



Memo

Response to Comments: 23 Ocean Avenue Development

Date: September 8, 2016

General Notes:

During the initial stages of the permitting process, it came to our attention (through public comment) that there may be flooding issues on Hersey Street. After discussion with Brad Roland and Justin Pellerin, we were able to confirm that during certain heavy rain events, the catch basin on the South Side of Hersey Street (at the downstream low point) has become overwhelmed and stormwater runoff has drained from the roadway onto adjacent private property. For this reason, we were asked to demonstrate that the project will not increase stormwater discharges to Hersey Street.

We were also told that the City plans to install a separated stormdrain system on Ocean Avenue and asked to direct our runoff to the Ocean Avenue drainage system to the greatest degree practical so that this runoff can be connected to the separated stormdrain system when it is installed.

Based this new information, we have adjusted our stormwater design to pipe the runoff from the roof of the new building to Ocean Avenue. In addition to addressing the comments below, this memorandum is intended to demonstrate that we have addressed the City's concerns/requests.

Comments Submitted by: Lauren Swett, PE of Woodard & Curran on 2016-07-14

Comments

1. The Applicant has submitted a City of Portland Wastewater Capacity Application. The Applicant should note that they will be required to provide evidence of capacity to serve and approval of the proposed design from the City of Portland.

Understood, no response needed.

2. The Applicant has indicated on their plans that they will be extending gas and electrical services from meters to be installed on the existing building to remain. The Applicant should provide verification from both Unitil and CMP that the ability to serve exists, and that the configuration will be acceptable to each utility.

As requested by the City, electrical and communications utilities have been

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reconfigured to run from an existing pole (Pole #1, Nynex 1) on the opposite corner of Hersey- Ocean, beneath Hersey Street to the new building, in a more traditional alignment. The applicant has set up an account with CMP for the new building and is in the process of scheduling an onsite meeting. The applicant is not proposing to install a new gas service to the new building.

3. The proposed underground gas and electric utilities will be located beneath an existing hedge located along Ocean Avenue. The site preparation plan notes that the hedge is to remain, and the landscaping plan does not provide any new plantings in this area. The Applicant should comment on the plan for maintaining this existing landscaping with the proposed utility installation.

The proposed utilities have been reconfigured as described above and are no longer in conflict with the hedge. The hedge will remain.

4. In accordance with Section 5 of the City of Portland Technical Manual, a Level III development project is required to submit a stormwater management plan pursuant to the regulations of MaineDEP Chapter 500 Stormwater Management Rules, including conformance with the Basic, General, and Flooding Standards. We offer the following comments:
 - a. Basic Standard: Plans, notes, and details should be provided to address erosion and sediment control requirements, inspection and maintenance requirements, and good housekeeping practices in accordance with Appendix A, B, & C of MaineDEP Chapter 500. The applicant has provided details, and notes indicating erosion control requirements, but we recommend the addition of erosion and sedimentation control locations on the plans and additional notes on inspection and maintenance requirements should be added to the plans to be in conformance with the standards.

Note 4 on sheet C-1 requires the contractor to inspect erosion control measures weekly and after rain events and to keep a log of the inspections. A mulch berm has been added along the eastern (down-gradient) edge of the property.

With such a small and constrained urban site, it is our assessment that allowing the contractor a certain degree of flexibility to maintain disturbed areas and keep soils onsite can produce the best results. For example, it may not be practical to install a mulch berm or silt fence along the southern (down-gradient) side of the site; however, it may be feasible to grade the site to drain internally or to drain towards the mulch berm along the eastern boundary.

- b. General Standard: The project is required to include stormwater management features for stormwater quality control. The Applicant is proposing to install rain gardens, pervious pavers, and underdrained roof drain collection systems on the site. The proposed systems are anticipated to provide acceptable stormwater treatment, but the Applicant is required to provide calculations and additional design information verifying compliance with the Maine DEP Chapter 500 and City of Portland Technical Standards Section 5.

The site's existing impervious area is 4,036 SF and the proposed impervious area is 6, 188 SF, which results in an impervious surface increase of 2,152 SF.

