

Article XVI Grading, Soil Erosion and Sediment Control

Section 273. Activities Affected

[a] This article pertains to all land-disturbing activities conducted within the town's jurisdiction. It is the property owner's responsibility to ensure that provisions of this article are adhered to; including activities contracted for, or performed by those under their employ. 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 anyway 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.

Section 274. Plan Approval Required

[a] Town review and approval of both a site specific "Grading Plan," and a site specific "Soil Erosion and Sediment Control Plan," is required when land-disturbing activity is proposed; with the exception of single family and two family projects of less than twenty one thousand, seven hundred eighty (21,780) square feet (0.5 acre) or commercial site improvements that involve no more than two thousand five hundred (2,500) square feet of land disturbing activity.

The following land-disturbing activities contemplated as part of the principal land-disturbing activity characterized above, should be included in the submission for grading and soil erosion plan approval, when not already covered by a valid existing plan approval:

- [1] Access and Haul Roads: Temporary access and haul roads, other than public roads, constructed or used in connection with any land-disturbing activity and are subject to the requirements of this ordinance which pertain to road building.

- [2] Borrow and Waste Areas: When the applicant conducting the land-disturbing activity is also the responsible party conducting the borrow or waste disposal activity, areas from which borrow is obtained and which are not regulated by the provisions of the Mining Act of 1971, and waste areas for surplus materials other than landfills regulated by the Department of Human Resources, Division of Health Services, shall be considered as part of the land-disturbing activity where the borrow material is being used or from which the waste material originated. When the applicant conducting the land-disturbing activity is not the responsible party for obtaining the borrow and/or disposing of the waste, these areas shall be considered a separate land-disturbing activity.

Approval of the “Grading Plan” and “Soil Erosion and Sediment Control Plan” shall be completed as part of the zoning approval process. “Grading Plans” will not be approved unless part of a development project submitted through the zoning approval process.

Section 275. Administrative Procedures for Plan Approval

[a] The “Grading Plan” and “Soil Erosion and Sediment Control Plan” along with all supporting calculations shall be submitted with the Zoning Permit application. The “Grading Plan” and “Soil Erosion Control Plan” with supporting calculations shall be designated collectively throughout this section as the Plan, or Plan(s).

- [1] The Plan(s) shall be prepared by, and shall bear the seal and signature of a licensed North Carolina professional engineer, landscape architect, surveyor, or architect competent to perform all aspects of the design.
- [2] The Soil Erosion and Sediment Control Plan approval application form shall be accompanied by an authorized statement of financial responsibility and ownership. This statement shall be signed by the person financially responsible for the land-disturbing activity or their attorney in fact. The statement shall include the financially responsible person’s principal place of business, addresses (mailing and street), plus each land owner’s or their registered agent’s address.
- a. The administrator may require the property owner or the financially responsible party to provide a security deposit to ensure compliance with the soil erosion and sediment control provisions (Article XVI, Part II) of the ordinance.

1. The applicant may, prior to commencing any land-disturbing activity, be required to file with the town an improvement security in the form of an escrow account, surety bond, irrevocable letter of credit, or other undertaking satisfactory to the Town Attorney, in an amount deemed sufficient by the administrator, to cover all costs of protection or other improvements required to establish protective cover on the site in conformity with this ordinance. Such security shall remain in force until the improvements are completed in accordance with the approved plan and said improvements are finally inspected and approved.
2. Upon completion of improvements required by this ordinance, written notice thereof shall be given by the applicant to the administrator and the department shall cause an inspection of the improvements to be made and, if approved, shall within thirty (30) days of the date of notice authorize in writing the release of the security given provided that the improvements have been made in accordance with the approved plan and this ordinance.

[b] Supporting documentation shall be considered an integral part of the Plan(s) submittal. The applicant shall include general supporting documentation such as; location map, and written specifications governing work performance and materials, for either plan submitted. Although specific Plan(s) content will vary to meet the needs of particular site requirements, following is some typical forms of specific supporting documentation:

- [1] Grading Plan: Site specific soils investigation (if performed), detail drawings and cross-section of earthwork, construction details for retaining structures, and whatever other narrative statements necessary to adequately describe the proposed development of the tract and the measures planned to comply with the requirements of this ordinance. More specialized documentation may include such items as; design calculations for temporary excavation support, calculations for temporary surface water diversion, dewatering methods with provisions for handling extracted water, importation of fill material (quantity and type), description of rock excavation techniques (blasting) with protection or monitoring of neighboring properties and structures, etc.

