IMPROVING QUALITY OF LIFE
I. Introduction

Clean water is essential to quality of life. BaySaver Technologies is 100% committed to minimizing pollution in stormwater which helps protect our water resources. By collaborating with the regulatory and engineering community to develop products and processes, BaySaver continually develops state of the art stormwater filters and particle separators. Our filters and separators effectively remove pollutants such as hydrocarbons, trash, sediments, metals, total phosphorous, dissolved phosphorous, and dissolved nitrogen.
II. BayFilter

The BayFilter by BaySaver Technologies is an ongoing commitment to state of the art stormwater treatment. The patented compound spiral media configuration results in over 90 square feet of filter media area in only 7 square feet of floor space. This configuration and incredible ratio results in the most efficient and effective stormwater filter available in the marketplace. The BayFilter is available in multiple sizes with multiple media configurations to meet any flow rate and design consideration while being able to target specific pollutants. A BayFilter System is typically a concrete structure (precast vault, manhole, or cast in place structure) with a single or multiple BayFilter cartridges. The concrete structure contains the inlet and outlet. The BayFilters are connected to a pipe manifold which is connected to the outlet. Polluted water flows in, clean water flows out.
III. Basic Principles of Stormwater Filtration

Stormwater treatment has unique requirements. We have to treat large volumes of water at relatively high flow rates to high standards for a long period of time between maintenance intervals. At BaySaver we believe it is our responsibility to find a highly effective level of equilibrium with these variables which provides exceptional value to stormwater professionals and the marketplace.

The concept of treating high flows to high levels of pollutant removal for long periods of time between maintenance intervals almost seems unreasonable from a practical perspective. We intuitively think of oil filters or air filters or water filters when someone asks about filtration and we understand that these filters are intended to intercept and hold particles until the filter is replaced—which we do regularly. What good would your cars air or oil filter be if it never had to be replaced? You’re probably thinking that it wouldn’t be removing anything if doesn’t need to be replaced. This is exactly the point. If we are going to filter something then the filter is going to collect the pollutants and experience reduced efficiency over time. We replace filters to maintain high levels of efficiency and pollutant removal. Think about this, how often are we supposed to change the air filters in our homes?

What makes for an effective and efficient stormwater filter? First a filter must be able to remove the pollutants of concern, and secondly a filter must function for a reasonable period of time as defined by industry and regulatory standards. Finally, a stormwater filter must reasonably function within the realm of scientific principles, physical properties, and known fact.

The traditional pollutants of concern in stormwater are sediment and hydrocarbons. Dissolved metals, phosphorous, and nitrate are also of high concern although they are not yet commonly regulated nationwide. There are many other pollutants which exist in stormwater runoff and most regulating bodies are not currently requiring stormwater treatment devices to demonstrate removal of pollutants such as fecal matter, bacteria, nitrogen, etc... BaySaver Technologies has extensively tested the BayFilter in the laboratory and the field. Testing demonstrates BayFilter’s effectiveness and efficiency at capturing sediment, hydrocarbons, phosphorous, and metals from stormwater flows to state and national standards. These tests also demonstrate removal of the less commonly regulated pollutants.

How does a stormwater filter remove pollutants? Settling and filtration are the two primary methods to remove pollutants from stormwater. While some settling of particles and pollutants occurs within filtration systems, it is the filter which actually performs the work of removing the very small particles, and dissolved nutrients and metals. The media within a filter must be small enough to intercept the tiny sediment particles which won’t settle, and capable of attracting and attaching charged and elemental particles through ion exchange. For this reason, BaySaver develops and tests media blends which yield high removal and capture capacity to prevent pollutants from reaching our public waterways.

Coarse Industry Media

Coarse Industry Media

BayFilter Media
Removing, capturing, and holding pollutants are the purposes of filters. Stormwater filters must perform this purpose at high flow rates through many storm events and provide a long maintenance interval. BayFilter achieves these requirements by maximizing filter area, minimizing filter media size, minimizing flow through and across the surface of the media, and proper filter design for the filters purpose.

The area of media provided by a stormwater filter is an important factor to consider when selecting and specifying a filter system. The more surface area provided by the media, the greater the potential flow through and across the media and the greater the pollutant removal potential of the filter. The vertically oriented and patented compound spiral media configuration of the BayFilter maximizes a media filter's area potential. The particle size of the media is also important with respect to pollutant interception and adsorption. A tightly packed, fine media captures a greater percentage of fine and dissolved pollutants when compared to a loosely packed, coarse media or a membrane media. A fine and tightly packed media not only minimizes the interstitial spaces between the media particles to optimize interception of pollutants, it also maximizes the amount of surface area in a given volume provided by the media for ion exchange.

The quantity of sediment a filter is capable of capturing is a significant component to filter longevity. A filter must be able to capture large quantities of sediment while maintaining claimed flow rates and removal efficiencies. The sediment capture capacity of the BayFilter is 350 pounds.

The significance of the area relationships can be simply demonstrated however, actual rates of occlusion vary with pollutant type, load, and flows. A 10 square foot (SF) filter flowing at 1 gallon per minute (GPM) per SF will pass 10 GPM. A 20 SF filter flowing at .5 GPM will pass 10 GPM. A 10 SF filter flowing at 1 GPM which occludes at a rate of 1 SF in 10 days will be expired in 100 days. A 20 SF filter flowing at .5 GPM which occludes at a rate 1 SF in 20 days, because of a lower flow rate per SF of media, will be expired in 400 days. Increasing media area and reducing flow rate has a beneficial impact on pollutant removal and filter longevity and these are some of the core engineering principles placed into practice with the BayFilter.