Runoff from the proposed building's roof (2,824 SF) will drain through a roof drain cartridge filter before discharging to an existing catch basin Ocean Avenue. See attached sizing information and specifications from the manufacturer and manufacturer's representative.

The remainder of the site will drain to an underdrained soil filter and pervious paver area in the south eastern corner of the site. Additionally, downspouts from the existing building will be directed into underdrain system with 12" of crushed stone storage below the pipe. We calculate water quality volumes for these BMPs as follows:

Underdrained Surface Soil Filter (Rain Garden): 75 CF (based on an area of 100 SF with an average depth of 9")

Crushed Stone Beneath Pervious Pavers: 58 CF (assumes 33% void ratio)

Crushed Stone Beneath Underdrain for Roof Liters: 47 CF (assumes 33% void ratio)

This results in a total volume of 180 CF, which is equivalent to 1" of rainfall over an impervious area of 2,160 SF.

Therefore, the proposed stormwater management system is designed to treat the runoff from a total of 5,024 SF of impervious area for a 1" rain event. This area is more than twice the impervious area we are proposing to add.

The proposed rain gardens do not appear to have any overflow structures or bypass outlets.

The rain garden in the southeastern corner of the site will overflow through the driveway apron to the Hersey Street gutter. This has been clarified on the plans and additional information on grading has been provided so that it is clear that overflows should through the driveway apron and not onto the sidewalk/esplanade.

Due to changes in the parking area and because the roof of the new building will now drain to Ocean Avenue (to be connected to a future separated stormdrain) the northern rain garden (near the existing building) has been eliminated.

Applicant should provide model and information indicating the peak water elevations within these systems during storm events, as well as information on infiltration rates at these sites. The Applicant should provide comment on the potential for these systems to overflow during storm events, and the impact that this may have on their site and adjacent properties.

The stormwater BMPs described above are intended to provide

treatment during small to moderate rain events and also to treat a “first flush” during larger rain events (treatment areas described above). Although a moderate degree of peak flow attenuation may occur, the BMPs are not designed to provide stormwater detention.

During larger rain events, the rain garden will routinely overflow to the Hersey Street gutter through the driveway apron. This is an existing condition, as the site currently drains through the driveway apron to Hersey Street; however, the peak flow rates and volumes of discharges to Hersey will be reduced because runoff from the roof of the new building will drain to Ocean Avenue (see Flooding Standard response). Therefore, impacts to adjacent residential properties will be reduced.

Based on the Cumberland County USDA soil survey GIS data, the existing soils on this site are hydrological group C & D, moderately to somewhat poorly drained. Also, based on surficial geology mapping, subgrade soils are part of the Presumpscot Formation, which is marine clay. For these reasons, we anticipate minimal infiltration and it is our opinion that it will be necessary to underdrain the rain gardens.

- c. Flooding Standard: The project is required to include stormwater management features to control the rate or quantity of stormwater runoff from the site. The Applicant has requested a waiver of the flooding standard. The project will result in the creation of greater than 1,000 square feet of new impervious surface, which cannot be considered as a de minimus increase. Additional information, including stormwater calculations and verification of downstream infrastructure capacity to handle any increases in flow, is required before we can consider a potential waiver of the flooding standard.

As shown on Sheet C-1, the runoff from the roof of the new building will be conveyed to the Ocean Avenue drainage system. The area of the new building, at 2,824 SF, is greater than the additional impervious area that this project will create. Because drainage from the new roof will drain to Ocean Avenue, total area and the impervious area that drains from this site will decrease. Therefore, the proposed development will result in a reduction in peak flow rates (and volumes) from this site into the Hersey Street drainage system.

The City has asked us to redirect drainage from this site to Ocean Avenue so it can be connected to a new separated stormdrain system, which will be installed in the near future. It is our understanding, will be designed to convey area stormwater flows.

After the separated drainage system is installed, this project will have zero impact on the Ocean Avenue combined sewer and as mentioned above, flow rates to Hersey will decrease. For these reasons, we are requesting either a waiver of the flooding standard or a determination that the flooding standing has been met.