- [2] Soil Erosion and Sediment Control Plan: Computations and assumptions sufficient to support the design of sediment control structures, erosion control practices, and velocity control measures. Construction details and sequencing for sedimentation and erosion control measures. Selected types of ground cover with their conditions and procedures for installation. Architectural and engineering drawings, and maps to convey this information. Whatever other narrative statements necessary to adequately describe the proposed development of the tract and the measures planned to comply with the requirements of this ordinance.

[c] The administrator shall review the Plan(s) for completeness and for compliance with the requirements of this ordinance. Incomplete or nonconforming Plan(s) will be returned to the applicant prior to review with an explanation of issues requiring resolution before plan review can be initiated.

[d] Approval or denial of the proposed Plan(s) shall be in writing. In the case of denial, the reasons for denial shall be clearly stated. The applicant may appeal the decision of the administrator to the Board of Adjustment as provided in Article V of this ordinance. A condition of Plan(s) approval will be the right to physical inspection of the land-disturbing activity.

[e] Application for amendment of a Plan(s) in written and graphic form may be made at any time by repeating the filing process outlined above in Subsections [a] through [d]. Until such time as any amendment is approved by the administrator, it shall be unlawful to deviate from the approved Plan(s).

[f] In the enforcement of this ordinance staff may perform random independent inspections of the land-disturbing activity to ensure compliance with the approved Plan(s). Discovery of substandard and non-conforming work will invoke the procedures outlined in Section 277.

- [1] No person shall willfully resist, delay, or obstruct the Planning and Inspections Department, or its duly appointed agent, that is inspecting or attempting to inspect a land-disturbing activity.

Section 276. Compliance With Approved Plans

[a] The property owner is responsible for ensuring that the land-disturbing activity is completed in accordance with the approved plan and specifications. The administrator shall require that a North Carolina registered professional engineer certify that the land-disturbing activity was completed in compliance with the approved Plan(s).

Section 277. Stop Work Orders

[a] Stop work orders shall be in writing and directed to the person responsible for the violations, and shall state the specific work to be stopped, the specific reasons for stoppage, and the conditions under which the work may be resumed. Appeals of a stop work order shall be made as prescribed in Article V, Section 106. Pending the ruling on the appeal, no further work may take place.

[b] Stop work orders may be issued by the Planning and Inspections Department on the following merits:

- [1] Land-disturbing activity is being undertaken in a manner which is in violation of this ordinance. The work in violation may be stopped immediately. Other portions of work impacted by the violation may also be stopped.
- [2] Substantial departure from the approved plan and specifications.
- [3] Refusal or failure to comply with the requirements of any applicable state law, local law, local ordinance, or local regulation.
- [4] Plan approvals granted on the basis of false statements or misrepresentations made by the property owner or their representatives during application.
- [5] Plan approvals mistakenly granted in violation of an applicable state law, local law, local ordinance, or local regulation may also be grounds for stopping work.

Section 278. Definitions

[a] As used in this article, unless the context clearly indicates otherwise, the following definitions apply:

- [1] *Accelerated Erosion* Any increase over the rate of natural erosion as a result of land-disturbing activities.
- [2] *Act*: The North Carolina Sedimentation Pollution Control Act of 1973 and all rules and orders adopted pursuant to it.
- [3] *Active Construction*: Activities which contribute directly to the completion of facilities contemplated or shown on the construction plans.
- [4] *Adequate Erosion Control Measure, Structure or Device*: Control of the soil material within the land area under responsible control of the persons conducting the land-disturbing activity.

