



CHAPTER 2 EARTHWORK, EROSION CONTROL AND SEEDING

2.1. INTRODUCTION

This chapter contains minimum criteria to be met on all earthwork, erosion control and seeding constructed in the City, both by private land developers and by the City.

2.2. EARTHWORK AND GRADING

All earthwork operations shall be executed in a manner which will minimize dust, noise, excessive accumulation of debris, danger to the public and interference with other construction. Positive drainage and adequate erosion control shall be provided at all times during the earthwork operations.

Earthwork operations shall be executed to provide compaction to a minimum 85-percent Standard Proctor density at + 3 percent of optimum moisture in areas to be eventually turfed or planted. Compaction to minimum 95 percent Standard Proctor density at + 2 percent of optimum moisture under all walks, trails, streets, structures and other site improvements. Testing, if required by the City to demonstrate compliance with this specification, shall be performed per AASHTO T-180 by a Professional Engineer registered in the State of Colorado and practicing in the field of soils mechanics. All costs for such testing shall be paid by the developer/contractor. Refer to the applicable section in these STANDARDS AND SPECIFICATIONS for compaction requirements within the public right-of-way.

Upon completion of earthwork operations, the developer/contractor shall leave the site and soil clean to allow for proper installation of irrigation, plantings and related site improvements. Completed grades shall be smoothly and uniformly sloped, properly compacted and shall provide drainage away from site improvements. All banks or slopes constructed shall be maintained in a stable condition by approved methods to prevent slips, washouts or erosion. No area to be seeded or sodded shall be steeper than a 4:1 maximum slope (4 horizontal: 1 vertical), nor flatter than a 2-percent minimum slope. Final grades shall conform to the final drainage study and grading plans.

2.2.1 EROSION CONTROL

The primary goal of all erosion control systems is to prevent unacceptable erosion and maintain water quality at acceptable levels. This shall be accomplished by analyzing pertinent environmental factors and applying technical procedures which result in a workable plan.

There are two major elements in developing an erosion and sedimentation control plan. The first is an investigation and analysis of the natural characteristics of a site (such as soil type, steepness of slopes and available vegetation) that will help the developer/contractor anticipate where erosion problems might occur. Detailed information on soils, vegetation, topography, geologic and hydrologic conditions shall be obtained for the site. The second element is use of effective control measures. Attention shall be given to identify and evaluate problems that may cause serious erosion during and after construction. Runoff from the site, as well as runoff from the watershed above, shall be controlled and discharged safely. Measures shall be taken to prevent erosion and sediment deposition on downstream properties.

2.2.1.1. Limitations

No person shall clear or grade land without implementing soil erosion and sediment controls in accordance with the requirements of these STANDARDS AND



SPECIFICATIONS, Urban Drainage and Flood Control District publication known as the Urban Storm Drainage Criteria Manual, Volumes 1 through 3, and Municipal Code.

2.2.1.2. Permit Required

No person shall clear or grade land without first obtaining a Grading Permit from the Department of Public Works in accordance with the requirements of Municipal Code.

2.2.2 EROSION AND SEDIMENT CONTROL PLANS

2.2.2.1. Review and Approval

- a. A person may not clear or grade land without first preparing an erosion and sediment control plan which has been approved by the City prior to the issuance of any required Grading Permit.
- b. The applicant shall submit an erosion and sediment control plan and any supporting computations to the City for review and approval. The erosion and sediment control plan shall contain sufficient information, drawings and notes to describe how soil erosion and off-site sedimentation will be minimized. The City shall review the plan to determine compliance with these STANDARDS AND SPECIFICATIONS, Urban Storm Drainage Criteria Manual, Volumes 1 through 3 and the Municipal Code prior to approval. The plan shall serve as a basis for all subsequent grading and stabilization.
- c. The City may impose such conditions thereto as may be deemed necessary to ensure compliance with the provisions of these STANDARDS AND SPECIFICATIONS, Urban Storm Drainage Criteria Manual, Volumes 1 through 3 and the Municipal Code for the preservation of public health and safety.
- d. The erosion and sediment control plan shall not be considered approved without the inclusion of the signature and date of signature of the Director of Public Works or their designee.
- e. Approved plans may remain valid for one year from the date of approval unless renewed by the City.
- f. Approved plans will become an exhibit to the City's Grading Permit.