5. The Applicant has requested that the outlet from one of the proposed rain gardens on the site be connected to the City of Portland combined sewer system in Hersey Street. Per Section 2 of the City of Portland Technical Manual, “the introduction of non-contaminated water such as rain water, non-contact cooling water, groundwater from foundation drains, sump pumps, surface drains or any other sources of inflow shall not be allowed to discharge into a sewer which conveys sanitary waste unless approved by the City Engineer.” A waiver of this requirement may be considered when no other alternative exists. Before a waiver can be considered for this project, additional information on the anticipated flow quantities must be provided.

The proposed underdrain will run beneath the pervious pavers at the driveway apron and the proposed rain garden. Based on consultation with Ransom’s Geotechnical engineering staff, we estimate the permeability of the sand (MaineDOT 703.22 Underdrain Type B Backfill) beneath the pavers to be in the range of 1 to 10 in/hour. This is greater than the permeability of the soil filter media (which Maine DEP estimates to be in the range of 0.5 to 2.4 inches per hour).

If we take the upper range of underdrain backfill permeability and double it (20 in/hour) then, considering the area of the pervious pavers and rain garden, the maximum flow rate from the underdrain is estimated to be in the range of 0.12 CFS. Considering that this is the high end of the estimated permeability range, we estimate that the average/actual discharge rates to the combined sewer will likely be less than 0.05 CFS.

6. The Applicant should provide proposed locations for snow storage, or comment on a plan for snow removal from the site. The site’s stormwater features should not be utilized for snow storage.

Snow storage has been added as shown on the revised plans

John I. Mahoney

Subject: FW: Downspout Filter/cartridge outbox box sizing

From: Rob Woodman [<mailto:rwoodman@acfenv.com>]

Sent: Wednesday, September 07, 2016 10:48 AM

To: John I. Mahoney

Subject: Downspout Filter/cartridge outbox box sizing

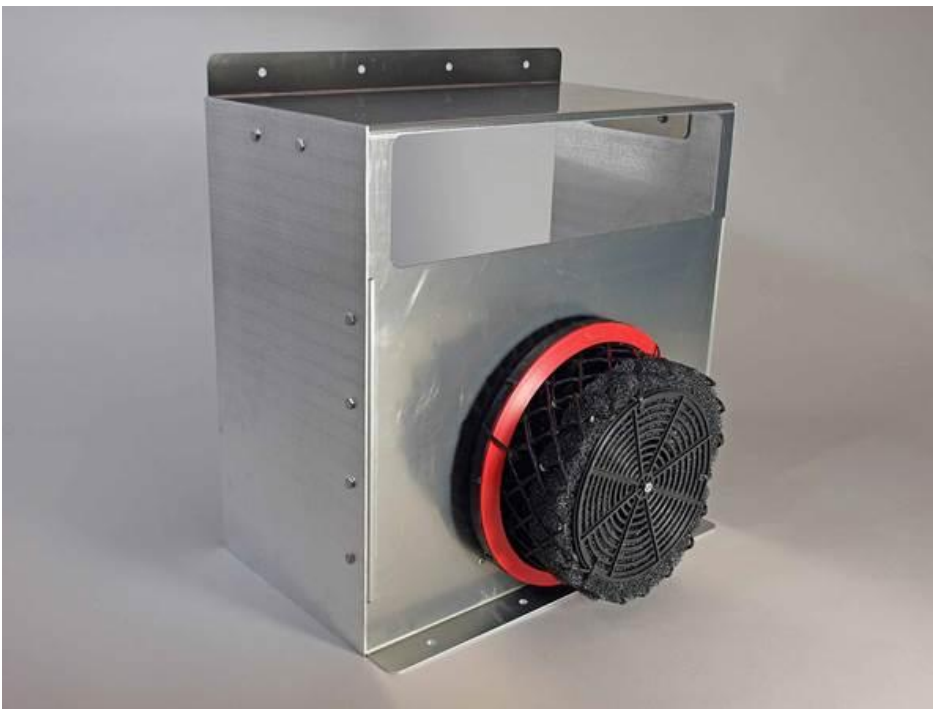
John,

In terms of sizing – if we take the 2,700 sf area you listed in a previous email and run it through the Rational Method –

Based on a 1yr intensity of 2"/hr, the 2,700 sf area and runoff coeff 'c' of 0.9 – peak flow would be around 0.12 cfs – so a 1 cartridge model would be fine.

