

Specifications for Municipal Deployment of the StormSafe-Helix

Municipality of _____
State of _____

Contract Number _____

PART 1 GENERAL

1.1 Description

The Contractor shall furnish and install the StormSafe-Helix stormwater treatment system, complete and operable as shown and as specified herein, in accordance with the requirements of the plans and contract documents.

The StormSafe-Helix stormwater treatment system shall consist of an underground precast structure that houses a passive, dual helix flow filter, held horizontally in a plastic pipe. The dual helix filter element functions like a multiple disk filter providing a tortuous travel path for stormwater. Each dual helix flow filter shall operate at a predetermined flow rate with the aid of a headwall. The StormSafe-Helix shall be capable of targeting either: 1) indicator bacteria (e-coli, fecal coliform, total coliforms, enterococcus; or 2) hydrocarbons.

1.2 Manufacturer

The StormSafe-Helix stormwater treatment system shall be of a type that has been installed and in use successfully for a minimum of three (3) years. The StormSafe-Helix stormwater treatment system shall be supplied by Fabco Industries located at 66 Central Ave, Farmingdale, NY 11735 (+1 631-393-6024), without exception.

1.3 Related Sections

A. Section []:

1.4 Submittals

- A. Fabco Industries, or authorized supplier, to submit shop drawings for StormSafe-Helix stormwater treatment system with vault, dual helix filters and accessory equipment. Drawings shall include performance characteristics, principal dimensions, maximum pick weight, filter placement, location of piping and unit foundation.

B. Fabco Industries, or authorized supplier, shall submit an Operation and Maintenance Manual.

C. Buoyancy and structural calculations available on request

PART 2 PRODUCTS

2.1 Internal Components

All internal components including ADS N-12 (HDPE) pipe, helical filter elements, removable inlet diffuser covers and associated mounting hardware shall be provided by Fabco Industries.

A. Filter housing: AASHTO Type 'S' or Type 'D' ADS N-12 (HDPE) pipe or equal.

B. Helical filter elements: CRS wire frame with treated open cell foam or non-woven polypropylene sheet cover.

C. Removable inlet diffuser cover made of 12 Gauge [0.0808 in (2.1 mm)], Aluminum Alloy, 5052-H32

D. All mounting hardware for filter housing shall be 304 stainless steel or equal

2.2 Precast Concrete Vault Components

A. Precast concrete vault structure shall be designed to meet or exceed H-20 load rating

B. Vault joint sealant shall be CONSEAL CS-101 or approved equal.

C. If interior concrete baffle walls are provided, baffle walls shall be sealed to the interior vault walls and floor with a polyurethane construction sealant rated for use below the waterline, SikaFlex 1a or equal. Contractor to provide sealant material and installation unless completed prior to shipment.

D. Frames and covers shall be gray cast iron and shall meet AASHTO H-20 loading requirements. East Jordan Iron Works (EJIW) #1581 and #1480 castings are recommended for repeated vehicular traffic.

2.3 Contractor Provided Components

All contractor-provided components shall meet the requirements of this section, the plans specifications and contract documents. In the case of conflict, the more stringent specification shall apply.

- A. Crushed rock base material shall be six-inch minimum layer of ¾-inch minus rock. Compact undisturbed sub-grade materials to 95% of maximum density at +/-2% of optimum moisture content. Unsuitable material below sub-grade shall be replaced to engineer's approval.
- B. Concrete shall have an unconfined compressive strength at 28 days of at least 3000 psi (20 MPa), with ¾-inch (19 mm) round rock, a 4-inch (102 mm) slump maximum, and shall be placed within 90 minutes of initial mixing.
- C. Silicone Sealant shall be pure RTV silicone conforming to Federal Specification Number TT S001543A or TT S00230C or Engineer approved.
- D. Grout shall be non-shrink grout meeting the requirements of Corps of Engineers CRD-C588. Specimens molded, cured and tested in accordance with ASTM C-109 shall have minimum compressive strength of 6,200 psi (43 MPa). Grout shall not exhibit visible bleeding.
- E. Backfill material shall be ¾-inch (19 mm) minus crushed rock, or approved equal.

PART 3 EXECUTION

3.1 Precast Concrete Vault

- A. Set precast vault on crushed rock base material that has been placed in maximum 12 inch (300 mm) lifts, loose thickness, and compacted to at least 95-percent of the maximum dry density as determined by the standard Proctor compaction test, ASTM D698, at moisture content of +/-2% of optimum water content.
- B. Vault floor shall slope 1/4 inch maximum across the width and slope downstream 1 inch (25 mm) per 12 foot (3.65 m) of length. Vault top finish grade shall be even with surrounding finish grade surface unless otherwise noted on plans.

- C. Inlet and outlet pipes shall be stubbed in and connected to precast concrete vault according to Engineer's requirements and specifications.
- D. If grout is used, Contractor to grout all inlet and outlet pipes flush with or protruding up to 2 inches (51 mm) into interior of vault.

3.2 Ballast

- A. When required, ballast shall be placed to the dimensions specified by the engineer and noted on the data block. Ballast shall not encase the inlet and/or outlet piping.

3.3 Clean Up

- A. Remove all excess materials, rocks, roots, or foreign material, leaving the site in a clean, complete condition approved by the engineer. All filter components shall be free of any foreign materials including concrete and excess sealant.

