

**Project Name**  
**Project Location**  
**Hydro Ref. #**

## **PART 1 - GENERAL**

### **1.01 SCOPE**

- A. Work described in this section includes furnishing all labor, equipment, materials, tools and incidentals required for a complete and operable installation of the stormwater filtration system as shown on the drawings and specified herein. The manufacturer shall design and supply the equipment listed in Part 4.A. and the Contractor shall install the equipment in accordance with the manufacturer's Handling, Storage, and Installation Instructions.
- B. The manufacturer shall design and supply the equipment listed herein and the Contractor shall install the equipment in accordance with the manufacturer's Handling, Storage, and Installation Instructions.

### **1.02 GENERAL REQUIREMENTS**

- A. The stormwater filtration system shall be a precast, modular, upward flow, fluidized media bed filtration system, with integrated pretreatment, siphon activated bypass and drain down. The system shall be self-activating with no mechanical parts or external power requirements.
- B. The stormwater filtration system shall be supplied by a manufacturer regularly engaged in such work and who has furnished stormwater filtration systems that have been in successful and continuous operation for a minimum period of five years.
- C. Upon request, independently certified performance data and shall be made available to the Engineer of Record for use in determining that the treatment system meets the design criteria and performance requirements stated herein.

### **1.03 SUBMITTALS**

- A. Submittals shall be provided and shall include the following:
  - 1. General arrangement and dimensional drawings of the filtration system.
  - 2. Plan and elevation drawings of the filtration system as it shall be incorporated into the stormwater drainage system. The elevation drawing shall indicate the top of water level both upstream and downstream of the treatment system at the flow conditions specified herein.
  - 3. Handling, Storage and Installation Instructions.
  - 4. Operation and Maintenance Instructions and a Maintenance video.

#### 1.04 QUALITY ASSURANCE

- A. The stormwater filtration system shall be manufactured under the direction of an ISO 9001 Certified Company.

B. Inspection

The stormwater filtration system shall be subject to inspection by the Engineer of Record or the owner's representative at either the place of manufacture or the project site. Any and all observed defects shall be repaired to the satisfaction of the owner or owner's representative or replacement shall be made available.

C. Warranty

The manufacturer shall guarantee the filtration system from defects in materials and workmanship for a period of two years following installation. If during the warranty period defects in materials or workmanship are noted, then the manufacturer shall be promptly notified. The decision to repair or replace affected units shall be made at the discretion of the manufacturer.

D. Patent Indemnity

Upon request, the manufacturer shall warrant that the treatment system does not infringe upon or violate any patent, copyright, trade secret or any other proprietary right of any third party and shall indemnify the Owner against any loss, cost, expense or liability arising out of such claim whether or not such claim is successful.

E. Certificate of Compliance

Upon request, the manufacturer shall provide a "Letter of Certification" to certify that the stormwater filtration system adheres to the specifications required herein and complies with the project's stormwater management permit.

#### 1.05 MANUFACTURER

- A. The stormwater filtration system shall be the Up-Flo® Filter as designed by Hydro International located at 94 Hutchins Drive, Portland, Maine 04102. Telephone (207) 756-6200. Fax (207) 756-6212.

- B. Alternate stormwater filtration systems must demonstrate compliance with the specifications herein and be approved by the Engineer of Record. Request for alternative filtration systems shall include:

- I. Revised site plan showing location and orientation of proposed alternative, pipe sizes, connections and excavation limits.
- II. Product installation drawings showing plan and elevation views with water elevations for the flow conditions specified herein.
- III. Verified/certified product evaluations that demonstrate proposed sizing and performance that adheres to section 2.02.
- IV. Maintenance manual including inspection and clean out costs, maintenance video and three references for verifying successful completion of the procedures and associated costs.

- C. Costs for reviewing submittals for alternative filtration system shall be the Contractor's or alternative Manufacturer's responsibility.

## **PART 2 – STORMWATER FILTRATION SYSTEM**

### **2.01 General**

- A. The stormwater filtration system shall be an Up-Flo® Filter that provides three modes of treatment; sedimentation, screening and high-rate upward flow filtration all within the same structure. Internal components shall provide a minimum 2-ft sediment storage sump, adjustable bypass hood, siphon-activated high-flow bypass hood, and drain down with integrated flow control.
- B. An inlet pipe or grated surface inlet cover shall be used to convey surface runoff into a precast cylindrical or rectangular vault. Capture pollutants that settle shall be stored in a location that does not contain filtration components. Water elevations within the precast structure will be controlled with a vertical bypass chute. A water-lock baffle shall prevent the loss of captured pollutants that float on the water surface from escaping through the bypass chute.
- C. The upward flow filtration system shall provide protected storage regions for captured pollutants that float and for those that settle and shall not release captured floating pollutants during surcharge conditions. The upward flow filtration system shall operate as intended and perform as specified herein as pollutants accumulate.
- D. The upward flow filtration system shall fit within the limits of excavation (area and depth) as shown in the project plans and will not exceed the dimensions for the design flow rates specified herein.
- E. Minimum 24-inch openings shall provide access to the sediment storage volumes from the surface for inspection and maintenance. Hand removal of media from the treatment system shall be possible; no heavy lifting equipment will be required when media exchange is required.