2.2.2.2. Modifications to Approved Erosion and Sediment Control Plans

When inspection of the site indicates the approved erosion and sediment control plan needs modification, the modification shall be made in compliance with the erosion and sediment control criteria contained in these STANDARDS AND SPECIFICATIONS, the Urban Storm Drainage Criteria Manual, Volumes 1 through 3 and Municipal Code.



- a. The permittee shall submit requests for major modifications to approved erosion and sediment control plans, such as the addition or deletion of a sediment basin, to the City to be processed appropriately. This processing includes modifications due to plan inadequacies at controlling erosion and sediment as revealed through inspection.
- b. The City may approve minor modifications to approved erosion and sediment control plans in the field if conditions so merit.

2.2.3 GRADING AND EROSION CONTROL NOTES

The following minimum grading and erosion control notes shall be stated on, as well as incorporated into the grading and erosion control plan:

2.2.3.1. Erosion Control Notes

All temporary erosion control facilities and all permanent facilities intended to control erosion of any earth disturbance operation shall be installed before any earth disturbance operations take place.

Any earth disturbance shall be conducted in such manner so as to effectively reduce accelerated soil erosion and resulting sedimentation and should not exceed the erosion expected to occur for the site in its totally undeveloped state.

All persons engaged in earth disturbances shall design, implement and maintain acceptable soil erosion and sedimentation control measures, in conformance with the erosion control technical standards adopted by the City.

All earth disturbances shall be designed, constructed and completed in such a manner so that the exposed area of any disturbed land shall be limited to the shortest possible period of time.

Sediment caused by accelerated soil erosion shall be removed from runoff water before it leaves the site of the earth disturbance.

Any temporary or permanent facility designed and constructed for the conveyance of water around, through or from the earth disturbance area shall be designed to limit the water flow to a non-erosive velocity.

Temporary soil erosion control facilities shall be removed and earth disturbance areas graded and stabilized with permanent soil erosion control measures pursuant to standards and specifications prescribed in accordance with the provisions of the "Erosion and Sediment Control for Construction Activities" and in accordance with the permanent erosion control features shown on the soil stabilization plan approved by the City.

Permanent soil erosion control measures for all slopes, channels, ditches or any disturbed land area shall be completed within fourteen (14) calendar days after final grading or the earth disturbance has been completed. When it is not possible to permanently stabilize a disturbed area after an earth disturbance has been completed or where significant earth disturbance activity ceases, temporary soil erosion control measures shall be implemented



within fourteen (14) calendar days. All temporary soil erosion control measures shall be maintained until permanent soil erosion measures are implemented.

2.2.3.2. Grading Permits and Construction Observation

Before construction begins, the applicant shall apply for a Grading Permit to the City of Northglenn. A permit shall be issued if a grading plan and an erosion control plan have been previously submitted and approved.

The Public Works Director or designee shall monitor all overlot grading and other earth disturbance activities for compliance with the Grading Permit. If the construction activities are not in compliance with the intent of the Erosion Control Plan, the Responsible Party shall be issued a stop-work order. Work will not be allowed to continue until the site is brought into compliance with the intent of the Erosion Control Plan.

2.2.3.3. Modification of Approved Plans

All proposed modifications of the approved grading plan must be submitted along with all supporting materials to the Director of Public Works. No work in connection with the proposed modifications shall be permitted without prior approval of the Director of Public Works, approval for which may be issued if the applicant can demonstrate that the modifications will provide soil erosion controls equivalent to or better than the originally approved soil disturbance plans.