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- [5] *Borrow*: Fill material which is required for on site construction and is obtained from other locations.
- [6] *Buffer Zone*: The strip of land adjacent to a lake or natural watercourse, the width of which is measured from the edge of the water to the nearest edge of the disturbed area, with the twenty five percent (25%) of the strip nearer the land-disturbing activity containing natural or artificial means of confining visible siltation. Waters that have been classified as trout waters by the Environmental Management Commission shall have an undisturbed buffer zone twenty five (25) feet wide.
- [7] *Commission*: The North Carolina Sedimentation Control Commission.
- [8] *Department*: The North Carolina Department of Environment, Health and Natural Resources.
- [9] *District*: The Watauga Soil and Water Conservation District created pursuant to Chapter 139, North Carolina General Statutes.
- [10] *Energy Dissipater*: A structure or a shaped channel section with mechanical armoring placed at the outlet of pipes or conduits to receive and break down the energy from high velocity flow.
- [11] *Erosion*: The wearing away of land surface by the action of wind, water, gravity, or any combination thereof.
- [12] *Ground Cover*: Any natural vegetation growth or other material which renders the soil surface stable against accelerated erosion.
- [13] *Lake or Natural Watercourse*: Any stream, river, brook, swamp, sound, bay, creek, run, branch, canal, waterway, estuary, and any reservoir, lake or pond, natural or impounded, in which sediment may be moved or carried in suspension, and which could be damaged by accumulation of sediment.
- [14] *Land-Disturbing Activity*: Any use of the land by any person in residential, industrial, education, institutional, or commercial development, highway and road construction and maintenance that results in a change in the natural cover or topography and that may cause or contribute to sedimentation.
- [15] *Local Government*: The Town of Boone, North Carolina.
- [16] *Natural Erosion*: The wearing away of the earth's surface by water, wind, or other natural agents under natural environmental conditions undisturbed by man.

- [17] *Person:* Any individual, partnership, firm, association, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, interstate body, or other legal entity.
- [18] *Person Responsible for the Violation:* As used in this ordinance, and North Carolina G.S. 113A-64, means:
- a. The developer or other person who has or holds himself out as having financial or operational control over the land-disturbing activity; and/or
 - b. The landowner or person in possession or control of the land when he has directly or indirectly allowed the land-disturbing activity or has benefited from it or he has failed to comply with any provision of this ordinance, the Act, or any order adopted pursuant to this ordinance or the Act as imposes a duty upon him.
- [19] *Person Conducting Land Disturbing Activity:* Any person who may be held responsible for a violation unless expressly provided otherwise by the ordinance, the Act, or any order adopted pursuant to this ordinance or the Act.
- [20] *Phases of Land-Disturbing Activity:* Defined portions (area or implementation) of grading or soil erosion and sediment control measures that are required to be done in a specific sequence as part of the Plan(s).
- [21] *Plan(s):* The Grading Plan and/or Soil Erosion and Sedimentation Control Plan, and the supporting documentation for such plan.
- [22] *Sediment:* The solid particulate matter, both mineral and organic, that has been or is being transported by water, air, gravity, or ice from its site of origin.
- [23] *Sedimentation:* The process by which sediment resulting from accelerated erosion has been or is being transported off the site of the land-disturbing activity or into a lake or natural water course.
- [24] *Siltation:* The sediment resulting from accelerated erosion which is settleable or removable by properly designed, constructed, and maintained control measures; and which has been transported from its point of origin within the site of a land-disturbing activity; and which has been deposited, or is in suspension in water.
- [25] *Storm Drainage Facilities:* The system of inlets, conduits, channels, ditches and appurtenances which serve to collect and convey stormwater through and from a given drainage area.

- [26] *Storm Water Runoff:* The direct runoff of water resulting from precipitation in any form.
- [27] *Ten Year Storm:* The surface runoff resulting from a rainfall of an intensity expected to be equaled or exceeded, on the average, once in ten years, and of a duration which will produce the maximum peak rate of runoff, for the watershed of interest under average antecedent wetness conditions.
- [28] *Tract:* All contiguous land and bodies of water in one ownership, or contiguous land and bodies of water in diverse ownership being developed as a unit, although not necessarily all at one time.
- [29] *Types of Grading:* One of two types of grading, rough or fine.
- [30] *Uncovered:* The removal of ground cover from, on or above the soil surface.
- [31] *Undertaken:* The initiating of any activity, or phase of activity, which results or will result in a change in the ground cover or topography of a tract of land.
- [32] *Velocity:* The average velocity of flow through the cross section of the main channel at the peak flow of the storm of interest. The cross section of the main channel shall be that area defined by the geometry of the channel plus the area of flow below the flood height defined by vertical lines at the main channel banks. Overbank flows are not to be included for the purpose of computing velocity of flow.
- [33] *Waste:* The surplus materials resulting from on site construction and disposed of at other locations.
- [34] *Working Days:* The days exclusive of Saturday, Sunday, and legal holidays during which weather or soil conditions permit land disturbing activity to be undertaken.

