharge;<sup>2</sup>
- IV. Alterations – Designs requiring a deepened foundation;<sup>3</sup>
- V. Pools where the excavation within a 1 Unit Vertical:1 Unit Horizontal imaginary sloped plain from the property line or an adjacent structure's foundation and pools built within the slope setback as established by CBC Section 1808.7.3, including pools with deepened footings;
- VI. Residential additions<sup>4</sup> – See Geotechnical Investigation Required Table below;
- VII. Special conditions properties shall include the following:
  - a. Adjacent to or within areas prone to landslide;
  - b. Sloped lots greater than 1 Unit Vertical:3 Units Horizontal;
  - c. Liquefaction zones; (Also see City Policy CBC 1803.5.11-12)

**GEOTECHNICAL INVESTIGATION REQUIRED TABLE<sup>1</sup>**

<b>Area Addition (Sq. Ft.)</b>	<b>Liquefaction Zone</b>	<b>Landslide Area</b>	<b>Properties without Special Conditions</b>
Basement	Yes	Yes <sup>6</sup>	Yes <sup>6</sup>
0 – 500	No	No	No
> 500 – 1,000	Yes <sup>5</sup>	Yes	No <sup>7</sup>
> 1,000	Yes <sup>5</sup>	Yes	Yes
Construction on or near a slope	Yes	Yes	Yes

Notes:

1. Minimum boring depth shall be 10 ft. below foundation unless within an area requiring special consideration. Projects requiring a geotechnical report on a flat lot shall provide a minimum 2 borings at a frequency of 1 boring/5,000 sq. ft. of site area.
2. Retaining walls and temporary shoring within a slope, liquefaction area or adjacent to a landslide area shall provide a geotechnical report.
3. Interior alterations only, do not require a geotechnical report.
4. Demolishing and reconstruction of existing foundation/slab area shall be counted in the total first floor footprint area in determining when a geotechnical report is required.
5. Shall use City Policy CBC 1803.5.11-12 for foundation design provided soil engineer reproduces the criteria within the geotechnical report.
6. Basements not greater than 200 sq. ft. which are non-habitable and used for storage are exempt.
7. Requires a soils inspection and memorandum to certify subgrade compaction and footing bearing pressure prior to requesting inspection.

Approved by: \_\_\_\_\_

*Seimone Jurjis*  
 Seimone Jurjis PE, Chief Building Official

## CONTENTS OF SOILS AND GEOLOGY REPORTS

(Prepared by a licensed Geo-technical Engineer or Civil Engineer with a Geologist)

**Site and Project Description** - Identify the address *and* legal description (Tract, Block, Lots, APN) for the site. Discuss the type, size, and scope of the project, including a brief description of the buildings/structures including number of floor levels and maximum anticipated design loads, existing site topography, and the extent of grading work proposed. Specify the proximity of the proposed development to any relevant ascending and descending slopes and indicate slope heights and Inclinations. Identify whether the site is located in a special studies zone designated by the State of California.

**Geologic/Geotechnical Map and Cross Section** - All reports shall contain a scaled geotechnical map with topographic data of the site and a north arrow, showing the location & extent of the project. Cross sections are usually required where a slope, basement, retaining wall, or temporary/permanent excavations are existing or proposed. The geotechnical map and cross sections shall clearly show the site boundaries, location and size of all existing and proposed buildings and structures, the location of all exploratory excavations, earth material contacts, and the extent of the proposed grading work. Cross sections shall also include: encountered groundwater, temporary excavations, existing and proposed grades, foundations, sub-drains, and slope setbacks. Topographic and cross section data shall extend beyond the site to demonstrate adjacent or offsite slopes and structures do not affect the stability of the site. A geologic map and cross sections shall be provided where bedrock formations are involved. The geologic map shall present all the features required on a geotechnical map and the distribution of geologic units, structural geology, faults, landslides, slumps, etc.

