January 31, 2013

REVISION OF SECTION 213

MULCHING

**NOTICE**

This is a standard special provision that revises or modifies CDOT’s *Standard Specifications for Road and Bridge Construction*. It has gone through a formal review and approval process and has been issued by CDOT’s Project Development Branch with formal instructions for its use on CDOT construction projects. It is to be used as written without change. Do not use modified versions of this special provision on CDOT construction projects, and do not use this special provision on CDOT projects in a manner other than that specified in the instructions unless such use is first approved by CDOT’s Standards and Specifications Unit. The instructions for use on CDOT construction projects appear below.

Other agencies which use the *Standard Specifications for Road and Bridge Construction* to administer construction projects may use this special provision as appropriate and at their own risk.

**Instructions for use on CDOT construction projects:**

Use in all projects having mulching.

Section 213 of the Standard Specifications is hereby revised for this project as follows:

In subsection 213.01, delete the last paragraph and replace with the following:

This work includes furnishing and applying spray-on mulch blanket or bonded fiber matrix on top of rock cuts and slopes after seeding or as temporary stabilization as shown on the plans or as directed by the Engineer.

In subsection 213.02, delete the eighth paragraph and replace with the following:

The hydromulch material for hydraulic mulching shall consist of virgin wood fibers manufactured expressly from clean whole wood chips. The chips shall be processed in such a manner as to contain no growth or germination inhibiting factors. Fiber shall not be produced from recycled materials such as sawdust, paper, cardboard, or residue from pulp and paper plants. The wood cellulose fibers of the mulch must maintain uniform suspension in water under agitation. Upon application, the mulch material shall form a blotter like mat covering the ground. This mat shall have the characteristics of moisture absorption and percolation and shall cover and hold seed in contact with the soil. The Contractor shall obtain certifications from suppliers that 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.

In subsection 213.02, delete the eleventh paragraph and replace with the following:

Material for mulch tackifier shall consist of a free-flowing, noncorrosive powder produced either from the natural plant gum of Plantago Insularis (Desert Indianwheat) or pre-gelatinized 100 percent natural corn starch polymer. The powders shall possess the following properties:

Plantago Insularis (Desert Indianwheat):

|  |  |  |
| --- | --- | --- |
| **Property** | **Requirement** | **Test Method** |
| (1) pH 1% solution  | 6.5 - 8.0 |  |
| (2) Mucilage content | 75% min.  | ASTM D7047 |

Pre-gelatinized 100 percent natural corn starch polymer:

|  |  |  |
| --- | --- | --- |
| (1)  | Organic Nitrogen as protein  | 5.5-7% |
| (2)  | Ash content | 0-2% |
| (3)  | Fiber  |  4-5% |
| (4) | pH 1% solution  | 6.5 – 8.0 |
| (5) | Size  | 100% thru 850 microns (20 mesh) |
| (6)  | Settleable solids | <2% |

All fibers shall be colored green or yellow with a biodegradable dye.

Delete the last paragraph in subsection 213.02 and replace with the following:

1. *Spray-on Mulch Blanket.* Spray on mulch blanket shall be one of the following, unless otherwise shown on the plans:
2. Spray-on Mulch Blanket (Type 1) shall be a hydraulically applied matrix containing organic fibers, water soluble cross-linked tackifier, reinforcing natural and/or synthetic interlocking fibers. Mulch Blanket (Type 1) shall conform to the following:

|  |  |  |
| --- | --- | --- |
| **Properties**  | **Requirement** | **Test Method** |
| Organic Fibers | 71% Min. | ASTM D 2974 |
| Cross linked Tackifiers  | 10% +/- 2% Min. |  |
| Reinforcing Interlocking Fibers | 10% +/- 1% Min. |  |
| Biodegradability  | 100% | ASTM D 5338 |
| Ground Cover @ Application Rate  | 90% Min. | ASTM D 6567 |
| Functional Longevity | 12 Months Min. |  |
| Cure Time | < 8 hours |  |
| **Application** |  |  |
| Application Rate | 3,000 lb./acre |  |

The organic fiber shall not contain lead paint, printing ink, varnish, petroleum products, seed germination inhibitors, or chlorine bleach. The organic fibers and reinforcing interlocking fibers cannot be produced from sawdust, cardboard, paper, or paper by-products.

1. Spray-on Mulch Blanket (Type 2) shall be a hydraulically applied matrix pre-packaged in 50 pound bags containing both a soil and fiber stabilizing compound and thermally processed wood fiber.

The sterilized weed-free wood fiber mulch shall be manufactured through a thermo-mechanical defibrating process containing a specific range of fiber lengths averaging 0.25 inches or longer.

