



# DENVER

## THE MILE HIGH CITY

CITY AND COUNTY OF DENVER  
DEPARTMENT OF PUBLIC WORKS | ENGINEERING DIVISION

## Storm Drainage and Sanitary Sewer Construction Detail and Technical Specifications

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### 22.0 Seeding

#### 22.1.1 General

This work shall consist of furnishing and drilling in seed or hydromulch seeding in accordance with these Detail and Technical Specifications and as shown on the Plans. The work shall also include soil preparation, furnishing and spreading fertilizer and installation of mulch and erosion control blanket.

All areas shall be seeded by drilling. In areas where access is a problem, seeding shall be conducted by hydromulch seeding as directed by the Project Construction Engineer. Mulch shall be required in all areas that are drilled.

Seeding and the installation of erosion control in certain areas designated by the Project Construction Engineer may be permitted before the construction of certain areas to take advantage of growing conditions.

Seeding shall not be accomplished when the ground is frozen or otherwise untillable.

Seeded areas damaged due to circumstances beyond the Contractor's control shall be repaired and reseeded as ordered. Payment for this corrective work shall be at the contract price.

#### 22.1.2 Grading

All areas requiring seeding shall be cleared of vegetation, roots, oversized materials and all other material which is objectionable in the opinion of the Resident Engineer and shall be disposed of as specified in Section 2.0, Site Preparation.

## 22.2 Materials

### 22.2.1 Seed

All seed shall be furnished in bags or containers clearly labeled to show the name and address of the supplier, the seed name, the lot number, net weight, the percentage of purity and germination. All brands furnished shall be free from such noxious seeds such as Russian or Canadian Thistle, European Bindweed, Johnson Grass and Leafy Spurge. All seed furnished shall be from a lot that has been tested by a recognized laboratory for seed testing within six months prior to the date of delivery. Seed which has become wet, moldy, or otherwise damaged in transit or in storage will not be acceptable.

Seed Type. The seeds acceptable for drilling and hydromulch seeding are: (1) White Dutch Clover, (2) Fairway Wheatgrass, (3) Perennial Rye, (4) "Sodar" Streambank Wheatgrass, and (5) Luna Pubescent or Western Wheatgrass.

Seeding Mixture. The seeding mixture shall be applied at a bulk rate per acre as follows for hydromulch seeding:

	Pounds	Purity	Germination
(1) White Dutch Clover	1.1	96%	90%
(2) Fairway Wheatgrass	2.9	95%	85%
(3) Perennial Rye	3.5	98%	90%
(4) Sodar Streambank Wheatgrass	5.2	97%	92%
(5) Luna Pubescent Wheatgrass	8.9	93%	85%
(6) Western Wheatgrass	10	80%	80%

The seeding rate per acre for drilling shall be one-half the rate of hydromulch seeding.

- c. Seed Purity. Seed and seed labels shall conform to all current State and Federal regulations and will be subject to the testing provisions of the Association of Official Seed Analysis.

If seed available on the market does not meet the minimum purity and germination percentages specified, the Contractor must compensate for a lesser percentage of purity of germination by furnishing sufficient additional seed to equal the specified product. Product comparison shall be made on the basis of pure live seed in pounds. The formula used for determining the quantity of pure live seed (PLS) shall be:

$$\text{Pounds of Seed} \times (\text{Purity} \times \text{Germination}) = \text{Pounds of Live Seed (PLS)}$$

### 21.2.2 Fertilizers

Fertilizers shall consist of a standard brand fertilizer having a minimum content of 18% available nitrogen. The percentage of nitrogen content shall be certified at the time of use.

Super Phosphate (45% minimum Phosphate when called for on the Plans) will be used on subsoil where all topsoil has been removed. The rate of application shall be approximately 250 pounds per acre.

### **22.2.3 Erosion Control Blanket**

Erosion Control Blanket. The blanket shall consist of a material or combination of materials that are biodegradable after a sufficiently long enough period of time to insure germination and rooting of grass seeds. The blanket shall have uniform openings and consist of knitted yarn in a material that has enough strength and flexibility that allows it to be placed over uneven ground surfaces. The erosion control blanket shall be furnished in rolls that have a width of 4' minimum to 10' minimum. Length and weight of the rolls may vary depending on the manufacturer and the blanket material.

Pins and Staples. Pins or staples shall be made of wire .091" or larger in diameter. "U" shaped staples shall have legs 6" long and 1" crown." T" shaped pins shall have a minimum length of 8" after bending. The bar of the "T" shall be at least 4" long with the single wire end bent downward approximately 3/4".

### **22.2.4 Tackifier**

A tackifier will be required with all hydromulch seeding.

### **22.2.5 Hydromulch**

Wood cellulose fiber for hydromulch seeding shall not contain any substance or factor, which might inhibit germination or growth of grass seed. It shall be dyed an appropriate color to allow metering of its application.