2.2.3.4. Maintenance Requirements

Persons carrying out soil erosion and sediment control measures under this section, and all subsequent owners of property concerning which such measures have been taken, shall maintain all permanent erosion control measures, retaining wall, structures, plantings and other protective devices. Should the applicant or any subsequent property owners fail to adequately maintain the permanent erosion control facilities, retaining walls, structures, plantings and other protective devices; the City reserves the authority, after properly notifying the owner of needed maintenance and the owner failing to respond to the City's demand for such maintenance, to enter affected property, provide needed maintenance and to charge the owner for the work performed by the City or its contractors.

2.2.3.5. Standard Erosion Control Details

Erosion control measures shall comply with the details included in the Appendix of these STANDARDS AND SPECIFICATIONS, however these may be revised or updated as necessary in compliance with the latest requirements of Urban Drainage and Flood Control District as applicable.

2.3. LANDSCAPING

For the purpose of this chapter, the term "landscaping" refers to ground cover only. "Formal" landscaping requirements are specified in the Municipal Code. Final drawings, specifications and details shall be submitted to the City for review and approval prior to construction.



2.3.1 SOIL PREPARATION

2.3.1.1. Materials

Soil preparation shall be provided on all areas to be seeded, sodded or otherwise planted. Organic matter for soil amendment shall be well aged dairy cattle manure, thoroughly composted organic material and other organic matter as approved by the City and shall contain a minimum of 60-percent organic matter. The mixture shall be free from clay subsoil, stones, lumps, plants or their roots, sticks, weed stolons and seeds, high salt content and other materials harmful to plant life. The materials shall be coarsely ground and thoroughly mixed together to ensure an even composition. The mix shall have an acidity no greater than pH 7.5 and shall meet the following mechanical analysis:

Table 2.1 - Classification Table for Amended Soil

Sieve Size	% Passing	% Retained
1-1/2 Inch Screen	100	0
1-Inch Screen	90-100	0-10
1/2 Inch Screen	50-80	20-50
#100 Mesh Sieve	0-15	85-100

Note: If testing is required, it shall be done by a Professional Engineer registered in the State of Colorado and practicing in the field of soil mechanics. Testing shall be at the developer's/contractor's expense.

2.3.1.2. Placement

Upon establishment of approved grades, the soil surface shall be loosened by rototilling to a minimum of 8 inches, and all materials over two inches (2") in diameter shall be removed. The organic matter shall be evenly spread over the entire surface at the rate of five (5) cubic yards per 1,000 square feet and shall be mixed thoroughly into the soil surface to a depth of eight inches (8") by means of a rototiller, soil mixer or similar equipment. The surface shall then be finish-graded and compacted to the approved elevations. Prior to seeding or sodding, D1-ammonium phosphate (18-46-0) shall be spread evenly over the entire surface at the rate of 15 pounds per 1,000 square feet.

2.3.2 TOPSOILING

Topsoiling is not considered a portion of the ordinary soil preparation operations as described in these STANDARDS AND SPECIFICATIONS. However, the use of good topsoil is desirable, and may help in reducing water consumption and encouraging plant growth. When topsoil exists on the project site, the developer/contractor shall strip and stockpile the topsoil and redistribute the topsoil over the open space areas after the overlot grading is complete. The City has the prerogative of deleting all or a portion of the soil preparation requirements when topsoil is provided, depending on topsoil quality and quantity.



2.3.2.1. Material

Topsoil shall be fertile sandy loam topsoil, taken from a well-drained site and free from clay subsoil, stones, lumps, plants or their roots, sticks, weed stolons and seeds, high salt content and other materials harmful to plant life. The topsoil shall have an acidity in the range of pH 5.5 to pH 8.5 and shall be screened and meet the following mechanical analysis:

Table 2.2 - Classification Table for Topsoil

Sieve Size	% Passing	% Retained
1-Inch Screen	100	0
1/2 Inch Screen	97-100	0-3
#100 Mesh Sieve	60-40	40-60

Note: If soil testing is required, it shall be by a Professional Engineer registered in the State of Colorado and practicing in the field of soil mechanics and in accordance with "Methods of Soils Analysis -- Agronomy No. 9" as published by the American Society of Agronomy. Testing shall be at the developer's/contractor's expense.