Section 279. Reserved

Section 280. Reserved

Part I Grading

Section 281. Grading Plan

[a] The grading plan shall define the existing site topography and the proposed elevations for all site improvements in sufficient detail to accurately plan and control earthwork construction. The grading plan shall be prepared to meet the grading performance standards contained in Section 284, and presented at a scale not smaller than 1 inch = 50 feet.

[b] The grading plan shall be prepared by and shall bear the seal and signature of a North Carolina licensed professional engineer, landscape architect, or architect competent to perform all aspects of design. Plans submitted for grading approval, and major and minor subdivisions submitted for approval, shall include detailed plans, specifications and supporting calculations for the construction of stormwater management installation. The design of drainage facilities shall be in accordance with Article XVII, Part II drainage and storm water management design standards.

[c] The applicant shall follow the administrative process for plan approval provided in Section 275, requiring three (3) copies of the grading plan, and two (2) copies of the supporting documentation for such plan, to be submitted to the Planning and Inspections Department.

[d] Grading plans shall contain sufficient information as specified herein, but not limited to the topographic survey (Section 282) and grading plan format (Section 283), to allow the administrator to determine if the requirements and intent of this ordinance as applied to the proposed development have been met.

[e] The construction sequence describing major work activities shall be listed on the plan. Grading that will be conducted in phases should be clearly indicated on the grading plan. Multiple grading plans may be necessary to adequately portray tracts with complex phasing or discontinuous areas of land-disturbing activity.

Section 282. Topographic Survey

[a] The grading plan shall be based upon a topographic survey of the tract that includes detailed information of both natural and cultural physical features prior to development. In addition to showing physical features such as existing buildings, overhead and/or underground utilities, roadways, walks, water or drainage features, the plan should also indicate the location of existing vegetation, particularly significant trees being retained and protected (see Article XX, Section 370) and limits of vegetation if the tract is partially wooded.

[b] Survey information can be provided through submittal of a separate topographical survey, or included as part of the grading and utilities plans. This survey shall be produced by a registered land surveyor. Topographical maps prepared for the town or Watauga County are also acceptable providing that the maps reflect the current existing conditions of the tract and are certified as accurate by a registered land surveyor.

- [1] Contour lines shall be used to present the topography of the entire tract, including sufficient distance into adjoining properties to indicate continuity. The contour line interval should be selected to appropriately convey the topographic information for planning and controlling construction. Generally, a two (2) foot contour interval is sufficient. However, smaller intervals (0.5 - 1.0 ft.) may be used for flatter areas and larger intervals (5 - 10 ft.) for steeper terrain. Contour intervals may be no greater than ten (10) feet.

[c] It is important to acquire the following basic survey data for proper execution of the grading plan:

- [1] Boundary information (metes and bounds, legal description of the site if available), including all existing and proposed street right-of-ways.
- [2] Location of existing curbing, walks, grass, utility or planting strips, edge of pavement, roadway medians, if any, and their respective grades, widths, and alignments.
- [3] Location, size, and depths of all underground utilities when available, including; gas, electric, water, sanitary sewer, storm water drainage features, telephone, television cable, etc.
- [4] Location and approximate height above existing grade of overhead utility lines and poles for lighting, electric, telephone, cable television, etc.
- [5] Location and description of all recorded public or private utility easements, building setbacks, and drainage easements encumbering the tract.
- [6] Location of all natural features such as rock outcroppings, watersheds, streams, ponds, etc. on the lot or within one hundred (100) feet of the graded area. This information conveys the impact of the proposed development on the lot.
- [7] Location of any wells or septic fields within one hundred (100) feet of the graded area.

- [8] Location of existing structures such as buildings, retaining walls, fences, building foundations, underground storage tanks, etc. Reference of the setbacks of other buildings on adjacent properties and adjacent property lines.
- [9] Location of sufficient spot elevations on existing land surface to generate a topographic map of the entire tract.