For the 25yr intensity of 6"/hr – the peak flow would be 0.33 cfs – which will easily be managed by the overflow bypass.

I think we can fit this in a 2' square catch basin – but will need to check the CAD detail (which I hope to have shortly) to make sure there is enough room to remove and replace the cartridge.



Hope this helps.

Rob

Robert J Woodman, P.E., CPESC

Senior Stormwater Engineer

| ACF Environmental |

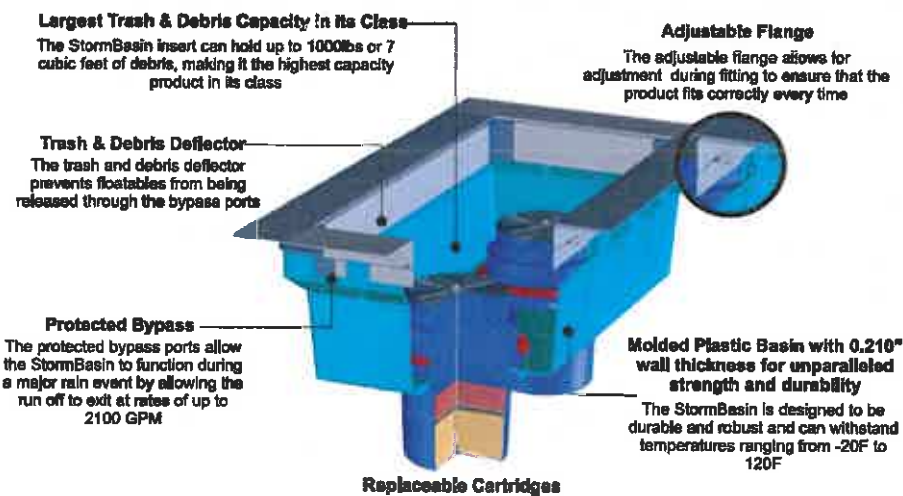
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STORMWATER MANAGEMENT SOLUTION SUBMITTAL

STORMBASIN, STORMSAFE AND DOWNSPOUT FILTER BY FABCO INDUSTRIES



PREPARED BY: ACF ENVIRONMENTAL

SEPTEMBER 2016

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Richmond, VA 23234



September 2, 2016,

**SUBJECT: Stormwater Treatment Device for City of Portland Infill projects
StormBasin, StormSafe, Downspout Water Quality Inlet Filter**

Dear City of Portland Engineer/Designer,

ACF Environmental is pleased to provide a comprehensive submittal package for the **StormBasin, StormSafe Vault and Downspout** – cartridge filter based water quality inserts by Fabco Industries and proudly represented by ACF Environmental in Pennsylvania.

This technology provides a high performance, space efficient, cost effective, and easy to maintain stormwater quality filter catch basin/manhole or downspout insert that is well suited to retrofit projects and as an effective pretreatment device upstream of infiltration systems.

While this system does not meet the full extent of MeDEP Chapter 500 water quality requirements for innovative solutions, the Downspout Filter has been recently approved on a series of infill projects in the City of Portland where there is insufficient space for the traditional BMPS to treat primarily roof runoff. Recent/current projects include both the **185 Fore Street** development and the **16 Middle Street** development projects where the Downspout Filter was approved by the City and their assigned reviewers to provide acceptable levels of treatment for the roof runoff.

As shown in the attached submittal package, the Fabco Stormbasin provides 82% TSS removal for the OK85 particle size distribution at 0.26cfs per cartridge – using the ‘standard’ cartridge.

Specific pollutant targeted cartridges are available to address Hydrocarbons, metals, nutrients and bacteria.

