

PART 1: GENERAL

1.1 SUMMARY

- A. This section specifies the use of HydroStraw® All In 1 Technology Bonded Fiber Matrix as an allowable All In 1 Technology Bonded Fiber Matrix for use in temporary cover by mulch, temporary cover by seeding or permanent cover by seeding applications. Do not use HydroStraw® All In 1 Technology Bonded Fiber Matrix as a channel liner or for areas receiving concentrated flow.
- B. Related Sections: Other Specification Sections, which directly relate to the work of this Section may include, but are not limited to the following:
1. *Section XXXXX – EARTHWORK*
 2. *Section XXXXX – LANDSCAPING*
 3. *Section XXXXX – SITE STABILIZATION*
 4. *Section XXXXX – SEEDING, FERTILIZING, AND MULCH*

1.2 APPLICATIONS

HydroStraw® All In 1 Technology Bonded Fiber Matrix addresses the biological, chemical, and physical requirements for stabilizing and restoring vegetation on disturbed soil sites, as well as controlling erosion during vegetation establishment. Use HydroStraw® All In 1 Technology Bonded Fiber Matrix when the site requires immediate erosion protection as a result of enhanced vegetation establishment.

- A. USE AS A BLOWN STRAW REPLACEMENT with hydraulically applied straw conversion.

Replace the recommended blown straw rate per acre or hectare with the recommended HydroStraw® All In 1 Technology Bonded Fiber Matrix rate per acre or hectare less the hydraulically applied fibers for seed application. Table 1 is an example:

Table 1: HydroStraw® All In 1 Technology Bonded Fiber Matrix Replacement

Example Blown Straw Specification		HydroStraw Recommendation	
Mulch Fiber seed and fertilizer	500 lbs / ac	HydroStraw All In 1 and Seed	1,000 lbs / ac
Blown Straw	4,000 lbs / ac	HydroStraw All In 1	2,000 lbs / ac
Mulch Fiber tackifier application	500 lbs / ac	HydroStraw All In 1	-0-
TOTAL Fiber Pounds Per Acre:	5,000 lbs / ac	TOTAL Fiber Pounds Per Acre:	3,000 lbs / ac

Example Blown Straw Specification		HydroStraw Recommendation	
Mulch Fiber seed and fertilizer	560 kg / ha	HydroStraw All In 1 and seed	1,120 kg / ha
Blown Straw	4,483 kg / ha	HydroStraw All In 1	2,242 kg / ha
Mulch Fiber tackifier application	560 kg / ha	HydroStraw All In 1	-0-
TOTAL Fiber Kilograms Per Hectare:	5,603 kg / ha	TOTAL Fiber Kilograms Per Hectare:	3,362 kg / ha

B. PRE BLENDED PRODUCT

HydroStraw® All In 1 Technology Bonded Fiber Matrix is a pre-blended product that eliminates the extra step and mess of field mixing of mulch components and additives and reduces additive break down by rain fall events.

C. HIGHER LOADING RATES

HydroStraw® All In 1 Technology Bonded Fiber Matrix performance is reduced by using lower than recommended mulch to water ratio. HydroStraw® formulation is designed for maximum performance with the following mulch to water mixture ratio:

Recommended HydroStraw® All In 1 Technology Bonded Fiber Matrix Mixture Rates

- 75 lbs (34 kg) per 100 Gallons (379 Liters) for hose work
- 100 lbs (45 kg) per 100 Gallons (379 Liters) for tower work

Higher loading rate reduces the amount of water required for the application of HydroStraw® All In 1 Technology Bonded Fiber Matrix.

D. VEGETATION ESTABLISHMENT

HydroStraw® All In 1 Technology Bonded Fiber Matrix includes long natural fibers for maximum matrix entanglement for improved performance. The combination of fiber entanglement in conjunction with cross linked high-strength polymer binders produce improved erosion prevention and vegetation establishment. The annually renewable straw fiber in HydroStraw® All In 1 Technology Bonded Fiber Matrix enhances vegetation establishment by aiding

in moisture retention and compensating for seed to soil contact. HydroStraw® All In 1 Technology Bonded Fiber Matrix includes 25% micronized natural fertilizers, biological inoculants and soil amendments providing slow release balanced nutrients for new vegetation and promote the growth of soil microbes. Complete soil coverage is needed to improve moisture retention and improve seed germination. Low rain fall regions may consider higher HydroStraw® All In 1 Technology Bonded Fiber Matrix application rates to increase soil moisture retention to improve the establishment of vegetation.