### **2.02 Performance**

- 1. Sizing of the upward flow filtration system shall be based on independent full-scale laboratory testing and shall adhere to the Performance Specifications listed in Table 1. The laboratory testing used as the basis of product performance shall be undertaken in accordance with testing protocols approved or endorsed by the Stormwater Equipment Manufacturers Association (SWEMA) or acceptable State agency, such as a State Department of Environmental Protection (DEP) or recognized verification agency (e.g. ETV, NJCAT, NETE).
- 2. Independent full-scale field monitoring results shall demonstrate greater than 80% TSS removal based on a median particle size of 29 microns and removal of fine particulate matter down to 5 microns. Field performance results shall demonstrate a performance life of at least 6 years or 130 lbs of particulate material captured per Filter Module before 10% filter occlusion. Field monitoring test protocol shall adhere to, "Total Suspended Solids Removal Based on Field Testing Amendments to TARP Protocol Dated August 5, 2009".

3. Performance of the upward flow filtration system shall be based on treating the Water Quality Flow rate (WQF) without internally bypassing. The maximum filtration rate shall be greater than or equal to the WQF for an operating head of less than 30-inches. The upward flow filtration system shall remove greater than or equal to 80% of TSS based on the Target Particle Size (TPS) of 20 microns and demonstrate removal of particles down to 5 microns.
4. The upward flow filtration system shall treat all flows without internally bypassing up to the WQF and shall provide sufficient bypass capacity to convey the peak runoff flow rate without risk of flooding.

### **PART 3 – EQUIPMENT**

- A. The Up-Flo® Filter shall consist of a hollow, cylindrical or vaulted vessel with internal components.

- (i) The internal components to be supplied by Hydro International shall include the Support Frames, Filter Modules, Filter Media Packs, Siphon Activated Bypass Chute with Floatables Hood, and Draindown Filter.

Materials of construction for the above components excluding the support frame shall be cross-linked polyethylene (XLPE). The component support frame and screen and all metal parts shall be Type 304 stainless steel or carbon steel powder coated in accordance with ASTM 775/ ASTM A775M with a resulting thickness of 8-12 mils. All components shall be designed to withstand all normal loadings associated with fabrication, shipping, site installation, and normal operation of the equipment.

- (ii) The precast concrete structure shall be manufactured with concrete that has attained a compressive strength of 4,000 psi after 28 days. The structure shall be reinforced to withstand an HS20-44 loading. Shiplap joints shall be sealed with butyl rubber mastic sealant conforming to ASTM C990. Slab tops shall be suitably reinforced and provided with manhole openings and covers as required. The cast iron manhole frames and covers shall be sized as per the manufacturer's drawings and shall be in accordance with ASTM A48, CL.35B and AASHTO M105. The masonry fixing bolts shall be Type 304 stainless steel.
- B. Each stormwater Filter Module shall be supported by a stainless steel frame which shall consist of an angled screen with 0.25-inch diameter perforations to retain all neutrally buoyant material and debris greater than 0.25-inches in diameter.
- C. The upward flow filtration system shall have a flow controlled Draindown Filter to drain down the water level in the chamber between storm events. The filter media shall be positioned above the standing water level between storm events to prevent anoxic conditions in the media.
- D. The stormwater filtration system shall have a self-activated siphonic bypass to convey flows in excess of the peak treatment flow rate. The bypass shall be equipped with a floatables baffle to prevent the escape of buoyant litter and debris.

- E. Each stormwater filter module shall be furnished with a media pack. The media pack shall consist of the media bags placed between flow distribution media.
- F. The stormwater filtration system media bags shall be one of the following:
  - i. Carbon-peat-zeolite (CPZ™ Mix)
  - ii. Carbon-peat-sand (CPS™ Mix)
  - iii. Hydro Filter Sand (HFS™)
  - iv. Perlite

#### **PART 4 - EQUIPMENT DELIVERY**

- A. The Up-Flo® Filter components shall be delivered within eight weeks from the date of approved technical submittal.
- B. The Up-Flo® Filter components shall be delivered to the site fully fabricated and pre-assembled within the host precast structure, with exception of the media filter bags.
- C. Off-loading, storage, installation of the media filter bags, and final installation shall be by the Contractor.
- D. The Contractor shall inspect and provide signed acceptance of equipment prior to unloading, or notify Hydro International of any damage to equipment to effect proper remedial action. Failure to notify Hydro International of damage to equipment prior to unloading will void all warranties pertaining to subject equipment.

#### **PART 5 - EQUIPMENT INSTALLATION**

- A. The system shall be installed in strict accordance with the site plans, and the manufacturer's general arrangement drawings and Handling, Storage and Installation Instructions. The Contractor shall be responsible for installing the preassembled equipment and all necessary site connections.
- B. Hydro International shall be notified immediately of any equipment which is damaged during unloading, storage, or installation. The damaged equipment shall be repaired or replaced at the discretion of Hydro International and entirely at the Contractor's expense.
- C. The precast concrete structure shall be set on a granular or compacted sand subbase in accordance with local requirements for standard manhole installation.
- D. The precast concrete structure shall be set level to within 0.5%.
- E. Non-shrink grout shall be used to provide a water tight seal in the lifting holes and around the concrete knock-outs for the inlet and outlet pipes.
- F. The Contractor shall be responsible for installing the flow distribution media and media bags for each filter module as per the manufacturer's recommendations. The maximum dry weight of each filter bag shall be no greater than 36 lbs.

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#### **PART 4 - EQUIPMENT DELIVERY**

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