Should you have any question or require additional information, don't hesitate to contact me for assistance.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert Woodman". The signature is fluid and cursive, with a long horizontal stroke at the end.

Robert J Woodman,
Senior Stormwater Engineer
ACF Environmental

POST CONSTRUCTION STORMWATER TREATMENT SUBMITTAL

StormBasin, StormSafe Vault and DownSpout Filter by Fabco Industries

Prepared by: Robert Woodman, PE – ACF Environmental

Date: May 16, 2016

Introduction:

ACF Environmental, Fabco Industries' primary distributor along the east coast, has prepared this document to provide a product summary and provide pertinent information including case studies, operations and maintenance and engineering details for the Fabco StormBasin drain insert (and StormSafe Vault and DownSpout Filter).

Proposed Products:

- **StormBasin** – Catch Basin Cartridge filter – By Fabco Industries.
- **StormSafe Vault** – Cartridge Filter Vault – By Fabco Industries.
- **DownSpout Filter** – Roof runoff cartridge filter – By Fabco Industries.

About Fabco Industries, Inc.

Fabco is an industry leader in the design, manufacturer, and application of stormwater treatment systems. Fabco practice a philosophy of continuous product innovation, research, and development. Fabco's goal is to provide innovative technology and products that result in cleaner water for all. Their range of durable, cost-effective products is designed to meet increasingly stringent pollution control regulations and best management practices for municipal and commercial stormwater markets.

Fabco offers sustainable, simple-to-maintain filtration solutions to meet virtually any stormwater pollution control challenge. Fabco and their distributors work with their clients to tailor the right Fabco solution for any situation. Fabco Industries was established in 1997 and is headquartered in Farmingdale, NY.

ACF Environmental is the primary distributor of Fabco solutions along the east coast.

Fabco StormBasin Product Overview:

Fabco StormBasin is a proprietary stormwater treatment cartridge based system that is mounted within the inlet to a drainage structure. The StormBasin is designed to capture and retain stormwater pollutants namely: sediment, trash, vegetation, nutrients, coliform bacteria, oil/grease and dissolved metals (e.g., lead, copper, cadmium and

chromium). The large sediment and debris basin provides ample storage volume for solids carried in stormwater flows (over 8 cubic ft. in the 30" x 48" size). The product's design features a "hooded" bypass to reduce the potential for flooding during peak storm events while still retaining sediment and debris. The StormBasin also keeps the captured material dry, simplifying maintenance and reducing disposal costs. Figure 1 provides a simple graphic of the system features.

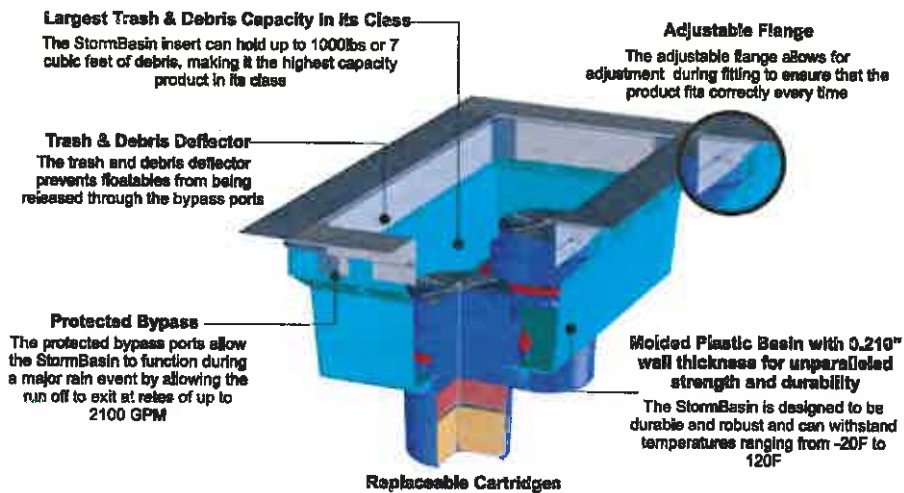


Figure 1: StormBasin Features

Fabco filter cartridges are designed to provide effective treatment of stormwater while maintaining high flow rates throughout the life of the cartridge. Filter cartridges are available in various configurations allowing you to fine tune performance by targeting specific pollutants such as: sediments and debris, heavy metals, hydrocarbons/toxic chemicals, pathogens/bacteria and nutrients. The lightweight filter cartridge comes fully assembled and snaps securely in place with a quick twist. The modular cartridge design allows quick and easy replacement while containing the spent material for safe transport and disposal.

