

BOLD & GOLD® CTS BIOSORPTION ACTIVATED MEDIA

1.1 Description

Bold & Gold® CTS Filtration media is a Biosorption Activated Media (BAM) for stormwater treatment in conjunction with other structural or non-structural stormwater BMPs. Bold & Gold® (B&G) Filtration media is a patented product developed at the Stormwater Management Academy of the University of Central Florida. Environmental Conservation Solutions, LLC. (ECS) is the licensed manufacturer of the Bold & Gold® Filtration media.

1.2 Responsibility

The contractor shall be responsible for the satisfactory delivery, stockpiling, installation and maintenance of the Bold & Gold® CTS Filtration media during construction based on information provided in the Contract Documents and as provided by the supplier. The Bold & Gold® CTS Filtration media shall be purchased from an approved source.

Contact the local Ferguson Waterworks branch for pricing information. **ECS will provide a Certificate of Authenticity to the Engineer of Record at the completion of the project. The Certificate of Authenticity includes the quantity of media delivered to the project site and certifies the Bold & Gold® media delivered meets the patent requirements of the University of Central Florida.**

1.3 Material

1.3.1 Composition: The Bold & Gold® CTS Filtration media is manufactured with mineral materials and no organic materials. The final product has more than 2% but less than 6% passing the US #200 (75 micron opening size) sieve. The mix is composed of 85% poorly graded clean sand (washed) and 15% sorption materials by volume. The sorption materials are composed of recycled tire crumb with no metal contents and mined kaolin clay that has no less than 99% clay content. Percentages shall be determined by in-place volume. Water passing through the media must not exhibit acute or chronic toxicity and not change the pH of the filtered water by more than 1.0 unit. The material will have a water holding capacity (amount of water that the media can hold for crop use) of at least 10% as measured by porosity, and total porosity of 32%. The permeability as measured in the laboratory for a media at 95 pounds per cubic feet must be greater than 10.0 inches per hour.

1-3.2 Storage and Handling: The Bold & Gold® CTS Filtration media may be delivered pre-mixed and ready to install or the material components delivered separately and mixed on site by a certified ECS representative. Pre-mixed material and/or the clay portion of the component material shall be stored in a covered and well-drained area. Material shall not be stockpiled longer than 30 days before installation and must be covered always, to prevent separation of the material due to adverse weather and environmental conditions such as, but not limited, to rainfall and wind.

1.4 Construction

1-4.1 **Delivery of the Material:** Bold & Gold® CTS Filtration media may be delivered to the jobsite premixed OR the component materials may be delivered for onsite mixing by a certified ECS representative.

1-4.2 **Premixed Delivery:** Bold & Gold® CTS Filtration media shall be mixed by Environmental Conservation Solutions, LLC. and delivered to the jobsite ready for installation. The delivered material is certified to meet the patent requirements and a certificate shall be issued as stated in Section 1.2 of this specification.

1-4.3 **Onsite Mixing Delivery:** The mixing shall be done either in a pugmill or other mechanical mixing system that has the capability of uniformly mixing the component material to the requirements of Section 1.3.1 of this specification. An Environmental Conservation Solutions, LLC. representative shall mix the material on a predesignated location. Care shall be taken to avoid contaminating the component material with the existing ground in the stockpile area. The mixed material may be stockpiled, and covered always, for up to 30 days before installation.

1-4.4 **Installation:** Surface on which the Bold & Gold® CTS Filtration media is placed shall be reasonably levelled within ± 1 -inch of the elevations shown in the plans. Unless a slope grade is specified in the plans, a level surface is recommended for the subgrade soil to ensure even infiltration of filtered stormwater spread over the entire surface area.

The surface of the subgrade soil underneath the Bold & Gold® CTS Filtration media shall be compacted and/or scarified to meet the requirements as specified by the design engineer. All necessary construction practices shall be taken to minimize the compaction of the subgrade soil, above the specified subgrade density, to avoid the reduction of the infiltration rate at the soil-filter media interface. The contractor shall take all necessary measures needed to control the deposition of sediments on the surface of the subgrade soil prior to the placement of the Bold & Gold® CTS Filtration media.

The Bold & Gold® CTS Filtration media shall not be installed until all areas that drain to it have temporally/permanent erosion and sedimentation stabilization in place. No runoff shall be directed to the specified location of the Bold & Gold® CTS Filtration Media until all drainage area leading to the location are stabilized. If the installed Bold & Gold® CTS Filtration media becomes contaminated with sediment, prior to the placement of the cover material, it shall be removed and replaced at the contractor's expense.

The Bold & Gold® CTS Filtration media may be placed in one lift and compacted to the density specified in the plan by the design engineer. For traffic load-bearing BMP applications, the Bold & Gold® CTS Filtration media shall be installed, in number and depth of lifts, as specified by the design engineer to achieve target installation density. The maximum dry density of the Bold & Gold® CTS Filtration media ranges between 100 and 105 pounds per cubic feet. Unless specified by the design engineer; a) the suggested installation dry density of the Bold & Gold® CTS Filtration media shall not be greater than 95 pounds per cubic feet for all non-traffic bearing BMP applications; or b) no less than 100 pounds per cubic feet for all traffic bearing BMP applications. The final in-place thickness of the Bold & Gold® CTS Filtration media shall not be less than the thickness shown in the plans for the specific project.

