

## BIOFILTRATION STORMWATER QUALITY SPECIFICATIONS

### GENERAL BIOFILTRATION STORMWATER QUALITY SPECS

#### 1.1 Scope

The Contractor shall install a precast biofiltration stormwater treatment unit(s) in accordance with the notes and details shown on the drawings and in conformance with these Specifications. The precast biofiltration stormwater treatment shall provided the treatment flow rate capacity(ies) as shown on the drawings in (XX.XX)-cubic foot per second (-cfs [-ft<sup>3</sup>/s]) or on a square foot of bio soil media bed surface area inches per hour per square foot (in/hr)/ft<sup>2</sup>. The precast biofiltration stormwater treatment units shall be the StormVault BioFiltration (SVBF), units manufactured by Jensen Precast. This type of SWTU(s) is typically categorized as a Low Impact Development (LID) bioretention filtration or infiltration process.

The Contractor shall furnish all labor, equipment and materials necessary to install the precast biofiltration stormwater treatment unit(s) along with any required appurtenances. The precast biofiltration stormwater treatment unit(s) shall be a structure capable of achieving the treatment and hydraulic performance and materials requirements of these Biofiltration Stormwater Quality Specifications.

The precast biofiltration stormwater treatment unit(s) shall come prefilled or shipped with the engineered bio soil media (BSM) filter material consisting of plant stabilization media, biofiltration media, and bridging stone. The engineered BSM filter material shall be arranged into three separate layers so that flow entering the precast biofiltration stormwater treatment unit(s) passes downwards through all three layers.

SWTU(s) must have approval prior to implementation.

The following specifications sections also apply to the installation of this precast WTU

Excavation & Backfill	Specification Section ( )
Shoring	Specification Section ( )
Dewatering	Specification Section ( )

### SWTU(s) TREATMENT, HYDRAULIC AND MATERIALS SPECS

#### 2.1 PERFORMANCE

##### A. Removal Efficiencies (RE%)

1. The precast biofiltration stormwater treatment unit(s) shall be capable of achieving an 80 percent (%) average annual reduction in the total suspended solids (TSS). This RE% shall be verified per New Jersey Corporation for Advanced Technology (NJCAT) or equivalent verification program and be

certified by the new jersey Department of Environmental Protection (NJDEP).

2. The engineered Bio Soils Media (BSM) as verified by the required NJCAT program shall achieve the following:

Table 1. Hydraulic Loading Rates for Pollutants of Concern

Hydraulic Loading Rate (in/hr)/ft <sup>2</sup>	Pollutant of Concern
191	TSS
100	Phosphorus (P) & Nitrates
60	Copper (Cu) & Zinc (Zn)
60	Iron (Pb)

3. Total Suspended Solids (TSS), removal shall be substantiated by the achievement of a certification listing on NJDEP’s website for Stormwater Manufactured Treatment Devices (MTDs), recognized in New Jersey for an approved TSS removal rate. The TSS RE% is based on a Particle Size Distribution conforming to the Technology Acceptance and Reciprocity Partnership, (TARP) and the NJDEP Tier II testing requirements.
4. The precast biofiltration stormwater treatment unit(s) shall be designed to retain all previously captured pollutants even during bypass flow conditions.
5. The precast biofiltration stormwater treatment unit(s) must have NJCAT verification and NJDEP certification under the updated procedures and protocols dated January 25, 2013.
6. The precast biofiltration stormwater treatment unit(s) shall be capable of achieving the following RE% for the pollutants listed:
  - 50 percent (%) average annual reduction in phosphorus.
  - 60 percent (%) average annual reduction in total and dissolved Zinc (Zn).
  - 30 percent (%) average annual reduction in total and dissolved Copper (Cu).
  - capture and retain 50 percent (%) Total Petroleum Hydrocarbons (TPH), also known as oils and greases (O&G), RE%<sub>TPH</sub>.
  - 2-log reduction in the annual reduction fecal coliform.