2.3.2.2. Placement

Upon establishment of the approved grade, the subsoil surface shall be loosened to a minimum depth of eight inches (8") by tilling and all objects over two inches (2") in diameter shall be removed. The topsoil shall be spread over the area to a minimum of six inches (6") compacted depth and mixed lightly into the subsoil by means of a rototiller, soil mixer or similar equipment. The surface layer shall then be finish graded and compacted to the approved elevations.

2.3.3 FERTILIZATION

A booster fertilizer with the chemical analysis of Nitrogen-12, Potash-12, Phosphorous-4 with 4 percent iron and 8 percent sulphur shall be applied on the prepared soil at the rate of 5 pounds per 1,000 square feet immediately prior to seeding. If a soil analysis indicates sufficient amounts of the above elements the City may, at its discretion, waive the requirement to fertilize.

2.3.4 MULCHING

Mulch may be needed to conserve moisture, prevent crusting, reduce runoff and erosion and help establish a plant cover. The need for mulch will be at the sole discretion of the City. Mulching material shall be applied immediately before or immediately after seeding. One of the mulching methods listed below will be acceptable:

- A. Application of hydro-mulch (wood fibers in a water slurry) -- minimum rate of 2,000 lbs/acre. Tackifier, fertilizer, etc. will be included in the hydro-mulch.
- B. Grain straw shall be used at an application rate of 4,000 lbs/acre of air dried material. At least 50-percent of the mulch by weight shall be 10 inches or



more in length. Mulch shall be anchored immediately after distributing with a mulch crimper, and tackifier.

- C. Mulch netting shall be firmly held in place with pins spaced not more than ten (10') linear feet apart. In sandy or extremely loose soil, the pins shall be located not more than five (5') linear feet apart.
- D. Jute netting, enkamat, and similar approved materials shall be installed according to the manufacturer's recommendations.
- E. Excelsior mat shall be installed according to the manufacturer's recommendations.

2.3.5 SEEDING - GENERAL

Seeding of grasses or ground cover plants is required for either of two purposes:

- A. Temporary erosion control.
- B. Permanent seeding for erosion control and appearance

Temporary seeding for erosion control shall be in accordance with Sections 2.2.3. and 2.3.6 of these STANDARDS AND SPECIFICATIONS.

2.3.6 DRY LAND SEEDING

Prior to any seeding, a depth of tillage sufficient to establish a seed bed will be done based on specific site conditions. Project scheduling should take advantage of spring or fall planting seasons for natural germination, but seeded areas shall be irrigated, if conditions so merit.

2.3.6.1. Germination Standard

The minimum standard for any dryland grass is five (5) seedlings of the seeded species per square foot. This count/inspection shall be taken four (4) weeks after germination by a qualified botanist. Any area not meeting the specifications on germination will be touch up seeded in one of the following methods:

- a. Hand Broadcast and Incorporation
- b. Mechanical Broadcast and Incorporation
- c. Interseeding with Seed Drilling Equipment

Dry land seeding, sometimes referred to as "native" seeding, shall be accomplished with mechanical power-drawn drills which have depth bands set to maintain a planting depth of at least 1/4-inch and shall be set to space the rows not more than seven inches (7") apart. Seed that is extremely small shall be sowed from a separate hopper adjusted to the proper rate of application. When requested by the developer/contractor and approved by the City, seeding may be accomplished by means of approved broadcast or hydraulic-type seeders. Seed shall not be drilled or sown during windy weather or when the ground is frozen or otherwise untillable.



All seed sown by broadcast-type seeders shall be “raked in” or otherwise covered with soil to a depth of at least 1/4-inch. Hand method of broadcasting seed will be permitted only on small areas not accessible to machine methods. Water shall be applied as necessary to establish the cover crop. If inspections indicate that strips wider than the specified space between the rows planted have been left or other areas skipped, the City may require immediate resowing of seed in such areas at the developer’s expense. A Dry land seed mix shall be proposed by the developer/contractor and approved by the City.