E. FERTILIZER DELIVERED RATES

HydroStraw® All In 1 Technology Bonded Fiber Matrix contains Micronized natural Fertilizer and other beneficial components. Table 2 below displays the amount of nutrients delivered in pounds per acre and kilograms per hectare when HydroStraw® All In 1 Technology Bonded Fiber Matrix is applied at specified amount of pounds per acre or hectare.

Table 2: HydroStraw® All In 1 Technology Bonded Fiber Matrix Mixture Fertilizer Rates Delivered Per Acre & Hectare

Mulch lbs / Acre	Nutrients Delivered lbs / Acre
4,000 lbs / ac	N(40 lbs) P(40 lbs) K(40 lbs)
5,000 lbs / ac	N(50 lbs) P(50 lbs) K(50 lbs)
6,000 lbs / ac	N(60 lbs) P(60 lbs) K(60 lbs)

Mulch kg / Hectare	Nutrients Delivered kg / Hectare
4,500 kg / ha	N(45 kg) P(45 kg) K(45 kg)
5,600 kg / ha	N(56 kg) P(56 kg) K(56 kg)
6,725 kg / ha	N(67 kg) P(67 kg) K(67 kg)

1.3 SUBMITTALS

- A. Submit the manufacturer’s product data and installation instructions. This includes but is not limited to the required site preparation, list of required materials and required application rate(s).
- B. Submit a letter from the manufacturer certifying that the hydraulic mulch fiber meets or exceeds all technical and packaging requirements.
- C. Upon request, submit from the manufacturer a *Report of Straw Analysis* test demonstrating the straw contains no viable seed. Ensure the *Report of Straw Analysis* is prepared by registered seed technologist from an accredited ISTA laboratory and is made available per product lot numbers upon request. Samples are taken during the production to represent a uniform sample.
- D. No material will be considered as an equivalent to the HydroStraw® All In 1

Technology Bonded Fiber Matrix material specified herein unless it meets all requirements of this specification, without exception. Manufacturers seeking to supply what they represent as equivalent material must submit records, data, independent test results, samples, certifications, and documentation deemed necessary by the ENGINEER to prove equivalency.

1.4 QUALITY ASSURANCE

- A. At the time of delivery, provide the ENGINEER with the specific packing list containing complete identification, including but not limited to the following:
 - 1. Manufacturer name and location.
 - 2. Manufacturer telephone number and fax number.
 - 3. Manufacturer's e-mail address and web address.
 - 4. Hydraulic mulch name, model and/or serial number.
 - 5. Certification that the specific All In 1 Technology Bonded Fiber Matrix meets the physical and performance criteria of this specification.

1.5 DELIVERY STORAGE AND HANDLING

- A. Deliver all materials in moisture resistant factory labeled packages.
- B. Store and handle HydroStraw® All In 1 Technology Bonded Fiber Matrix in strict compliance with the manufacturer's instructions and recommendations. Protect the packaged hydraulic mulch from damage from weather, excessive temperatures, and construction operations.
- C. Clean all spills promptly.

PART 2: PRODUCTS

2.1 ACCEPTABLE PRODUCTS & MANUFACTURER

- A. HydroStraw® All In 1 Technology Bonded Fiber Matrix

HydroStraw, LLC
22110 S State Route 27
Rockford, WA 99030
Toll Free: 800-545-1755
Fax: 815-468-7450
www.hydrostraw.com
info@hydrostraw.com

2.2 **MATERIALS**

- A. All materials consist of HydroStraw® All In 1 Technology Bonded Fiber Matrix and conform to the composition requirements of Section 2.3.

2.3 **COMPOSITION**

The pre-packaged All In 1 Technology Bonded Fiber Matrix materials consists of a specially formulated composition of annually renewable straw fiber, long natural fibers for maximum fiber matrix entanglement, and cross linked high-strength polymer binders.