Section 283. Grading Plan Format

[a] The grading plan should show the existing and proposed shape of earth and surfaced areas. The method of portrayal should be well thought out, systematized, and clearly presented graphically. The following information shall be included in all grading plans submitted to the town for approval:

- [1] Contour lines shall be used to present the existing and proposed topography of the entire tract, including sufficient distance into adjoining properties to indicate continuity. The contour line interval should be selected to appropriately convey the topographic information for planning and controlling construction. Generally, a two (2) foot contour interval is sufficient. However, smaller intervals (0.5 -1.0 ft.) may be used for flatter areas and larger intervals (5 - 10 ft.) for steeper terrain. Contour intervals may be no greater than ten (10) feet.
- [2] Grades at corners of buildings, step landings, and first floor elevations.
- [3] Finished grades at the edges of surfaced areas and at such interior points as necessary to show the shaping of the area. A combination of proposed contours and spot evaluations may be used to convey this information.
- [4] Proposed roadway elevations by indicating proposed contours and spot elevations where necessary. Profiles, cross sections, and spot elevations are to be used to establish grading of paved areas such as roadways.
- [5] Top-of-curb grades at all connecting walks, curb returns, and all catch basin locations.
- [6] Spot elevations along swale lines, by using arrows to show direction of flow. Slope gradients should also be shown.
- [7] Top elevation of all storm and sanitary sewer manholes and other appurtenances.
- [8] Lawn and earth grades can be shown by proposed contours and by spot elevations where necessary.

- [9] The proposed location of stockpiled topsoil for future use in landscaped areas. To avoid root compaction the stockpile should be located outside root zones of the significant vegetation to be preserved.
- [10] The storage locations of construction materials outside the root zones of significant vegetation to be preserved to avoid root compaction.
- [11] The location of existing significant vegetation such as specimen trees or the canopy limits of wooded areas intended for preservation.
- [12] The elevations of any flood plains located on, or directly affecting a tract (i.e. drainage, sediment and erosion control considerations and/or watershed protection).

Section 284. Grading Performance Standards

[a] Any land disturbing activity that includes alteration of existing topographic slope grades shall conform to grading performance standards contained in Subsections [b] through [j].

[b] 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.

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

[c] 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.

[d] 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.

[e] Notification of the administrator shall be made prior to starting grading for any slope steeper than 3H:1V.

[f] 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 (5) feet 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 (20) feet. 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 sub-section may be modified or waived.

[g] Exposed and fill covered slope cuts in rock foundations or slopes greater than 5 feet 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.

[h] Retaining systems providing a cumulative vertical relief greater than five feet within a horizontal distance of 50 feet 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:

1. Foundation support system is adequate for the intended site conditions;
2. Quality of construction materials conform with specifications;
3. Actual soil conditions are substantially and functionally similar to those anticipated in design, and;
4. 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.

[i] 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.

[j] 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.

Section 285. Special Requirements for Land Disturbing Activities Involving Steep Slopes

[a] The purpose and intent for creating special measures for land development activities in areas requiring land disturbance of steep and very steep slopes is to facilitate the identification of land areas subject to possible slope failure and to require investigation and remediation of such conditions, if necessary, when such land is proposed to be developed.

[b] The following categories of steep slope are hereby established:

Very Steep Slopes: Slopes steeper than 50%.

Steep Slopes: Slopes between 30% and 50%.

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

- [1] 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.
- [2] 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.
- [3] No diversion or channelization of perennial streams on very steep slopes is permitted.
- [4] Culverting of perennial streams on very steep slopes shall be discouraged, and will be allowed only for necessary road crossings.
- [5] 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 35 feet from each edge of the stream.

- [6] The owner of any property 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 UDO Section 106.
- [7] Developers of property where the 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.

[d] Development of **Steep Slopes** or in areas where geological hazard indicators are present.

- [1] Whenever new development is proposed which involves land disturbing activity on a steep slope, as defined above, or if geological hazard indicators, as defined in Section 15 of the UDO, 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 UDO Section 106.
- [2] If the property is determined to be safe for development and requires no remedial measures, no further studies will be required.
- [3] 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.
- [4] 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.

- [5] Culverting of perennial streams on steep slopes shall be discouraged, and is allowed only for necessary road crossings.
 - [6] 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 35 feet from each edge of the stream.
 - [7] 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 UDO Section 106.
- [e] 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.

Section 286. Reserved

Part II Soil Erosion and Sediment Control

Section 287. Authority and Purpose

[a] The Town of Boone soil erosion and sediment control requirements are adopted pursuant to authority granted in the North Carolina Sedimentation Pollution Control Act of 1973. The purpose of this portion of the ordinance is to:

- [1] Regulate certain land-disturbing activities to control accelerated erosion and sedimentation in order that water pollution from sedimentation may be prevented, that the accelerated erosion and sedimentation of lakes and natural watercourses and damage to public and private property by sedimentation be prevented, and
- [2] Establish procedures through which these purposes can be fulfilled.