Illustrations of the "standard", "Hydrocarbon" and "Nutrients" cartridges and their capacities are shown below as Figure 2 (on the next page).

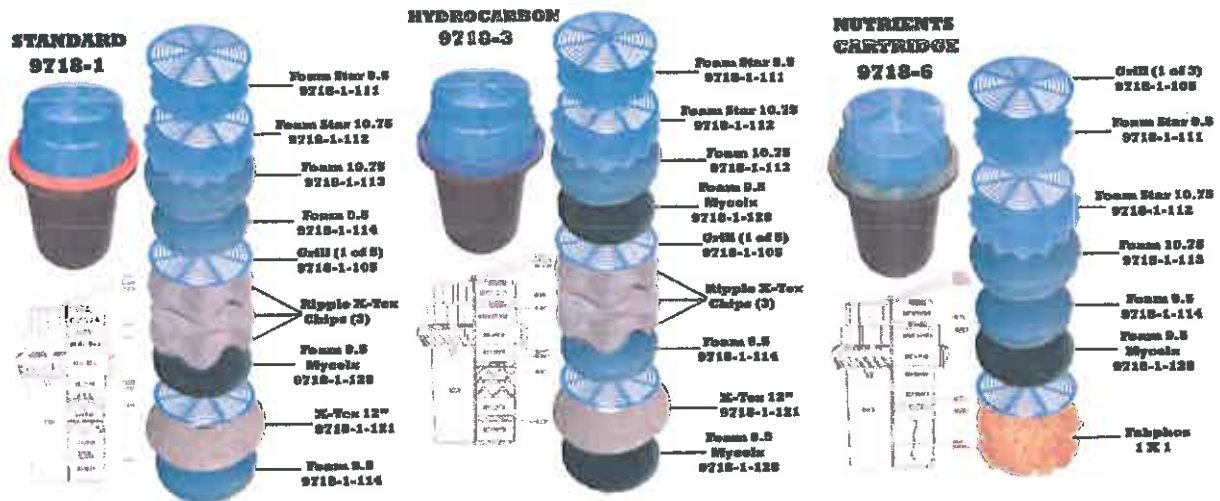


Figure 2: Fabco filter cartridge

Fabco StormBasin Images:



As discussed above, the Fabco StormBasin cartridges target TSS, heavy metals, bacteria, and oils and grease.

Third Party Testing

Long Island Analytical Laboratories, Inc. , A third party laboratory, performed a test in 2015 that demonstrated that for an OK85 silica sand gradation at a design flow rate of 120 gpm per cartridge, a mean TSS removal of 82.3% was achieved.

A copy of the lab report is included with this letter at Attachment A.

Fabco Industries Laboratory Testing

Hydraulic Test Report and O&G Removal:

This was a FABCO laboratory test that evaluated clean cartridge flow capacities and oil and grease removal rates.

Results indicated clean flow rates of 100 gpm +/- 15% and oil and grease reductions of greater than 80% for influent concentrations in the 50-80 mg/L range.

Stormwater Nutrient P&N Test Program:

This program was conducted as a result of local New York Municipal and County requirements to show our efficacy in reducing total phosphorus and total nitrogen in the field. The program lasted 14 months (Oct 2006 to Dec 2007) and tested a number cartridge designs and local hydrologic\land use conditions. At the end of the study, the optimal nutrient cartridge was capable of removing on average > 60% Total Phosphorus for concentrations above 0.14 mg/L and > 40% Total Nitrogen. The final conclusions were based on stormwater runoff samples collected from Site 3 for a 1 month period (November of 2007). Site 3 is described as a residential area (grassy lawns, impervious sidewalks, surface streets, landscaping, trees, etc.). The contributing drainage area to the 24" round grate was less than 0.25 acres and was 50% impervious.