Compaction of the Bold & Gold® CTS Filtration Media shall be achieved by using industry-standard compaction techniques. Water free of contaminants (sediments and nutrients) may be

sprinkled on to the Bold & Gold® CTS Filtration media to achieve the compaction requirements. If the compacted Bold & Gold® CTS Filtration media has an in-place density greater than 105% of the required density, the material will be reworked to meet density requirements.

Unless specified by the design engineer, the surface of the Bold & Gold® CTS Filtration media shall have a slope of between zero and 0.5 percent in preparation for the placement of the top cover material. The top cover material shall serve as a spreader of runoff over the filter media and prefilter of gross pollutants from contaminating the Bold & Gold® CTS Filtration media. In the event of clogging, the top cover material shall be removed and replaced with clean top cover material, at the same depth, to rejuvenate flow into the filter media. The top cover shall be free-draining material that is free of organics, sediments and all other pollutants that negates the purpose for the installation of the Bold & Gold® CTS Filtration media. Top cover materials shall be, but not limited to clean sand, gravel, geotextile, grass and others that may be specified by the design engineer and does not hinder the performance of the Bold & Gold® CTS Filtration media.

If required by the design engineer, sod or seed shall be placed over the Bold & Gold® CTS Filtration media within two days of placement. The sod used as cover for the Bold & Gold® CTS Filtration media shall have been grown in a predominantly sandy site with less than 5% of the soil attached to the sod passing the #200 (75 micron opening size) sieve and have no added fertilizer.

After placement of the top soil over the Bold & Gold® CTS Filtration media, driving and parking on the installed Bold & Gold® CTS Filtration media maybe allowed, if the surface is intended for traffic loading. If rutting to the Bold & Gold® CTS Filtration media occurs due to vehicles or equipment during installation, the contractor shall repair it to the grades and elevations in the plans.

1.5 Maintenance

Maintenance requirements for the Bold & Gold® CTS Filtration media shall be dependent on the proper functioning and maintenance of all components of the applicable BMP in which the filter media is used. To prevent the clogging of the voids of the Bold & Gold® CTS Filtration media, there shall be installed an intermediary aggregate media that is free-draining and free of organics (clean sand, acceptable aggregates, etc.) as cover material directly above the top of the filter media surface. In addition, the cover material shall serve to control the erosion of the components of the Bold & Gold® CTS Filtration media.

In the event of the clogging resulting from the reduction of permeability through the cover material and the filter media, the sediment-laden cover material shall be removed and replaced with new material meeting the original specifications. Reduction in permeability shall be described as the increase of the drawdown time that exceeds the design duration for the specific BMP application.

Bold & Gold® CTS Filtration media is typically designed to last the life span of the applicable BMP. However, maintenance shall be performed if the Bold & Gold® CTS Filtration media has shown a reduction in the performance efficiencies on the reduction of Total Phosphorus (TP) below the design value before and/or at the expiration of the design service life. The maintenance procedure shall involve the removal of the cover material and Bold & Gold® CTS Filtration media and replaced with new material and filter media meeting the original specifications. The spent filter media and cover material shall be disposed off at an approved landfill.

1.6 Applications

1.6.1 Bold & Gold® CTS Filtration media is recommended for stormwater nutrient removal to be used in low loading or slow-flow filters, either in 12-, 24- or 30-inch depth filters; after a wet pond or within a dry basin, swale and strips. It is also used in stormwater low impact development applications in either a detention or retention capacity; and in a wastewater, Rapid Infiltration Basin for nutrient reduction. It is not intended for storage to control volume attenuation but provides some storage capacity to the limits of the available porosity of 0.25 of the volume occupied by the filter media.

Types of Stormwater BMPs where it can be used:

- Side-bank and shelf filters in wet detention ponds and retention ponds with shallow seasonal high groundwater table elevations
- Bottom of retention pond; roadside ditches; swales; trench underdrains; permeable pavements; vegetated filter strips (VFS)
- Underneath subsurface storage systems used as retention systems
- Low Impact Development (LID) devices such as – tree wells, rain gardens, bioretention, bioswales, sand filters, and other user-defined slow-flow BMPs

1.7 Design Considerations

The primary control for sizing the Bold & Gold® CTS Filtration media is to capture the water quality volume (WQ_v) and pass it through the filter media with a specified hydraulic residence time (HRT) to achieve a specified drawdown time. The capture volume is dependent on the flow-through rate per available surface area of the filter media. Thus, primary design parameter for the filter media is the minimum surface area, which is expressed as:

$$SF_{fm} = \frac{WQ_v}{1/FS \cdot k \cdot t} = \frac{EIA \cdot TD}{1/FS \cdot k_{fm} \cdot t}$$

where SF_{fm} = surface area of filter media (square feet); EIA = Effective Impervious area (square feet); TD = treatment depth over the contributing area (feet); FS = factor of safety (2.0); k_{fm} = laboratory permeability of the filter media (0.83 ft/hr); and t = required drawdown time (72 hr).