B. BioFiltration Treatment Sizing Criteria: The treatment sizing methodology and design criteria for this precast biofiltration stormwater treatment unit(s) shall conform to the following:

1. The specified precast biofiltration stormwater treatment unit(s) is designed in accordance with the governing tenets of bio filtration processes for the treatment

of the water quality runoff rate, to achieve a  $RE\%_{TSS} = 80\%$  for TSS. This TSS RE% shall be achieved at 191-(in/hr) per square foot surface area of the bio soil media.

C. Alternative BioFiltration Treatment Units: Alternative biofiltration treatment unit(s) may be considered and must be approved before implementation. At a minimum, an alternative biofiltration treatment unit(s) shall have treatment sizing methodology and design criteria that conform with these entire specifications to include the following:

1. The performance of alternative biofiltration treatment processes shall have been evaluated and verified by the NJCAT and certified by the NJDEP.
2. Sizing of the alternative biofiltration treatment's bio soil media (BSM) bed area shall be sized in accordance with the listed hydraulic loading rates on the NJCATs website for the approved list of Manufactured Treatment Devices (MTDs).
3. The manufacturer of an alternative biofiltration treatment unit(s) shall be vetted to confirm their suitability to provide an acceptable biofiltration unit. At a minimum, alternative manufacturer shall have been regularly engaged in the engineering design and production of stormwater treatment systems deployed for at least five (5) years with a proven record of providing quality biofiltration units as well as a history of successful production and delivery.

D. Hydraulic Treatment and Bypass Capacity

1. The biofiltration treatment unit shall have a treatment flow rate capacity of not less than that listed on the plans measured in cfs ( $ft^3/s$ ), before bypass flow is allowed.
2. The biofiltration treatment unit shall maintain the peak conveyance capacity of the drainage network as defined by the Engineer.

## 2.2 MATERIALS

A. Precast Concrete Components: Precast concrete components shall conform to applicable sections of ASTM C 857, ASTM C 858, and the following:

1. Concrete shall achieve a minimum 28-day compressive strength of 5,000 pounds per square-inch (psi);
2. Unless otherwise noted, the precast concrete sections shall be designed to withstand lateral earth and AASHTO H-20 traffic loads;
3. Cement shall conform to ASTM C 150;
4. Aggregates shall conform to ASTM C 33;
5. Reinforcing steel shall be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 706, A 185 or A

- 497;
6. Joints shall be sealed with preformed joint sealing compound conforming to ASTM C 990; and
  7. Connections made between internal drain piping/the storm drain line and the SWTU shall be made using connectors conforming to ASTM C 923.
- B. PVC pipe shall conform to ASTM D 3034.
- C. Bio Soil Media (BSM) Components: The biofiltration treatment unit is composed of plant stabilization media, biofiltration media, and bridging stone arranged in layers with an underdrain and shall conform with the following:
1. Plant Stabilization Media shall consist of wood chips, nuggets, or bark. This is often referred to as mulch. Typical mulch is generated from double shredded wood or it can also be produced from bark;
  2. Proprietary Jensen engineered bio soil media (BSM) has been specially engineered to treat high flow rates with a design treatment rate of 191-inches/hr per square foot (ft<sup>2</sup>) or 2-gpm/ft<sup>2</sup>;
  3. Specified public domain filtration media may be used as a substitute for Jensen engineered bio soil media. Public domain media has a design treatment rate of 10-inches/ft<sup>2</sup>/hr or 0.1-gpm/ft<sup>2</sup> that will occupy a footprint that is typical twenty (20x) times larger;
  4. Bridging stone shall consist of either 3/8-inch washed pea gravel or 1/2-inch clean round rock; and
  5. The underdrain will consist of a 4-inch or 6-inch slotted pipe depending on the model of the precast biofiltration stormwater treatment unit.
- D. Tree grates and access covers shall be cast iron. Tree grate frames shall be cast iron.
- E. Projects requiring curb nosing shall be manufactured from galvanized steel and where specified shall be cast into a top slab designed to support vehicle loading per standard municipal and/or agency details and specifications.