3.4 Helical Filter Elements

- A. Helical filter elements shall be delivered with the vault. Contractor shall take appropriate action to protect them from sediment and other debris during construction. Methods for protecting the cartridges include but are not limited to:
 - 1. Remove helical filters from the vault and store appropriately. Helical filter elements shall be reinstalled to operate according to 3.4 B (see below).
 - 2. Leave helical filter elements in the vault and plug inlet and outlet pipe to prevent stormwater from entering the vault. The method ultimately selected shall be at Contractor's discretion and Contractor's risk.
- B. Helical filter elements shall not be placed in operation until the vault is clean and the project site is clean and stabilized (construction erosion control measures no longer required). The project site includes any surface that contributes storm drainage to the StormSafe-Helix. All impermeable surfaces shall be clean and free of dirt and debris. All catch basins, manholes and pipes shall be free of dirt and sediments. Contact Fabco Industries to assist with system activation and/or inspect the system for proper installation once site is clean and stabilized.

PART 4 PERFORMANCE

4.1 Energy Dissipation

- A. Each stormwater filtration system shall include an inlet diffuser to spread the trajectory and reduce the velocity of the inlet flow as well as provide for floatables control and gravity settling of coarse particulates in the pretreatment chamber.

4.2 Headwall

- A. Each stormwater filtration system shall include a headwall to control the rate of flow entering the helical filters and to provide a bypass mechanism when flows exceed the capacity of the filters (clean or exhausted with pollutants).

4.3 Helical Filter Elements

- A. Each stormwater filtration system shall contain one or more helical filter elements made from a CRS wire frame with treated open cell foam media for removing indicator bacteria or non-woven polypropylene geotextile for treating oils and grease, hydrocarbons, poly aromatic hydrocarbons (PAHs) and sediment particulates. The size of the filter elements can vary; with the standard element being 30 inches (760 mm) in diameter by 30 inches (760 mm) long.
 - 1. The helical filter element shall be constructed of individual steel frame baffles assembled on a central rod to form a dual helix shape. Steel frame baffles shall accept filtration media in the shape of a sleeve.
 - 2. Bacteria Media – An open cell foam sleeve shall be treated with FABGuard Antimicrobial Shield or approved equal, which forms a colorless, odorless, polymer layer of stiff fibers that are electrically charged. When indicator bacteria come in contact with the treated surface, the fibers puncture the cell membrane. The method of reducing bacterial counts within a flow stream is therefore considered mechanical treatment.
 - a. Open cell foam sleeves specified for the helical filters shall be polyurethane foam that is heat and pressure treated to create a flexible skeletal foam structure without cell membranes. The resulting open-pore foam shall contain void volumes of 90 to 95 percent and surface areas of 150 to 200 ft² per cubic foot (492 to 650 m² per cubic meter).

- b. The FABGuard Antimicrobial Shield or equal product shall be non-volatile, insoluble and non-leaching, and last the life of the open cell foam.
 - c. The FABGuard Antimicrobial Shield or equal product shall be verified through its use in consumer and medical goods including hosiery, surgical drapes, carpets,
 - d. The open cell foam material treated with FABGuard Antimicrobial Shield or equal product shall be safe, non-hazardous and can be disposed of in a municipal landfill.
3. Oils and Grease (Hydrocarbons) Media – Shall be a very efficient, non-polar and lipophilic lightweight fiber matrix such as X-TEX, that adsorbs an average of greater than 20 times its weight of hydrocarbons or vegetable oils in loose fiber form, and greater than 10 times its weight in the textile-blanket form..
- a. The X-TEX or equal textile material shall meet the EPA's definition of a sorbent as specified in Title 40 of the CFR, Sect 300.5 and 300.915(g) and approved for use by at least one agency involved in spill response and cleanup such as the US Army Corps of Engineers.
 - b. At a minimum, pollutants captured by X-TEX sleeves shall include the following:
 - i. Liquid hydrocarbon, oils and grease
 - ii. Motor oil, diesel, and fuel residues from water
 - iii. PAHs including, benzo(a) anthracene, chrysene, benzo(b) fluoroanthene, benzo(a) pyrene
 - iv. Animal and vegetable oils

4.4 Hydraulic Performance

- A. Flow testing of a standard 30" diam X 30" long helical filter (760 mm X 760 mm) shall be performed for rates up to 3 cfs (0.08 cms). Hydraulic testing shall include a steady state flow of 3 cfs (0.08 cms) held for at least 2 hours, thereby allowing at least 162,000 gallons (613,236 L) to pass through the filter with little or no change in head pressure.

4.5 Performance Summary

- A. Each StormSafe-Helix shall be capable of reducing indicator bacteria by 50 to 80 percent at flows at or below the treatment capacity when deployed with FABGuard media.
- B. At a minimum, each StormSafe-Helix shall be capable of reducing hydrocarbons according to test data and technical specifications provided by the X-TEX Corporation which can be found at the following URL - <http://www.xetex.com/testdata.htm>.
- C. Each StormSafe-Helix model shall adhere to the following design specifications.

StormSafe-Helix Model	Number of Helical Filters	Treatment Capacity ¹	Typical Vault Footprint WXL	Oil Storage Capacity
StormSafe Pathogen HF1	5	3 cfs 85 lps	8 ft X 20 ft 2.4 m X 6 m	NA
StormSafe Pathogen HF2	10	6 cfs 170 lps	10 ft X 20 ft 3 m X 6 m	NA
StormSafe Pathogen HF3	15	9 cfs 255 lps	12 ft X 20 ft 3.7 m X 6 m	NA
StormSafe O&G HF1	3	3 cfs 85 lps	8 ft X 20 ft 2.4 m X 6 m	30 gal 114 L
StormSafe O&G HF1	6	6 cfs 170 lps	10 ft X 20 ft 3 m X 6 m	90 gal 340 L
StormSafe O&G HF1	9	9 cfs 255 lps	12 ft X 20 ft 3.7 m X 6 m	120 gal 454 L

1. Treatment capacity based on standard helical filter size 30" Diam X 30" Long (760 mm X 760 mm)

END OF SECTION