- A. The primary HydroStraw® All In 1 Technology Bonded Fiber Matrix fiber is produced from annually renewable heat and mechanically treated straw fiber.
- B. The primary HydroStraw® All In 1 Technology Bonded Fiber Matrix tackifier is a cross linked high-strength polymer.
- C. HydroStraw® All In 1 Technology Bonded Fiber Matrix contains long natural fibers for maximum fiber matrix entanglement.
- D. HydroStraw® All In 1 Technology Bonded Fiber Matrix contains 25% micronized natural fertilizers, biological inoculants and soil amendments. Refer to Table 2
- E. All HydroStraw® All In 1 Technology Bonded Fiber Matrix materials are free from plastic materials or other non bio-degradable substances.
- F. HydroStraw® All In 1 Technology Bonded Fiber Matrix is of such character that the fiber will disperse into uniform slurry when mixed with water.
- G. HydroStraw® All In 1 Technology Bonded Fiber Matrix is colored brown and does not stain concrete or other surfaces.
- H. HydroStraw® All In 1 Technology Bonded Fiber Matrix ingredients are free from growth or germination inhibiting ingredients.
- I. All HydroStraw® All In 1 Technology Bonded Fiber Matrix components are pre-packaged by the manufacturer to assure both material performance and compliance with the minimum requirements of Table 3.
- J. Under no circumstances is HydroStraw® All In 1 Technology Bonded Fiber Matrix field mixing of additives or components accepted.

Table 3: Minimum HydroStraw® All In 1 Technology Bonded Fiber Matrix Requirements

Property	Requirement
Physical	
Organic Matter	100%
Toxicity	Non Toxic
Applied Color	Brown and shall not stain concrete or other surfaces.
Surface Tension	Material evenly disperses and suspends when agitated in water.
Absorbency	When sprayed uniformly at the recommended rate, the mulch fibers form an absorbent mulch cover which allows percolation of water and increased water infiltration to the underlying soil matrix
Solubility	Mulch Fibers are non water soluble
pH	6.8 +/- 0.5
Average Fiber Length	1/2" +/- 1/4" (1.27 cm +/- .64 cm)
Composition	
Heat & Mechanically Treated (HMT™) - Straw	50.0% +/- 1.0%
Micronized Natural Fertilizer / Soil Amendments	25.0% +/- 1.0%
Moisture	10.0% +/- 1.0%
Natural Fibers	7.5% +/- 1.0%
Proprietary Cross Linked Tackifiers	7.5% +/- 1.0%

2.4 PACKAGING

A. Ensure all products are packaged in the following manner:

1. Bag Size: 11.5" W x 17" D x 25" H (29.2 cm W x 43 cm D x 63.5 cm H)
2. Bag Weight: 50 lb (22.7 kg) compressed bales
3. Packaging: Moisture resistant package protected
4. Pallet: 40 bags/pallet: 52" W x 45" D x 96" H (132 cm W x 114 cm D x 244 cm H)

PART 3: EXECUTION

3.1 EXAMINATION

- A. Use HydroStraw® All In 1 Technology Bonded Fiber Matrix where all components are pre-packaged by the manufacturer to assure material performance.
- B. Examine substrates and conditions before applying materials. Do not proceed with installation until unsatisfactory conditions are corrected. Apply hydraulic mulch to stable slopes that are constructed to divert runoff water away from the face of the slope, eliminating damage to the slope face caused by the surface flow from above the slope.

3.2 INSTALLATION

- A. Use personnel or subcontractors experienced in the proper procedures for mixing and application of hydraulic mulch. Use personnel or subcontractors certified and trained by the manufacturer in the proper procedures for mixing and application of hydraulic mulch.
- B. Strictly comply with the manufacturer's installation and mixing instructions shown in Table 4.

Table 4: HydroStraw® All In 1 Technology Bonded Fiber Matrix Mixture Rates

Mulch Fiber Weight	Amount of Water
75 lb (34 kg)	100 Gallons (379 Liters) hose work
100 lb (45 kg)	100 Gallons (379 Liters) tower work

- C. Loading and Mixing Instructions
 - 1. Start the flow of water into the tank.
 - 2. Pre-wet hoses and prime the pump by running water through the lines.
 - 3. Engage the agitator at ½ speed.
 - 4. When applying seed and/or fertilizer, add to the tank when the water level reaches ¼ full.
 - 5. **Load all HydroStraw® All In 1 Technology Bonded Fiber Matrix components before the tank reaches ¾ full. Do not hesitate to shut off water before this step is completed.**

- 6. Resume filling the tank with water until the tank is full.
 - 7. Set the engine to full throttle for approximately ½ minute. Then set the engine throttle to about ½ speed to begin hose application operations.
- D. It is imperative to apply the mulch at the specified mixture rate: too wet of a mixture will cause the fibers to be buried into the soil and also dilutes the fiber binders reducing effectiveness.
- E. Apply HydroStraw® All In 1 Technology Bonded Fiber Matrix as a slurry solution by means of approved hydraulic seeding/mulching machines with appropriate nozzles for hydraulic mulch applications.
- F. Apply HydroStraw® All In 1 Technology Bonded Fiber Matrix at the specified rates per in Table 5 in a uniform manner.

