

## Article 19 GRADING

### **19.01 Activities Affected**

**19.01.01** This Article pertains to all land-disturbing activities conducted within the Town's jurisdiction. Land disturbing activities will not be approved unless part of a zoning permit application for the development of a principal, accessory or temporary use.

**19.01.02** Pursuant to the application requirements in Article 4, plans and information shall be submitted that demonstrate compliance with this Article and Appendix A in regards to grading activities.

- A.** Single family and two family projects of less than 21,780 square feet (0.5 acre) or commercial site improvements that involve no more than 2,500 square feet of land disturbing activity though required to apply for a zoning permit with a site plan are not required to submit plans that demonstrate compliance with grading activities.
- B.** The waiver of plan approval requirements due to the size of activity contemplated, does not relieve the property owner of responsibility for following the requirements contained herein, or in any way limit their liability for the consequences of their land-disturbing activity under North Carolina state law or the administrative procedures and penalties outlined in this Ordinance.

### **19.02 Grading Performance Standards**

**19.02.01** Any land disturbing activity that includes alteration of existing topographic slope grades shall conform to grading performance standards contained in this Section.

**19.02.02** The grading plan and specifications controlling execution of land-disturbing activities shall adhere to the following standards unless superseded by a site specific subsurface investigation, report and recommendation performed by a registered professional engineer competent in geotechnical engineering.

- A.** Existing grade may remain, if natural vegetation undisturbed and slope(s) are unaffected by the planned site improvements.
- B.** Maximum cut grade shall be 2H:1V.
- C.** Maximum fill grade shall be 2H:1V.
- D.** Grades shall be sloped to drain surface water away from buildings, pavements, slopes and structures, and toward storm drainage facilities.

**19.02.03** Conventional seeding with native grasses and mulching are acceptable permanent erosion control measures for slopes flatter than 2H:1V, provided the grasses can be established and properly nourished to maturation.

**19.02.04** Site specific permanent erosion control and stabilization of slopes steeper than 2H:1V must be designed by a licensed professional engineer or landscape architect competent in

such practice. Universally accepted armoring techniques and innovative approaches will be considered appropriate when properly detailed and specified.

**19.02.05** Notification of the Administrator shall be made prior to starting grading for any slope steeper than 3H:1V.

**19.02.06** Cut and fill slopes that are steeper than 3H:1V shall have intermediate benches to control surface water runoff. These benches shall be a minimum of five feet (5') wide and sloped back from the crest of the lower slope, to form a drainage swale at the toe of the upper slope. The drainage swale invert shall divert surface water to the appropriate storm drainage facilities. The maximum change in elevation between these benches shall be twenty feet (20'). Slope stability considerations may require wider benches for steeper or taller slopes. If a site specific evaluation is performed and recommendations submitted by a licensed professional engineer with a specialization in sub-surface evaluations; the provisions of this Subsection may be modified or waived.

**19.02.07** Exposed and fill covered slope cuts in rock foundations or slopes greater than five feet (5') and steeper than 1(H):1(V) should be properly investigated and designed by a North Carolina registered professional engineer or geologist competent in rock slope engineering. The grading plan should clearly indicate the depth, orientation, and method to accomplish a cut into rock formations.

**19.02.08** Retaining systems providing a cumulative vertical relief greater than five feet within a horizontal distance of fifty feet (50') or less, including retaining walls or mechanically stabilized earth walls, shall be designed and constructed under the responsible charge of a North Carolina registered professional engineer. Testing and inspection reports shall verify:

- A. Foundation support system is adequate for the intended site conditions;
- B. Quality of construction materials conform with specifications;
- C. Actual soil conditions are substantially and functionally similar to those anticipated in design, and;
- D. Backfill materials and any drainage systems comply with plans and specifications.

The North Carolina licensed engineer will submit a separate summary report stating that the constructed retaining structures are in compliance with the intent of the design.

**19.02.09** Utilize a maximum 3H:1V slope within any temporary or permanent buffer zone adjacent to any lake or natural water course, tying into existing grades along the perimeter or property line of the tract. Landscape buffer areas shall be limited to a maximum 3H:1V slope unless otherwise approved by the Administrator.