[b] The following land-disturbing activities are exempted from the requirements of this section:

- [1] Those done for the purpose of fighting fires.
- [2] Those done in the stockpiling of raw or processed sand, stone, or gravel in material processing plants and storage yards (with a properly approved Soil Erosion and Sediment Control Plan for this activity).
- [3] Those undertaken on agricultural land for the production of plants and animals useful to man, including but not limited to: forage and sod crops, grain and feed crops, tobacco, cotton and peanuts; dairy animals and dairy products; poultry and poultry products; livestock, including beef cattle, sheep, swine, horses, ponies, mules or goats, including the breeding and grazing of all such animals; bees and apiary products, fur animals.
- [4] Those undertaken on forest land for the production and harvesting of timber and timber products when conducted in accordance with Forest Practices Guidelines (15NCAC 11.0101-.0209).
- [5] Activity undertaken by persons as defined in North Carolina G.S. 113A-52 (8) who are otherwise regulated by the provisions of the Mining Act of 1971, G.S. 74-46 through G.S. 74-68.

- [6] Land-disturbing activity over which the state by statute, has exclusive regulatory jurisdiction, which are those;
- a. Conducted by the state,
 - b. Conducted by the United States,
 - c. Conducted by persons having the power of eminent domain,
 - d. Conducted by a local government,
 - e. Licensed by the state or United States,
 - f. Funded in whole or in part by the state or United States.

Note that all road building activities require “Soil Erosion and Sediment Control Plan” approval, even those conducted by government authorities.

Section 288. Soil Erosion and Sediment Control Plan

[a] The soil erosion and sediment control plan shall define the existing site topography and the proposed site conditions in sufficient detail to accurately plan and implement the planned erosion, sedimentation, and velocity control measures. The soil erosion and sediment control plan shall be prepared to meet the basic objectives, design standards, and performance standards for erosion control (Sections 289 to 291) in this Ordinance. The soil erosion and sediment control plan shall be presented at a scale not smaller than 1 inch = 50 feet.

[b] The soil erosion and sediment control plan shall be prepared by and shall bear the seal and signature of a licensed professional engineer, landscape architect, surveyor, or architect competent to perform all aspects of design. Plans submitted for soil erosion and sediment control approval, and minor and major subdivisions submitted for approval, shall include detailed plans, specifications and supporting calculations for the construction of stormwater management installation. The design of drainage facilities shall be in accordance with Article XVII, Part II drainage and storm water management design standards.

[c] The applicant shall follow the administrative process for plan approval provided in Section 275, requiring three (3) copies of the soil erosion and sediment control plan, and two (2) copies of the supporting documentation for such plan, be submitted to the Planning and Inspections Department.

[d] The soil erosion and sediment control plan should follow a format similar to the grading plan format (Section 283) and provide sufficient information as specified herein, to allow staff to determine if the requirements and intent of this ordinance as applied to the proposed development have been met.

[e] Soil erosion and sediment control measures that will be active, dormant, or removed during various phases of the land-disturbing activity should be clearly indicated on the soil erosion and sediment control plan. Multiple erosion and sediment control plans may be necessary to adequately portray the tracts with complex phasing or discontinuous areas of land-disturbing activity.

Section 289. Basic Erosion Control Objectives

[a] Persons conducting land-disturbing activity shall take all reasonable measures to protect all public and private property from damage caused by such activity.

[b] On site areas which are subject to severe erosion, and off site areas which are especially vulnerable to damage from erosion and/or sedimentation, are to be identified and receive special attention.

[c] All land disturbing activity is to be planned and conducted to limit exposure to the shortest feasible time.

[d] All land disturbing activity is to be planned and conducted to minimize the size of the area to be exposed at any one time.

[e] Surface water runoff originating upgrade of exposed areas should be controlled to reduce erosion and sediment loss during the period of exposure.

Section 290. Soil Erosion Control Design Standards

[a] Any land disturbing activity that includes alteration of existing topographic slope grades or natural ground cover shall conform to the soil erosion and sediment control design standards in Subsections [b] through [d].

[b] Erosion and sedimentation control measures, structures, and devices shall be so planned, designed, and constructed as to provide protection from the calculated maximum peak rate of runoff from the ten (10) year storm. Runoff rates shall be calculated using the procedures in the USDA, Soil Conservation Service, *National Engineering Field Manual for Conservation Practice*, the *North Carolina Erosion and Sediment Control Planning and Design Manual*, or other acceptable calculation procedures.