**Field Exploration** - Description of the method of exploration including sampling and testing of the soil and bedrock is required. Detailed logs of test pits and borings shall show the location of all samples and sampling resistance (blow counts, etc.). Ground water and seeps with possible fluctuation should be noted on the logs. If previous exploration data by others is relied upon in the investigation, the engineer shall provide a statement accepting professional responsibility for use of such data.

**Laboratory Testing** - If testing was done by others, provide a complete laboratory report signed and stamped by the engineer who supervised the laboratory testing, together with a responsibility statement by the project soils engineer who is using the laboratory data. Provide descriptions of all testing procedures and sample preparation. Graphical presentations are required for grain size analysis, maximum density, consolidation, and shear tests. The shear graphs shall include: the sample location, soil description, moisture content, dry density at the time of shearing, the shearing rate, type of test/sample preparation (undisturbed) or remolded), and if the results are peak, ultimate, or residual. The graphs shall show all of the test points, the shear strength envelope, the resulting cohesion, and the friction angle. The approximate degree of saturation during testing shall be provided on the graph or an accompanying table.

**Analysis** - Analysis is required for any recommendations less stringent than Code values and for the following:

1. **Static Slope Stability Analysis** - For slopes steeper than 2:1 or where adverse geologic conditions are encountered, the soils report shall provide slope stability analysis. When existing landslides are present nearby, back-calculation of shear strengths and evaluation of Atterberg Limits shall be provided to supplement laboratory shear testing. The analysis shall provide a complete search to demonstrate that the worst case condition has been determined. Temporary and permanent slopes require a minimum factor of safety of 1.25 and 1.5, respectively. Temporary excavations require a stability analysis for any of the following conditions: More than a 3-foot vertical; it is steeper than 1:1; it is surcharged by off-site structures; slot cuts; and/or adverse geologic conditions. All analysis must use saturated shear test data.
2. **Seismic Slope Stability Analysis** - Seismic slope stability analysis shall be performed for new construction at sites having landslides, and those sites within a State of California Seismically Induced Landslide Seismic Hazard Zone. Seismic stability analysis shall be in accordance California Geological Survey (CGS) Special Publication 117.
3. **Liquefaction Analysis** - Liquefaction analysis shall be performed for new construction at sites located within a State of California Liquefaction Seismic Hazard Zone. When such analysis is required, it shall be based on the maximum historic groundwater level in accordance CGS SP 117. Seismically induced settlement and lateral spreading shall be evaluated and reported.
4. **Lateral Earth Pressure Analysis** - Retaining structures up to 6 feet in height may be designed in accordance with Table No. 1610.1 of the building code, provided that the wall supports either certified compacted fill or undisturbed native earth material with no adverse geologic conditions. Retaining structures over 6-foot high, or surcharged by structures, or subject to adverse geologic conditions, require a soil investigation report containing a lateral earth pressure analysis. Design lateral pressures shall be greater than or equal to those from limit equilibrium analysis (free-body diagram and vectors) with minimum safety factors on mobilized shear strength of: 1.5 for static lateral earth pressures. Additionally, retaining and basement walls require a soil investigation report containing a determination of lateral pressures due to earthquake motions. Point of application of seismic load may be assumed at 0.3H or 0.6H above the base of the wall, where H = retained wall height. Sub-drains shall be provided to eliminate hydrostatic pressure, or walls shall be designed for hydrostatic pressure for their entire height: Walls founded in adverse geologic conditions, or on a descending slope will require a passive pressure analysis.
5. **Settlement Analysis** - Settlement analysis is required where the differential settlement of foundations will exceed 1/4 inch. Estimated differential settlement between an existing structure and a proposed addition should be reported also.

**Recommendations** - The recommendations should cover mitigation of the effects of liquefaction and adverse geologic conditions; exposure categories and classes per section 4.2 ACI, address the temporary and permanent cut, fill, and natural slopes; provide design parameters for shoring, foundations, retaining walls, pavement, setbacks from ascending and descending slopes; stipulate measures to handle expansive soil conditions; and specify any inspection requirements to be performed by the soil engineer. Recommendations concerning sub-drains, lateral deflection, and the order of construction/backfill shall be provided for retaining structures, as appropriate.