Table 5: Minimum HydroStraw® All In 1 Technology Bonded Fiber Matrix Application Rates

Slope Gradient	lb / Acre	kg / Hectare
≤ 3:1	4,000	4,500
≤ 2:1	5,000	5,600
≤ 1:1	6,000	6,725
Poor Soil Conditions	4,000 – 6,000	4,500 – 6,725

- G. Ensure the HydroStraw® All In 1 Technology Bonded Fiber Matrix application is uniform and even throughout the seeded area. Ensure the mulch is not bunched or clumped up on the site.
- H. Avoid creating a “shadowing effect” on the site. Apply HydroStraw® All In 1 Technology Bonded Fiber Matrix from opposing directions to the soil surface in successive layers, reducing the “shadow effect” to achieve maximum coverage of all exposed soil. Start All In 1 Technology Bonded Fiber Matrix applications on the windward side of the project.
- I. Add seed, lime, and fertilizer as outlined in Section XXXXX *SEEDING, FERTILIZING, AND MULCH*.
- J. Ensure seed to soil contact best management practices are utilized. Improved seed germination and establishment can be achieved by improving the seed to soil contact by drilling or broadcasting the seed application prior to HydroStraw® All In 1 Technology Bonded Fiber Matrix application.

Applying the seed (Hydroseeding) with HydroStraw® All In 1 Technology Bonded Fiber Matrix at a rate of 1,000 lbs (1,120 kg) or less per acre or hectare during a first pass application is another option. In this situation, the balance of the targeted HydroStraw® All In 1 Technology Bonded Fiber Matrix rate is

applied during the second pass application to cover the seed and soil creating an ideal environment for seed germination and establishment.

3.3 INSPECTION AND MAINTENANCE

A. Prepare a maintenance plan that includes the following:

1. Reapplication as directed by the ENGINEER to disturbed areas that require continued erosion control.
2. Maintenance of equipment to provide uniform application rates.
3. Rinsing all mixing and application equipment thoroughly with water to avoid formation of residues and appropriate discharge of rinse water.

B. Degradation can be expected to occur as a result of mechanical degradation, chemical degradation, biological hydrolysis, sunlight, salt, and temperature. Where necessary, reapply in accordance with the manufacturer's instructions. Reapplication is not required unless treated soils are disturbed or turbidity or water quality shows the need for an additional application. If treated soils are left undisturbed, the necessity of reapplication is determined by the ENGINEER.

C. Payment for the reapplication is not made unless the reapplication is approved by the ENGINEER.

PART 4: ACCEPTANCE MEASUREMENT AND PAYMENT

4.1 ACCEPTANCE

Obtain acceptance and approval of HydroStraw® All In 1 Technology Bonded Fiber Matrix installation from the ENGINEER. When requested by the ENGINEER, ensure that a manufacturer's representative is on-site to oversee and approve the initial installation. Obtain a letter from the manufacturer approving the installation when requested by the ENGINEER.

4.2 MEASUREMENT

The quantity for the pay item HydroStraw® All In 1 Technology Bonded Fiber Matrix is the surface area covered by the hydraulic mulch applied at the recommended rate and is measured by the one-acre (acre) or one-hectare (hectare) unit in-place, complete, and accepted. The installation may require written acceptance by the manufacturer's representative before acceptance for payment.

4.3 PAYMENT

Payment for HydroStraw® All In 1 Technology Bonded Fiber Matrix is full compensation for installing the hydraulic mulch as specified or directed by the ENGINEER and includes furnishing, applying, and maintaining the hydraulic mulch including testing and documentation of Quality Control and Quality Assurance programs and all other materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, the Specifications, and other terms of the Contract.

END OF SECTION