[c] Erosion and sediment control measures must accomplish the following mandatory standards when land-disturbing activity is undertaken on a tract:

[1] Containment: Installation of sufficient sedimentation and erosion control devices and practices to retain the sediment generated by the land disturbing activity within the boundaries of the tract during construction and upon completion of development.

[2] Buffer Zone: No land-disturbing activity shall be permitted in proximity to a lake or natural watercourse unless an undisturbed

buffer zone is provided along the margin of the watercourse. The buffer must be a minimum of twenty five (25) feet wide or of sufficient width to confine visible siltation within the twenty-five percent (25%) of the buffer zone nearest the land-disturbing activity, whichever is greater. If the slope perpendicular to the stream measured from the top of the stream bank is 3H:1V or steeper a detailed erosion control plan and calculations sufficient to support the proposed buffer width must be submitted for town review. A temporary and minimal disturbance may be permitted if the applicant submits documentation that there is no reasonable alternative. The temporary and minimal disturbance shall be limited to a maximum of ten percent of the total length of the buffer zone within the tract to be distributed such that there is not more than 50 linear feet of disturbance in each 1000 linear feet of buffer zone.

- [3] Ground Cover: Groundcover (temporary or permanent depending on phase of grading) that is sufficient to restrain erosion must be placed on all disturbed areas within 21 calendar days of completion of any phase of grading. Specifications for groundcover must be listed on the erosion control plan and should be consistent with the NCDENR *Erosion and Sedimentation Control Planning and Design Manual*.

[d] Land-disturbing activity in connection with construction in, on, over, or under a lake or natural watercourse shall be planned and conducted in such a manner as to minimize the extent and duration of disturbance of the stream channel. The relocation of a stream, where relocation is an essential part of the proposed activity, shall be planned and executed so as to minimize changes in the stream flow characteristics, except when justification for significant alteration to flow characteristic is provided.

Section 291. Soil Erosion Control Performance Standards

[a] Any land disturbing activity that includes alteration of existing topographic slope grades or natural ground cover shall conform to the soil erosion and sediment control performance standards, in Subsection [b], for storm water exiting the tract. Stream banks and channels downstream from any land-disturbing activity shall be protected from increased degradation by accelerated erosion caused by increased velocity of runoff from the land-disturbing activity.

[b] The land-disturbing activity shall be planned and conducted such that the velocity of storm water runoff in the receiving watercourse at the point of discharge resulting from a ten (10) year storm while undertaken, and after development, shall not exceed the lesser of:

- [1] The maximum permissible velocity for earth lined (unprotected soils) channels as determined from the table below, or
- [2] The velocity in the receiving watercourse determined for the ten (10) year storm prior to development.

Should conditions (1) or (2) of this subsection not be met, the channel below the discharge point shall be designed and improvements constructed to withstand the expected velocity.

[c] This performance standard can be waived if it can be clearly demonstrated that storm water discharge velocities will not create an erosion problem in the receiving watercourse.

Soil Types	Maximum Permissible Velocity for Earth - Lined Channels	
	Feet per second	Meters per second
Fine Sand (noncolloidal)	2.5	0.8
Sandy loam (noncolloidal)	2.5	0.8
Silt loam (noncolloidal)	3.0	0.9
Ordinary firm loam	3.5	1.1
Fine gravel	5.0	1.5
Stiff clay (very colloidal)	5.0	1.5
Graded, loam to cobbles (noncolloidal)	5.0	1.5
Graded, silt to cobbles (colloidal)	5.5	1.7
Alluvial silts (noncolloidal)	3.5	1.1
Alluvial silts (colloidal)	5.0	1.5
Coarse gravel (noncolloidal)	6.0	1.8
Cobbles and shingles	5.5	1.7
Shales and hard pans	6.0	1.8

SOURCE: Adapted from recommendations by Special Committee on Irrigation Research, American Society of Civil Engineers, 1926, for channels with straight alignment. For sinuous channels multiply allowable velocity by 0.95 for slightly sinuous, 0.9 for moderately sinuous channels, and 0.8 for highly sinuous channels.