Mulch Blanket (Type 2) shall meet the following requirements:

|  |  |  |
| --- | --- | --- |
| **Property** | **Requirement** | **Test Method** |
| Fiber Retention On 28-Mesh Screen | ≥ 40% | Tyler Ro-Tap Method |
| Moisture Content | 12% ± 2% | Total Air Dry Weight Basis |
| Organic Matter | 99.2% ± 0.2% | Oven Dry Weight Basis |
| Ash Content | 0.8% ± 0.2% | Oven Dry Weight Basis |
| pH At 3% Consistency In Water | 4.5-7.0 ± 0.5% |  |
| Sterilized Weed-Free | Yes |  |
| Non-Toxic To Plant Or Animal Life | Yes |  |

The soil and fiber stabilizing compound shall be composed of linear anionic copolymers of acrylamide pre-packed within the bag having a minimum content of 1.0 percent. The compound shall conform to the following:

|  |  |
| --- | --- |
| **Property** | **Requirement** |
| Molecular Weight | ≥ 12x106 |
| Charge Density | > 25% |
| Non-Toxic To Plant Or Animal Life | Yes |

1. *Bonded Fiber Matrices (BFM).* BFMshall consist of hydraulically-applied matrix with a minimum of 70 percent non-toxic thermally processed or refined long strand organic fibers and water soluble tackifier to provide erosion control and designed to be functional for a minimum of 9 months. BFMs form an erosion-resistant blanket that promotes vegetation and prevents soil erosion. The BFM shall be 100 percent biodegradable. The binder in the BFM should also be biodegradable. Biodegradable BFMs should not be applied immediately before, during, or immediately after rainfall if the soil is saturated. BFM shall conform to the following requirements:

|  |  |  |
| --- | --- | --- |
| **Property** | **Requirement** | **Test Method** |
| Ground Cover (%)  | 95 | ASTM 6567 |
| Bio-degradability (%) | 100 | ASTM 5338 |
| Functional Longevity (months) | 9 month minimum |  |
| Cure Time (hours) | 24-48 |  |
| Cross-linked tackifier | 10% minimum |  |

|  |  |  |
| --- | --- | --- |
| **Application** |  |  |
| Application Rate (lbs./Acre) | 3000 |  |

The fibers shall not contain lead paint, printing ink, varnish, petroleum products, seed germination inhibitors, or chlorine bleach. Fiber shall not be produced from sawdust, cardboard, paper, or paper by-products.

In subsection 213.03 (b) 2, delete the second paragraph and replace with the following:

Application Rate: Apply this as an overspray at the following rate or as approved by the Engineer.

**Powder Fiber Water**

200 lbs./Acre 300 lbs./Acre 2000 gal./Acre

In subsection 213.03, delete (f) and replace with the following:

1. *Spray-on Mulch Blanket.* Spray-on Mulch Blanket shall strictly comply with the Manufacturer’s mixing recommendations and installation instructions. No chemical additives with the exception of fertilizer, soil pH modifiers, extended-term dyes and bio nutrients will be permitted. Apply Spray-on mulch blanket in a uniform application using a minimum 22 degree arc type nozzle. Apply hydro slurry in two direction (from top of slope down and from toe of the slope up, as well as, be applied at a minimum of two layers).

Hydromulching vessel shall be filled with water to at least 1/3 capacity (high enough to cover agitators) prior to adding any material. Continue to fill vessel with water and slowly add the fibers while agitators are in motion. Run agitators at ¾ speed. Continue to mix tank a minimum of 10 minutes prior to application.

Co-polymer shall not be used use in channels, swales, or other areas where concentrated flows are anticipated and should not be used on saturated soils that have groundwater seeps.

Subsection 213.03 shall include the following:

1. *Bonded Fiber Matrices (BFM).* Bonded fiber matrices shall strictly comply with the Manufacturer’s mixing recommendations and installation instructions. No chemical additives with the exception of fertilizer, soil pH modifiers, extended-term dyes and bio stimulant materials shall be permitted. BFM shall be applied in a uniform application using a minimum 22 degree arc type nozzle. Apply BFM in two direction (from top of slope down and from toe of the slope up, as well as, be applied at a minimum of two layers.

Biodegradable BFMs should not be applied immediately before, during, or immediately after rainfall if the soil is saturated.

Product shall not be used use in channels, swales, or other areas where concentrated flows are anticipated and should not be used on saturated soils that have groundwater seeps.

Foot traffic, mechanical traffic or grazing shall not be permitted on treated areas until vegetated. Treated areas damaged due to circumstances beyond Contractor’s control shall be repaired or re-applied as ordered. Payment for corrective work, when ordered, shall be at contract rates.

In subsection 213.04, delete the first paragraph and replace with the following:

The quantity of hay and straw mulch, wood chip mulch, wood fiber and, spray-on mulch tackifier, bonded fiber matrix and tackifier will not be measured but shall be the quantity designated in the Contract, except that measurements will be made for revisions requested by the Engineer, or for discrepancies of plus or minus five percent of the total quantity designated in the Contract. Measurement for acres will be by slope distances.

In subsection 213.04, delete the fourth paragraph and replace with the following:

Spray-on Mulch Blanket and Bonded Fiber Matrix will be measured by the acre or by the actual pounds of product applied, as shown on the plans. The area will be calculated on the basis of actual or computed slope measurements. The Contractor shall verify prior to application, weight of spray on mulch blanket and bonded fiber matrix bags for certification of materials and application rate.

Subsection 213.05 shall include the following:

Payment will be made under:

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| --- | --- |
| **Pay Item** | **Pay Unit** |
| Bonded Fiber Matrix | Acre |
| Bonded Fiber Matrix | Pound |
| Spray on Mulch Blanket | Pound |

Payment for spray-on mulch blanket and bonded fiber matrix will be full compensation for all work and materials necessary to complete this item.