

Study Session

3

2018 SBC 303 Chapter 3 Excavation, Grading and Fill

- OBJECTIVE:** To develop an understanding of the purpose, scope, and provisions of the SBC 303 regarding the procedures that should be followed in the case of cut and/or fills, the materials that could be used for backfilling, and the acceptance criteria for all earthwork operations. In addition, this chapter illustrates reporting and inspection requirements.
- REFERENCE:** Chapter 3, 2018 SBC 303 *Saudi Soils and Foundations Code*
- KEY POINTS:**
- What is the purpose and scope of the 2018 SBC 303 *Saudi Soils and Foundations Code*?
 - Which code is referred to for the inspection of compacted fill?
 - Which codes are referenced for the design and the construction of underpinning?
 - Under what circumstances can excavation near an existing foundation be permitted?
 - Which code is referenced for flood hazard?
 - How shall flood hazard be considered during the design and construction of fill and grading or both?
 - To what extent are the referenced codes and standards considered part of this code?
 - Who is responsible for enforcing the code and interpreting its provisions?
 - Who can decide on/request additional requirements outside the scope of this code?
 - What is the additional information that should be included in the investigation report with regard to excavation, grading, and fill?
 - Under what conditions would the building official require special or more tests?

Code Text: *Proper safety precautions shall be considered at all stages of excavation. Special care, measures, and techniques shall be followed for excavation below groundwater table.*

Discussion and Commentary: Health and safety measures have become a prime concern and a major request by different (if not all) codes and standards. Almost all construction sites comprise, at certain stages, one or more of excavations, grading, or fill works. Accordingly, a hazard imposed by such works on personnel and/or plants should be assessed before the commencement of the site works. Also, safety measures should be preplanned and applied as necessary.



As part of the geotechnical investigation report, all anticipated excavation works, location plan for the considered site and the neighboring buildings, and earthwork in general (i.e., excavation, grading, and backfilling) should be included in the investigation report with all associated recommendations, documents, and drawings prior to submission to the building official for approval.

Code Text: *Excavation, grading and fill shall not be commenced without first having obtained a permit from the building official.*

Discussion and Commentary: In order to obtain permission from the building official to commence excavation, grading, or fill activities on site, all the information stated in the SBC 303–3.1 should be submitted as part of the geotechnical investigation report.



The Figure Is For Illustration Purpose Only

Excavation, grading, and filling works at an isolated area that impose no risk or hazard to the adjacent structures or public utilities do not need any permit from the building official to start work on site. Also, all excavation works carried out under the direct instruction of a geotechnical engineer do not require a permit for commencement. In addition, excavation with less than 600 mm in depth or a cut slope not greater than 1500 mm in height with side slopes not steeper than 3H:2V does not require any permit. A fill less than 300 mm that does not intend to act as a supporting wedge to any structure does not need a permit for work commencement.

Code Text: *Excavations for any purposes shall not reduce lateral support from any adjacent foundation without first underpinning or protecting the foundation against detrimental lateral or vertical movement, or both.*

Discussion and Commentary: Any excavation, in general, results in stress relief and lateral movement in the ground. Accordingly, excavation near or adjacent to any existing structure or foundation will hinder its stability and/or safety due to movements caused by excavation as well as a reduction in confinement stress. Accordingly, the SBC 303–Section 3.3 requires investigating the effect of any excavation on adjacent or nearby foundations or structures and designing a proper supporting system or protection measures (i.e., underpinning, reference to be made to the SBC 201–Chapter 33) for the affected foundations or structures before the commencement of any site work.

