COMMUNITY DEVELOPMENT

SUBJECT: RESIDENTIAL BUILDING PERMITS – GEOTECHNICAL FILL REQUIREMENTS

FROM: RUSSELL GRAYSON, PE – DEVELOPMENT SERVICES DIRECTOR

DATE: SEPTEMBER 18, 2018

Purpose

The purpose of this memorandum is to provide clarification and guidance for geotechnical requirements specifically related to "fill lots" on residential building permit applications.

Background

The requirements for geotechnical investigations are regulated by two different Codes:

1. Bend Development Code Title 16

Under the permit requirements of Title 16, the Private Development Engineering Department (PDED) determines fill lots based on the Tier 3 (Infrastructure) permit or separate grading permits that are applied for by the developer. During the review of the plans, PDED verifies the finish grade contours against existing grades. If it is determined that there is more than 2+ ft. of fill within the potential foundation areas, the lots are flagged in the City system so that Building Safety can confirm at the time of Building Permits that a geotechnical report has accounted for proper compaction of the fill material. PDED does not request a geotechnical report and testing on these fill lots but it is strongly encouraged, as this is a requirement per the building code. PDED does require a geotechnical report and testing for excavation of fill within the public right-of-way or easements that include construction or alteration of public infrastructure (See the City of Bend Standards and Specifications Section 11). See below for the relevant BDC Title 16 code reference.

> ***16.10.020 Clearing, Grading and Erosion Control on Construction Sites***
>
> *A. Permit Requirements.*
>
> *1. The City shall issue a clearing, grading, and erosion control permit (permit) for nonexempt construction work.*
>
> *2. The permit is required for clearing and grading activities related to construction, demolition, and site development for improvements related to all land divisions, multifamily developments, and commercial, industrial, and institutional sites. Single-family and duplex site developments are exempt from the permit requirement (but not from the standards described in BC 16.10.010 and 16.10.070 through 16.10.100) unless one of the following activities is proposed:*
>
> *a. **Excavation or fill exceeding two feet other than foundation areas of single-family or duplexes**.*
>
> *b. Alteration to or creation of a slope exceeding 20 percent.*
>
> *c. An excavation or fill within two feet of the property line.*

d. Tree removal of trees more than eight inches dbh on properties greater than one acre.

e. Any clearing and grading activity located entirely or partially on sensitive areas or within a designated area of special interest or Waterway Overlay Zone as described in BDC Chapter 2.7.

f. Any other site determined by the City to have conditions necessitating additional control measures on a site-specific basis for the protection of health, safety, property, or water quality protection.

2. 2014 Oregon Residential Specialty Code Section 401 and 403

No specific guidance is provided under the Oregon Residential Specialty Code except that footings shall be designed and installed on undistributed soils or engineered fill. Because no technical specifications are provided, the Building Safety Division reverts to the Oregon Structural Specialty Code for additional guidance.

R401.2 Requirements. Foundation construction shall be capable of accommodating all loads according to Section R301 and of transmitting the resulting loads to the supporting soil. Where a construction joint is created between a concrete footing and stem wall, a means of connection shall be provided to accommodate lateral displacement. The connection shall be made by the use of a key-way or other method in accordance with accepted foundation design practices. Fill soils that support footings and foundations shall be designed, installed and tested in accordance with accepted engineering practice. Gravel fill used as footings for wood and precast concrete foundations shall comply with Section R403.

R401.4 Soil tests. Where data indicates expansive, compressible, shifting or other questionable soil characteristics are likely to be present, the *building official* shall determine whether to require a soil test to determine the soil's characteristics at a particular location. This test shall be done by an *approved agency* using an *approved* method.

R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other *approved* structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. Footings shall be supported on undisturbed natural soils or engineered fill. Concrete footing shall be designed and constructed in accordance with the provisions of Section R403 or in accordance with ACI 332.

3. State of Oregon Structural Specialty Code Section 1803

As indicated in the referenced sections below, the Code states that fill material more than 12 inches in depth requires a geotechnical investigation. This is not a new requirement and is intended to ensure that foundations are being built on acceptable compacted fill material.

1803.5.8 Compacted fill material. *Where shallow foundations will bear on compacted fill material more than 12 inches (305 mm) in depth, a geotechnical investigation shall be conducted and shall include all of the following:*
1. Specifications for the preparation of the site prior to placement of compacted fill material.
2. Specifications for material to be used as compacted fill.
3. Test methods to be used to determine the maximum dry density and optimum moisture content of the material to be used as compacted fill.
4. Maximum allowable thickness of each lift of compacted fill material.
5. Field test method for determining the in-place dry density of the compacted fill.
6. Minimum acceptable in-place dry density expressed as a percentage of the maximum dry density determined in accordance with Item 3.
7. Number and frequency of field tests required to determine compliance with Item 6.

1804.5 Compacted fill material. *Where shallow foundations will bear on compacted fill material, the compacted fill shall comply with the provisions of an approved geotechnical report, as set forth in Section 1803.*
Exception: *Compacted fill material 12 inches (305 mm) in depth or less need not comply with an approved report, provided the in-place dry density is not less than 90 percent of the maximum dry density at optimum moisture content determined in accordance with ASTM D 1557. The compaction shall be verified by special inspection in accordance with Section 1704.7.*

Recommended Guidance

1. New Subdivisions or Grading Permit Applications with fill of more than 12”

    - Contract with geotechnical engineer to perform a geotechnical investigation on the subject property to obtain the necessary sampling and testing to provide geotechnical recommendations for proposed grading on the property.
    - Submit the geotechnical investigation to the City for review with the subdivision design or grading permit application.
    - Perform the required observation and testing as recommended in the geotechnical investigation.
    - Obtain a Certification Letter from the geotechnical engineer for the entire project that indicated that the earthwork was constructed in conformance and tested per the geotechnical investigation recommendations.
    - The lots will be flagged in the City permitting system as fill lots.
    - That Certification Letter can then be submitted with each individual building permit to indicate to the Building Safety Division that the lots have engineered fill.

2. Existing Lot with untested fill material of more than 12” – Identified either at the time of building permit review or based on field observations by the building inspector
    - Contact a geotechnical engineer to perform the required field-testing and/or investigation necessary to provide information to the City indicating that fill material was placed in an acceptable manner for the proposed construction, or provide the necessary mitigation necessary to bring the soils into an acceptable specification.
    - Provide the geotechnical information (i.e. testing results, certification letter) to the City that fill material on the property has been appropriately placed and compacted for the proposed development.