Section 292. Acceptable Erosion Control Management Measures

[a] Measures applied alone or in combination to satisfy the intent of this section are acceptable if there are no objectionable secondary consequences. The town recognizes that the management of storm water runoff to minimize or control downstream channel and bank erosion is a developing technology. Innovative techniques and ideas will be considered and may be used when shown to have the potential to produce successful results by meeting the performance standards outlined above. Some alternatives are to:

- [1] Compensate for increased surface water runoff volume and velocity by including measures to promote infiltration of excess runoff from areas rendered impervious.
- [2] Reduce storm water discharge velocities by using vegetated or roughened swales and waterways in lieu of closed drains and high velocity paved sections.
- [3] Provide energy dissipaters at outlets of storm drainage facilities to reduce flow velocities at the point of discharge. These may range from simple rip rapped sections to complex structures.
- [4] Protect watercourses subject to accelerated erosion by improving cross sections and/or providing erosion resistant lining.

[b] Most of the established “best” management practices for soil erosion and sediment control are detailed in the *North Carolina Erosion and Sediment Control Planning and Design Manual*.

Section 293 Monitoring and Maintenance of Erosion Control Measures

[a] During the development of a tract, the person conducting the land-disturbing activity shall install and maintain all temporary and permanent erosion and sedimentation control measures as required by the approved plan or any provision of this ordinance, the Act, or any order adopted pursuant to this ordinance or the Act.

[b] During the development of a tract, the person conducting the land disturbing activity shall inspect all erosion and sediment control facilities and all stormwater management facilities including the discharge facility at least once every seven calendar days and within 24 hours after any storm event of greater than 0.5 inches of rain within a 24 hour period. These inspections shall determine the erosion control devices and stormwater facilities have not been damaged and are operating as designed. During this inspection the discharge from the site shall also be observed and a qualitative assessment of the discharge shall be made to determine clarity, presence of floating or suspended solids, presence of an oil sheen or other obvious indicators of stormwater pollution. If any evidence of deterioration of the system is present or there is evidence of any visible sedimentation outside the disturbed limits it shall be recorded and corrective measures taken. The applicant shall maintain a record of inspections, findings and any corrective action. This record shall be available on site for the Administrator.

[c] Whenever the town determines that significant sedimentation is occurring as a result of land-disturbing activity, despite application and maintenance of protective practices, the person conducting the land-disturbing activity will be required to and shall take additional protective action to mitigate or eliminate the sedimentation.

[d] After site development, the land owner or person in possession or control of the land shall install and/or maintain all necessary permanent erosion and sediment control measures, except those measures installed within a road, street right-of-way, or easement and accepted for maintenance by a governmental agency.

Section 294. Penalties

[a] The procedure of notification and magnitude of penalty for any person in violation of Part II, Soil Erosion and Sediment Control of Article XVI Grading, Soil Erosion and Sediment Control, are provided in Article VII, Enforcement and Review, Section 132 of this ordinance.

[b] Any person who knowingly or willfully violates any provision of Part II, Soil Erosion and Sediment Control of Article XVI Grading, Soil Erosion and Sediment Control of this ordinance, or rule or order adopted or issued pursuant to this ordinance or who knowingly or willfully initiates or continues a land-disturbing activity for which an erosion control plan is required except in accordance with the terms, conditions, and provisions of an approved plan, shall be guilty of a Class 2 misdemeanor which may include a fine not to exceed five thousand dollars (\$5000.00).

Section 295. Reserved

Section 296. Existing Uncovered Areas

[a] All uncovered areas existing on the effective date of this ordinance which:

- [1] Resulted from land-disturbing activity,
- [2] Exceed one half contiguous acre,
- [3] Are subject to continued accelerated erosion, and
- [4] Are causing off site damage from sedimentation;

shall be provided with a ground cover or other protective measures, structures, or devices sufficient to restrain accelerated erosion and control off site sedimentation.

[b] The town will serve upon the landowner a written notice of violation by registered or certified mail, return receipt requested, or other means. The notice will set forth the measures requiring compliance, and will state the time within which such measures must be completed. In determining the measures required and the time allowed for compliance, the authority serving notice shall take into consideration the economic feasibility, technology, and quantity of work required, and shall set reasonable and attainable time limits of compliance.

[c] The town reserves the right to require preparation and approval of an erosion control plan in any instance where extensive control measures are required.

[d] These regulations shall not require ground cover on cleared land forming the future basin of a planned reservoir.

Section 297. Reserved

Section 298. Reserved