Analysis of Sediments from Cleanout Events – Short Summary:

Street dirt or sediments deposited in a StormBasin (Site 349) installed in an urban roadway setting in Nassau County were allowed to collect in the StormBasin over a 4 month period. Analysis of this material showed that 40% by mass were less than 300 microns, which is supportive of Fabco's claim that the unit will remove 110 micron particles at a very high rate of efficiency (at least 80%).

Fabco StormBasin Sizing:

The Fabco StormBasin is a flow based device. The 'standard' cartridge can treat a peak flow of 0.22 cfs (80% TSS). As such the water quality design flow or treatment goal for the inlet of interest determines how many cartridges are required to meet the water quality goal. Table 1 (below) provides the flow ranges for 1, 2, 3 and 4 cartridge StormBasins.

Table 1: # Cartridges Req'd to meet Flow Requirement

Req'd Treatment Flow (Q_{wq}) (cfs)	# Standard Cartridges Req'd
0-0.26	1
0.27-0.52	2
0.53-0.78	3
0.79-1.04	4

Note: A high flow cartridge is available to treat up to 0.58cfs per cartridge.

Details of 1, 2, 3 and 4 cartridge StormBasin water quality units are included in Attachment B. Note: The StormBasin is available in many different dimensional layouts. The details in Attachment B are just examples of common configurations.

A copy of the Fabco StormBasin tech brochure is included with this letter as Attachment C.

Fabco StormBasin Case Studies:

Fabco StormBasins have been installed for retrofit projects across the country. Since 2009 more than 4,000 Fabco catch basin inserts have been installed in Nassau County, NY - a major suburban area on Long Island in order to comply with NYS DEC MS4 permit requirements and clean water act goals of restoring the health of the South Shore Estuary and Long Island Sound – See Attachment D.

Other notable StormBasin projects include:

- Putnam Valley, NY – Phosphorus Limited Lake Watershed (see Attachment D)
- Patchogue Lake, NY – See Attachment D News article

Fabco StormBasin Maintenance:

After installation the StormBasin requires periodic cleaning. There are no hard and fast rules in this regard. Small units and installation sites with higher than expected sediment loads or areas with significant trees and foliage require more maintenance. In general, Fabco Industries recommends cleaning out the unit(s) twice per year by removing the debris, sand and silt and replacement of the cartridges once per year. An Operations and Maintenance Manual is provided as Attachment E.

Fabco StormBasin Specification:

The StormBasin cartridge specification is provided as Attachment F.

Fabco StormSafe Vault:

In certain applications, typically in larger developments or redevelopment projects, it can be more economical to consolidate the number of required cartridges into one single manhole or vault. This configuration is referred to as the Fabco **StormSafe Vault**. The StormSafe vault can be configured several different ways, but typically consists of a concrete structure with a deck that is custom built to house the required number of cartridges. Images of the StormSafe Vault are provided below:



StormSafe Cartridge Vaults are ideal for small drainage areas that require stormwater treatment beyond simple gross pollutants and trash removal. By utilizing the same proven filter technology from the StormBasin product line, the StormSafe Cartridge Vault can reduce concentrations of targeted stormwater pollutants in a cost effective manner. This flexibility in design makes the StormSafe Cartridge Vault ideal for small parking areas, storage areas that have high concentrations of heavy metals, or maintenance facilities that generate oils and grease loads.

Relative to other vault systems the StormSafe Cartridge Vault is designed to provide a highly effective treatment solution within a small foot print.

Inside the StormSafe Cartridge Vault there are 3 discrete chambers:

Chamber 1: Pretreatment Chamber - Untreated water enters the StormSafe here

Chamber 2: Filtration Chamber - Contains the filter cartridges.