The wood cellulose fibers shall have the property of becoming evenly dispersed and suspended when agitated in water. When sprayed uniformly on the surface of the soil, the fibers shall form a blotterlike ground cover, which readily absorbs water, and allows infiltration to the underlying soil. Weight specifications from suppliers, and for all applications, shall refer only to air dry weight of the fiber, a standard equivalent to ten (10%) percent moisture. The mulch material shall be supplied in packages having a gross weight not in excess of one hundred (100) pounds, and shall be marked by the manufacturer to show the air dry weight content. Suppliers shall certify that the laboratory and field testing of their product has been accomplished and that it meets all of the foregoing requirements pertaining to wood cellulose fiber mulch.

### **22.2.6 Mulch**

Materials for straw mulch shall consist of straw of oats, barley, wheat, or rye and shall not contain seed of noxious weeds.

Straw or hay in such an advanced stage of decomposition as to smother or retard the normal growth of grass will not be accepted. Old dry straw which breaks in the crimping process in lieu of bending will not be accepted.

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## **22.3 Construction**

### **22.3.1 Grade Preparation**

Prior to seeding, the top 4 inches of the surface shall be tilled and brought to the desired line and grade, except where seeding follows so closely behind the initial grading as to make special seeding preparation unnecessary. Areas to be seeded shall be tilled or handworked into a reasonably even and loose sandbed immediately in advance of the seeding.

### **22.3.2 Seeding**

Hydromulch Seeding. As required, cellulose fiber mulch shall be added with the proportionate quantities of water and other approved materials in the slurry tank. All ingredients shall be mixed to form a homogeneous slurry. Using the color of the mulch as a metering agent, the operator shall spray-apply the slurry mixture uniformly over the designated seeded area. Unless otherwise ordered for specific areas, wood cellulose fiber mulch shall be applied at the rate of 1500 pounds per acre or 35 pounds per 1,000 square feet.

Hydromulch seeding shall not be done in the presence of free surface water resulting from rains, melting snow or other causes.

Drilling. Seeding shall be accomplished by means of an approved mechanical power drawn drill, followed by packer wheels or drag chains. Seed shall not be drilled during windy weather or when the ground is frozen or otherwise untillable.

Mechanical power drawn drills shall have depth bands set to maintain a planting depth recommended for the type of seed being drilled and shall be set to space the rows not more than 7 inches apart.

If the inspections indicate the stripe wider than the specified space between the rows planted have been left or other areas skipped, the Project Construction Engineer shall require immediate re-sowing of seed in such areas at the Contractor's expense.

All seeding shall be done between September 1 to September 15 and March 2 to April 15 of the Calendar year of construction.

The Contractor shall be responsible for maintaining and watering areas seeded for a period of 7 weeks after the time of seeding. Areas in which there is not a satisfactory stand at the expiration of this 7-week period shall be re-seeded. Sprinkling of the seeded areas shall be carefully done in such a manner as to avoid standing water, surface wash or scour. Areas seeded and so maintained shall be protected against damage by vehicle or pedestrian traffic by the use of barriers and appropriate warning signs. Areas shall be re-seeded as many times as is required to establish a significant growth of grass seedlings (a minimum of 25 plants per square feet).

### **22.3.3 Mulch**

After seeding has been completed, a rate of 11/2 tons of hay or straw per acre, or as directed, shall be applied uniformly, crimped in with a crimper or other approved equipment. The Project Construction Engineer may order the employment of hand crimping operations on

such areas where excessive ground slopes or confined areas would cause unsatisfactory crimping by mechanical methods.

The seeded area shall be mulched and crimped within 24 hours after seeding. Areas not mulched and crimped within this 24-hour period must be reseeded with the specified seed mix at the Contractor's expense prior to mulching or crimping.

On steep slopes or other specific areas as shown on the plans, which are difficult to mulch or crimp by conventional methods, burlap or other blanketing materials properly anchored or secured may be used when approved by the Project Construction Engineer.

#### **22.3.4 Fertilizer**

Fertilizer shall be spread uniformly at the rate specified and washed into the soil by the application of water or tilled into the top two inches of soil. Sufficient fertilizer shall be evenly distributed to provide 50 pounds of free nitrogen per acre.

#### **22.3.5 Erosion Control Blanket (Channels, Etc.)**

Erosion control blanket shall be installed on each side and bottom of the low flow channel as shown on the drawings and as directed by the Project Construction Engineer. An additional row of blanket (approximately 4' to 5' wide) may be required in areas of steep slopes or southern exposures.

The area to be covered shall be properly prepared, fertilized and seeded before the erosion control blanket is applied. The blanket shall be placed in accordance with the manufacturer's recommendations and in such a manner to insure contact with the ground creating maximum protection for the newly planted seed. In the low flow channel, the erosion control blanket shall be applied in the direction of the flow of the water, butted snugly at the sides and lapped approximately one foot. On slopes the blankets may be applied either horizontally or vertically to the slope as directed by the Project Construction Engineer. Ends and sides shall be butted snugly. The blanket shall be stapled down at intervals in accordance with the manufacturer's specifications.

The Contractor shall also be responsible for maintaining and caring for the erosion control blanket for a 7-week period. All blanket that is disturbed during this period will be replaced and restapled by the Contractor.