### 2.3 MANUFACTURER

In accordance with these Specifications and the Drawings, the SWTU(s) shall be a StormVault BioFiltration (SVBF) manufactured by:

Jensen Stormwater Systems  
521 Dunn Circle  
Sparks, NV 89431  
(877) 649-0095

**INSTALLATION SPECS****3.1 HANDLING AND STORAGE**

The contractor shall handle and store the precast biofiltration stormwater treatment unit(s) and any of its components with care upon receipt and during installation. Any repair or replacement costs associated with events occurring after the delivery has been accepted and unloading has commenced shall be the responsibility of the contractor.

**3.2 INSTALLATION**

- A. The precast biofiltration stormwater treatment unit(s) shall be installed in accordance with the manufacturer's recommendations, these specifications, and per the drawings. The manufacturer shall provide the contractor installation instructions and offer guidance during critical stages of the installation. Reasonable notice shall be provided to the manufacturer prior to installation to coordinate onsite guidance.
- B. The contractor shall grout fill all voids in the precast concrete that are associated with lifting connection pockets in the concrete sections. Use non-shrink grout to fill pockets and strike flush with adjacent finished surfaces. The contractor shall trim all protruding lifting provisions flush with the adjacent concrete surface, leaving no sharp points or edges.
- C. Inspection: All components shall be subject to inspection by the Engineer at the place of manufacture and/or installation. All components are subject to be rejected or identified for repair if the quality of materials and manufacturing do not comply with the requirements of this specification. Components which have been identified as defective may be subject for repair. Final acceptance of the component is at the discretion of the Engineer.
- D. Engineered bio soil media for the precast biofiltration stormwater treatment unit shall be delivered installed in the vault, unless such delivery is unfeasible due to final lift weights or per an agreement. Contractor shall take all necessary step to ensure the bio soil media is free from foreign sediment and other debris responsibility to ensure the BSM is not fouled from construction site sediment erosion.
- E. Grate Protection covers shall remain fixed in place through the duration of the onsite construction activities or until the unit is formally brought online.
- F. Should the Bio Soil Media be shipped separate from the precast vault, the Manufacturer or a Manufacturer's rep shall provide onsite installation guidance, supervising the Contractor's placement of the BSM in the unit.

**3.3 SUBMITTALS**

- A. Shop Drawings & Catalog Cut Sheets Details: The contractor shall submit shop drawings for approval by the Engineer. Shop drawings shall be annotated to indicate all materials to be used and all applicable standards for materials, required tests of materials, and design assumptions for structural analysis. The shop drawings shall detail horizontal and vertical dimensioning, reinforcement, and pipe type and locations. Supporting

Catalog Cut Sheets of associated components and appurtenances shall also be included in the submittal packet substantiating materials and dimensions.

- B. **Warranty:** The manufacturer shall guarantee the precast biofiltration stormwater treatment unit(s) components against all manufacturer-originated defects in materials or workmanship for a period of twelve (12) months from the date of installation. The manufacturer shall be notified of repair/replacement issues in writing within the referenced warranty period. The manufacturer shall, upon its determination: repair, correct or replace any manufacturer-originated defects identified by the written notice within the referenced warranty period. The use of precast biofiltration stormwater treatment unit(s) components shall be limited to the application for which it was specifically designed.
  
- C. **Manufacturer's Performance Certificate:** The precast biofiltration stormwater treatment unit manufacturer shall submit a "Manufacturer's Performance Certification" certifying that each precast biofiltration stormwater treatment unit can achieve the specified removal efficiencies as listed in these specifications. The certification shall be supported by previous independent third-party research of the biofiltration treatment unit.