Chamber 3: Outlet Chamber - Located behind the Pretreatment and Filtration chambers, the Outlet chamber contains the outfall pipe

Treatment process:

Stormwater runoff enters the vault through the Pretreatment chamber where the heaviest sediments begin to separate from the water and drop to the bottom of the chamber. As the runoff fills the chamber the water level rises upwards towards a rectangular opening or weir passing through the wall to the Filtration Chamber.

To protect the Filtration Chamber from the floating trash, debris and, oils/grease in the runoff, the opening/weir connecting the Pretreatment to the Filtration Chamber is equipped with a full length hood. This submerged hood, acts like an oil/water separator trapping floating material in the Pretreatment Chamber. This simple process protects the filter cartridges extending their service life and allowing optimum treatment flow rates.

Water leaving the Pretreatment Chamber enters the Filtration Chamber where it is filtered through cartridges held in a permanently installed mounting plate.

The treated water leaving the cartridges drops down below the mounting plate and flows directly into the Outlet Chamber where it exits the treatment process.

If the inlet hood between the Pretreatment Chamber and the Filtration Chamber becomes blocked or if the total flow rate to the StormSafe exceeds the system treatment capacity, water can flow over the internal dividing walls and into the Outlet Chamber thereby providing additional hydraulic capacity.

A copy of the StormSafe Vault tech brochure is included with this letter as Attachment G.

Maintenance for the StormSafe Vault is similar to that of the StormBasin – discussed above.

Fabco DownSpout Filter:

The Fabco cartridge filter technology can also be applied to treat stormwater in roof drains and downspouts. The Fabco **DownSpout Filter** (an example shown below) can also be configured in several ways and can be pavement mounted adjacent to a building, wall mounted or set within a building utility room or basement to collect and treat internal roof drains.

The **DownSpout Filter** is designed to treat particulates and soluble pollutants contained in runoff water from roof tops. While most would agree that water leaving roof surfaces is much cleaner than most stormwater runoff, it is not completely free of potentially harmful contaminants. For example:

Heavy metals: Water can react with the metal roofs, metal components or roof mounted equipment which then releases soluble metals, such as zinc, copper, lead and aluminum into the water stream. This release can be accelerated in areas where acid rain is prevalent. For example, studies have shown that zinc concentrations in rooftop runoff are substantially higher than those in rainwater. Elevated levels of zinc in soils may lead to phytotoxicity (the poisoning of plants), which is a concern when portions of plants will be consumed.

Pathogens: Birds, insects, and small mammals deposit fecal matter on rooftops and in gutters, contributing bacteria and pathogens to runoff.

Polycyclic aromatic hydrocarbons (PAHs), dust and particulate matter from vehicle exhaust and the burning of fossil fuels can collect on roof surfaces, producing elevated PAH levels in runoff.

The DownSpout filter utilizes proven StormBasin replaceable filter Cartridges to treat most common stormwater pollutants. Filter cartridges can be selected to treat: Sediments/debris; hydrocarbons; heavy metals; nutrients and bacteria. The High Flow DownSpout system is versatile and expandable beyond the standard two filter cartridge design.

System overview:

- Large freestanding filter enclosure offers multiple installation and mounting options.
- Constructed from high strength, exterior grade Polyethylene material (nominal ¼" wall thickness) with an aluminum internal support frame.
- Aluminum cartridge mounting plates have "Twist-Lok" retention and a tight seal.
- 4" PVC inlet/Outlet pipes.
- Internal debris storage capacity.
- Built in high flow bypass.
- Internal water/debris collection tub is lined with a seamless, flexible rubber membrane to prevent long-term leakage issues due to material degradation or thermal expansion due to temperature changes.

Images of the DownSpout filter are provided on the next page:



Maintenance for the DownSpout Filter is similar to that of the StormBasin – discussed above.

Attachments:

Attachment A – Long Island Analytical Laboratories Report

Attachment B – StormBasin engineering details

Attachment C – StormBasin tech brochure

Attachment D – Case Studies

Attachment E – O and M manual

Attachment F – Specification

Attachment G – StormSafe Vault tech brochure