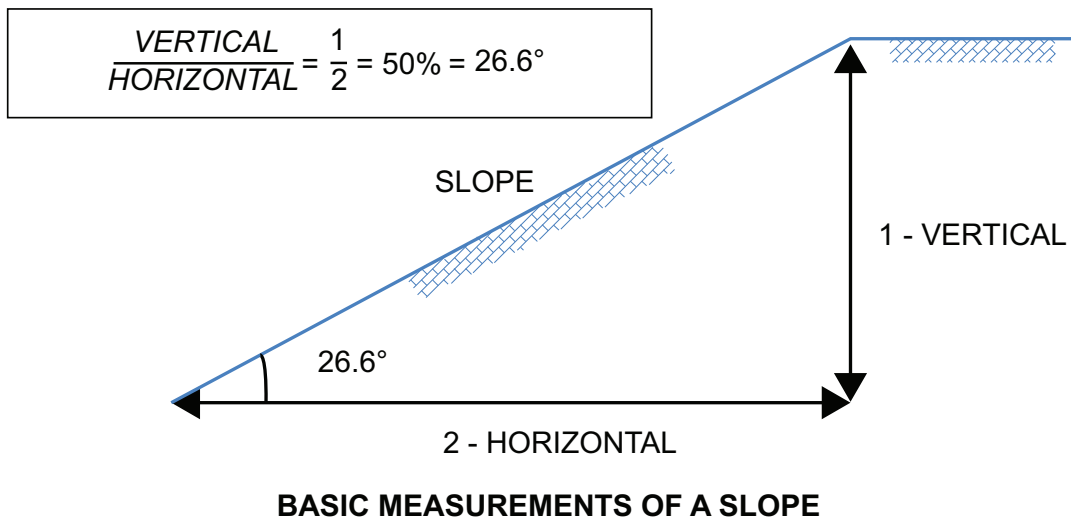
SECTION 3307 PROTECTION OF ADJOINING PROPERTY

3307.1 Protection required. Adjoining public and private property shall be protected from damage during construction, remodeling and demolition work. Protection shall be provided for footings, foundations, party walls, chimneys, skylights and roofs. Provisions shall be made to control water runoff and erosion during construction or demolition activities. The person making or causing an excavation to be made shall provide written notice to the owners of adjoining buildings advising them that the excavation is to be made and that the adjoining buildings should be protected. Said notification shall be delivered not less than 10 days prior to the scheduled starting date of the excavation.

The *Saudi Building Code—General* (SBC 201), Chapter 33 covers different situations regarding excavation, fill, and grading and provides procedural and precautionary measures associated with site activities. The aim is to ensure the safety of lives, properties, and utilities on site and surrounding areas.

Code Text: *Slopes for permanent fill shall not be steeper than one-unit vertical in two units horizontal (50-percent slope). Cut slopes for permanent excavations shall not be steeper than one-unit vertical in two units horizontal (50-percent slope). Deviation from the foregoing limitations for cut slopes shall be permitted only upon the presentation of a soil investigation report acceptable to the building official and shows that a steeper slope will be stable and not create a hazard to public or private property.*

Discussion and Commentary: Slope is the relationship between the vertical rise and the horizontal run (see figure below). Slopes are naturally unstable. The recommended safe side slope for cut or fill should not be steeper than 1V:2H. However, slope safety analysis should always be carried out, considering all surrounding parameters that could affect the slope stability, such as surcharge at the top of the slope, wet or dry conditions, or water infiltration through the slope.



Slopes, either natural or man made, are generally vulnerable to failure or collapse and represent a hazard to the surrounding areas (i.e., humans, utilities, structures, etc.). There are several factors that lead to slope instability (especially steep slopes) through a mass movement. Those factors include gravity, wind, water and/or disturbance, and erosion.

Code Text: *The ground immediately adjacent to the foundation shall be sloped away from the building at a slope of not less than one unit vertical in 20 units horizontal (5-percent slope) for a minimum distance of 3000 mm measured perpendicular to the face of the wall. If physical obstructions or lot lines prohibit 3000 mm of horizontal distance, a 5-percent slope shall be provided to an approved alternative method of diverting water away from the foundation. Swales used for this purpose shall be sloped a minimum of 2 percent where located within 3000 mm of the building foundation. Impervious surfaces within 3000 mm of the building foundation shall be sloped a minimum of 2 percent away from the building. Exception: Where climate or soil conditions warrant, the slope of the ground away from the building foundation shall be permitted to be reduced to not less than one unit vertical in 50 units horizontal (2 percent slope). The procedure used to establish the final ground level adjacent to the foundation shall account for additional settlement of the backfill.*

Discussion and Commentary: Grading the ground surface away from any building or foundation is considered a minimum requirement by several codes. It should always be targeted to achieve the minimum distance and slope away from the buildings, if possible. However, a larger distance and a lesser slope minimize the chances for water infiltration to the foundation. In addition, the effect of fill weight and compaction process (if significant) should be considered during foundation design and settlement assessment.

