15-11-02 **Grading and Excavating Requirements**

E. **Design Standards**. The following shall be considered to be the minimum required standards for cuts, fills, drainage, erosion control, revegetation and maintenance, unless otherwise determined by the City Engineer upon review of plans submitted by a licensed professional engineer.

1. Cuts.

   a. Maximum Slope.

      1. Cuts shall not be steeper in slope than 2 horizontal to one vertical, unless a soils engineering and an engineering geology report is filed with the Director certifying that the site has been investigated and indicating that the proposed steeper slope will be stable and will not endanger any private or public property, or result in the harmful deposition of debris on any public way or interfere with any existing drainage course.

      2. The Director and the City Engineer may require the excavation to be made with a cut face flatter in slope than 2 horizontal to one vertical if necessary for stability and safety. Cut slopes shall be rounded into the existing terrain to produce a contoured transition from cut face to natural ground.

   b. Drainage Terraces. Cut slopes exceeding 30 feet in vertical height shall have drainage terraces at vertical intervals not exceeding 25 feet except that where only one terrace is required, it shall be at approximately mid-height, unless some other location is approved by the Director and City Engineer. The design and construction of the drainage terraces shall conform to the requirements of this Chapter and the Uniform Building Code, as adopted.

   c. Expansive Soils. If during the grading operation, expansive soil is found within two feet of the finished lot grade of any area intended or designed as the location for a building, the expansive soil shall be removed from such building area to a depth specified by a licensed professional civil engineer and replaced with nonexpansive soil properly compacted. The City Engineer may approve other procedures such as footing designs or floor slab designs certified by a professional engineer to alleviate any problem created by such expansive soil.

   d. 100 Year Storm. No cut shall be allowed in a natural drainage course without a mitigation plan indicating the allowable passage of a 100 year storm that has been approved by the appropriate agency.

2. Fills.

   a. Fills shall be constructed in layers. The loose thickness of each layer of fill material before compaction shall not exceed 8 inches. Completed fills shall be stable masses of well integrated material bonded to adjacent materials and to the materials on which they rest. Fills shall be competent to support anticipated loads and be stable at the design slopes shown on the plans. Proper drainage and other appropriate measures shall be taken to ensure the continuing integrity of fills.

   b. Compaction. All fills shall be compacted throughout their full extent to a minimum of 90 percent of maximum density with an average of 95 percent. Any soil underlaying footings, foundations, or other structures shall have a minimum density of 95 percent. The Developer shall perform sufficient tests as determined by the City Engineer for reasonable assurance of compliance with the provisions of this Section.

Exception:

Compaction may not be less than 90 percent of maximum density, as determined by the above test, within 6 inches of the slope surface when such surface material is placed and compacted for the planting of the slopes by a method acceptable to the Director and/or the City Engineer.

The Director may require that an investigation be made by a soils laboratory to establish the characteristics of the soil, the amount of settlement to be expected, and the susceptibility of the soil to erosion or slippage.

c. Preparation of Ground to Receive Fill. The natural ground surface shall be prepared to receive fill by removing vegetation, noncomplying fill, top soil, or other incompetent material, and where slopes are five horizontal to one vertical, or steeper, by benching into competent material. The lowermost bench shall be at least 10 feet wide, except where recommended by the City Engineer. Subdrains shall be provided under all fills placed in natural drainage courses and in other locations where seepage is evident. Such subdrainage systems shall be of a material and design approved by the City Engineer and acceptable to the Director. The location of the subdrains shall be shown in plan and elevation views on the plan. Such drains shall be designed to accommodate runoff of a 100-year storm. No fill shall be allowed in a natural drainage course without a mitigation plan approved by the appropriate agency.

d. Fill Slopes. No fill shall be made which creates an exposed surface steeper in average slope than two horizontal to one vertical, exclusive of benches and exclusive of rounds described herein, unless permitted by the Director and City Engineer after receipt of a report by a licensed professional civil engineer, based on appropriate laboratory tests, certifying such steeper slope will be stable and will support erosion control plantings, when required by the City. The Director and City Engineer may require that the fill be constructed with an exposed surface flatter than two horizontal to one vertical, or may require such other measures as he deems necessary for stability and safety. Fill slopes shall be rounded into existing terrain to produce a contoured transition from fill face to natural ground and abutting cut or fill surfaces where conditions permit.