**19.02.10** Property boundary and field grading stakes sufficient to define the land-disturbing activity shall be established prior to starting, and maintained until earthwork construction is completed.

**19.03 Special Requirements for Land Disturbing Activities Involving Steep Slopes**

**19.03.01** The following categories of steep slope are hereby established:

- A. Very Steep Slopes: Slopes steeper than 50%.
- B. Steep Slopes: Slopes between 30% and 50%.

**19.03.02** The requirements for land disturbing activities on Very Steep Slopes shall be as follows:

- A. Plans for the development of any property must be accompanied by a site- specific geologic analysis of the very steep slope portion of the site to be disturbed by the proposed development plan, paid for by the applicant, and conducted by a North Carolina licensed geologist, to determine whether that plan can be developed on the site without jeopardizing slope stability on the site itself or on properties surrounding the site.
- B. If the property is determined to be safe for development and requires remedial measures to ensure slope stability, a North Carolina registered professional engineer competent in geotechnical engineering must develop and present a plan to the Administrator that will preserve slope stability on the site during and after the completion of grading and construction for the site, as well as for surrounding properties to the extent that the contemplated development activities on the site affect surrounding properties.
- C. No diversion or channelization of perennial streams on very steep slopes is permitted.
- D. Culverting of perennial streams on very steep slopes shall be discouraged, and will be allowed only for necessary road crossings.
- E. To prevent debris flow development and damage to slope stability, the riparian zone of perennial stream on very steep slopes must be left intact, which means that removal of trees, vegetation, soils, or disturbance of soils within this zone is prohibited. The riparian zone shall extend from the edge of the existing stream for thirty-five feet (35') from each edge of the stream.
- F. The applicant whose development plan will include the disturbance of a Very Steep Slope, as determined by the Administrator, may challenge this determination by appeal to the Town of Boone Board of Adjustment, in conformity with the procedures of Article 6.
- G. The applicant whose development plan requires land disturbing activity on Very Steep Slopes shall make reasonable efforts to preserve and protect features of the slope, such as trees and other plant material, which may help to stabilize the slope.

**19.03.03** Development of Steep Slopes or in areas where geological hazard indicators are present.

- A. Whenever new development is proposed which involves land disturbing activity on a steep slope, or if geological hazard indicators, are observed on the land which will be

disturbed by the development, the Administrator may require that the applicant obtain investigation(s) by a licensed geologist and/or licensed engineer, as appropriate, before allowing the development to proceed. If the Administrator requests such additional investigation(s), the Administrator shall designate in writing the geological hazard indicator observed. When the Administrator requires an additional study, this requirement shall be considered an appealable order from the Administrator, and it may be appealed to the Town of Boone Board of Adjustment, in conformity with the procedures of Article 6.

- B.** If the property is determined to be safe for development and requires no remedial measures, no further studies will be required.
- C.** If the property is determined to be safe for development but requires remedial measures to ensure slope stability, a North Carolina registered professional engineer competent in geotechnical engineering must develop and present a plan to the Administrator that will preserve slope stability on the site during and after the completion of grading and construction for the site, as well as for surrounding properties to the extent that the contemplated development activities on the site affect surrounding properties.
- D.** No diversion or channelization of perennial streams will be permitted on steep slopes unless without such diversion or channelization, a tract existing at the time of the adoption of this amendment is rendered unusable for any of the principal use(s) allowed within the zoning district.
- E.** Culverting of perennial streams on steep slopes shall be discouraged, and is allowed only for necessary road crossings.
- F.** To prevent debris flow development and damage to slope stability, the riparian zone of perennial streams must be left intact, which means that removal of trees, vegetation, soils, or disturbance of soils within this zone is prohibited. The riparian zone shall extend from the edge of the existing stream for thirty-five feet (35') from each edge of the stream.
- G.** The owner of any property determined by the Administrator to be a Steep Slope may challenge this determination by appeal to the Town of Boone Board of Adjustment, in conformity with the procedures of Article 6.

**19.03.04** The Town shall have the option to employ and/or contract with an independent geologist and/or engineer to evaluate plans for development as necessary, whether such development is on a very steep slope, on a steep slope, or when the Administrator believes that the development presents geological hazards or geological hazard indicators which have not been adequately investigated by the applicant.