e. Fill Material. No organic material shall be permitted in fills. Rock or similar irreducible material with a maximum dimension greater than 12 inches shall not be buried or placed in fills within 2 feet of a finished grade. When such greater sized material is placed in fills it shall be done in accordance with specifications prepared by the City Engineer.

f. Drainage Terraces. Fill slopes exceeding 30 feet in vertical height shall have drainage terraces at vertical intervals not exceeding 25 feet, except that where only one terrace is required, it shall be at approximately mid-height unless some other location is approved by the Director and City Engineer. Such drainage terraces shall be at least 6 feet wide and shall be designed and constructed so as to provide a swale or ditch having a minimum depth of one foot and a longitudinal grade of not less than four percent nor more than 12 percent. There shall be no reduction in grade along the direction of flow unless the velocity of flow is such that slope debris will remain in suspension on the reduced grade. Downdrains or drainage outlets shall be provided at approximately 300 foot intervals along the drainage terrace or an equivalent location. Downdrains and drainage outlets shall be approved materials and of adequate capacity to convey the intercepted waters to the point of disposal. The terrace, including the swale or ditch, shall be protected from erosion by an especially designed

drainage way with a concrete or asphalt lining that discharges into a safe disposal area. If the drainage discharges onto natural ground, adequate erosion protection shall be provided.

g. Slopes to Receive Fill. Fill placed on the top of an existing or proposed cut or natural slope shall be set back a minimum distance of 3 feet measured horizontally from the edge of the cut or slope. Tests to determine the density of compacted fills shall be made by the developer on the basis of not less than one test for each two-foot vertical lift of the fill, but not less than one test for each 1,000 cubic yards of material placed. An additional density test at a point approximately one foot below the fill slope surface shall be made on the basis of not less than one test for each 1,000 square feet in slope surface, but not less than one test for each ten-foot vertical of slope height. Additional tests may be required throughout the fill as determined by the City Engineer or the Director. All tests shall be reasonably uniformly distributed within the fill or fill slope surface. Results of such testing and location of tests shall be certified by the developer in writing and submitted to the Director for review by the City Engineer.

h. Expansive Soils. In areas intended or designed to support buildings, expansive soil shall not be placed within 2 feet of the finished grade unless recommended by a licensed professional civil engineer based on laboratory tests and the certification that a design of footings or floor slab or other procedure will alleviate problems created by placing the expansive soil within such building areas, as reviewed and approved by the Director and City Engineer.

3. Setbacks. Cuts and fills shall be set back from property lines and from existing buildings as shown in the accompanying illustration (H=vertical height of the slope). The Director and City Engineer may increase these dimensions based on information showing that the dimensions do not provide adequate safety or comply with other City ordinance requirements.

4. Drainage.

a. Disposal Requirements. All drainage facilities shall be designed to carry surface and subsurface waters to the nearest practical street, storm drain and natural watercourse as approved by the Director and City Engineer. Adequate provisions shall be made to avoid damage to adjacent and downstream properties. The following additional restrictions also shall apply:

1. Water shall not pond above cut or fill slopes or on drainage terraces. Adequate drainage facilities shall be provided to prevent such ponding.

2. Areas designed for buildings shall be graded to provide for at least a two percent slope away from the building.

3. All drainage facilities shall be capable of handling runoff from a 10-year storm and in natural drainage areas the drainage facility shall be capable of handling runoff from a 100-year storm. The 100-year design flow channel will be designed to carry water in the roadways or large natural channels where property damage will be minimized.

4. All provisions of the Sandy City Storm Drainage and Flood Development Ordinance 83-18 shall be complied with.

5. Erosion Control.

a. Slope Protection. Provisions shall be made to minimize damage to the face of cuts and fills.

b. Dikes, Swales and Ditches. When required, dikes, swales and ditches or other methods approved by the Director and/or the City Engineer shall be designed and constructed to control runoff and erosion from graded areas. Where concentrated drainage discharges onto natural ground effective measures shall be taken to dissipate the energy and, where practical, release the accumulated waters as sheet flow unless the discharge is directed into a storm sewer or natural water course.