BaySaver Technologies is committed to the purpose of protecting public waterways. Permanently capturing pollutants, effectively backwashing media, allowing media to drain between storm events, and providing an economically reasonable maintenance interval are key design parameters for properly functioning stormwater filtration systems. The BayFilter helps you exceed these key requirements and protect our water resources.

Spiral media provides optimal media area resulting in superior treatment capability
IV. BayFilter Products

Product Specifications

BayFilter 545
- Size = 30” diameter
- Weight = 250 lbs.
- Media Area = 90 sf.
- Flow Rate = 45 gpm
- Flow Rate per Square Foot = 0.50 gpm/sf
- Head = 30”
- Sediment Capture Capacity = 350 lbs
- Manifold Diameter = 6”

BayFilter 545L
- Size = 30” diameter
- Weight = 125 lbs.
- Media Area = 45 sf.
- Flow Rate = 22.5 gpm
- Flow Rate per Square Foot = 0.50 gpm/sf
- Head = 18”
- Sediment Capture Capacity = 175 lbs
- Manifold Diameter = 3”

BayFilter 545N
- Size = 20” diameter
- Weight = 125 lbs.
- Media Area = 45 sf.
- Flow Rate = 22.5 gpm
- Flow Rate per Square Foot = 0.50 gpm/sf
- Head = 30”
- Sediment Capture Capacity = 175 lbs
- Manifold Diameter = 3”
EMC is now BayFilter 545
BFC is now BayFilter 530

BayFilter 530
- Size = 28” diameter
- Weight = 250 lbs
- Media Area = 90 sf
- Flow Rate = 30 gpm
- Flow Rate per Square Foot = 0.33 gpm/sf
- Head = 28”
- Sediment Capture Capacity = 350 lbs
- Manifold Diameter = 4”

BayFilter 730
- Size = 28” diameter
- Weight = 250 lbs
- Media Area = 43 sf
- Flow Rate = 30 gpm
- Flow Rate per Square Foot = 0.70 gpm/sf
- Head = 28”
- Sediment Capture Capacity = 150 lbs
- Manifold Diameter = 4”

BayFilter 760
- Size = 30” diameter
- Weight = 250 lbs
- Media Area = 90 sf
- Flow Rate = 63 gpm
- Flow Rate per Square Foot = 0.70 gpm/sf
- Head = 28”
- Sediment Capture Capacity = 350 lbs
- Manifold Diameter = 6”
BayFilter 545P
Size = 30” diameter
Weight = 250 lbs.
Media Area = 90 sf.
Flow Rate = 45 gpm
Flow Rate per Square Foot = 0.50 gpm/sf
Head = 30”
Sediment Capture Capacity = 350 lbs
Manifold Diameter = 6”

BayFilter 545LP
Size = 30” diameter
Weight = 125 lbs.
Media Area = 45 sf.
Flow Rate = 22.5 gpm
Flow Rate per Square Foot = 0.50 gpm/sf
Head = 18”
Sediment Capture Capacity = 175 lbs
Manifold Diameter = 3”

BayFilter 545NP
Size = 20” diameter
Weight = 125 lbs.
Media Area = 45 sf.
Flow Rate = 22.5 gpm
Flow Rate per Square Foot = 0.50 gpm/sf
Head = 30”
Sediment Capture Capacity = 175 lbs
Manifold Diameter = 3”
BayFilter 530P
Size = 28” diameter
Weight = 250 lbs
Media Area = 90 sf
Flow Rate = 30 gpm
Flow Rate per Square Foot = 0.50 gpm/sf
Head = 28”
Sediment Capture Capacity = 350 lbs
Manifold Diameter = 4”

BayFilter 530M
Size = 28” diameter
Weight = 250 lbs
Media Area = 90 sf
Flow Rate = 30 gpm
Flow Rate per Square Foot = 0.50 gpm/sf
Head = 28”
Sediment Capture Capacity = 350 lbs
Manifold Diameter = 4”

BayFilter 545M
Size = 30” diameter
Weight = 250 lbs.
Media Area = 90 sf.
Flow Rate = 45 gpm
Flow Rate per Square Foot = 0.50 gpm/sf
Head = 30”
Sediment Capture Capacity = 350 lbs
Manifold Diameter = 6”
BayFilter 545LM
Size = 30" diameter
Weight = 125 lbs.
Media Area = 45 sf.
Flow Rate = 22.5 gpm
Flow Rate per Square Foot = 0.50 gpm/sf
Head = 18"
Sediment Capture Capacity = 175 lbs
Manifold Diameter = 3"

BayFilter 545NM
Size = 20" diameter
Weight = 125 lbs.
Media Area = 45 sf.
Flow Rate = 22.5 gpm
Flow Rate per Square Foot = 0.50 gpm/sf
Head = 30"
Sediment Capture Capacity = 175 lbs
Manifold Diameter = 3"
V. BayFilter Operation

Stormwater runoff enters the manhole or concrete structure via an inlet pipe and begins to fill the structure. When the water surface elevation in the vault/manhole reaches operating level, water flows through the BayFilter driven by a hydrostatic head. Within the BayFilter, the water flows through a proprietary filter media and drains via a vertical pipe. The vertical drain is connected to the under drain system which conveys filtered water to the outfall.

During a typical storm event, the BayFilter system has four cycles:
1. Vault and BayFilter fill and air release
2. Uniform bed load hydrodynamic filtration
3. Uniform bed load siphon filtration
4. Siphon break and hydrodynamic backwash

The cycle operation of a BayFilter is as follows:

A. Vault and BayFilter Fill and Air Release: The BayFilter vault and BayFilter cartridges fill when stormwater flow enters the system. As the vault fills, water enters the BayFilter cartridge through the inlet plate on the bottom. Air is purged from the media spiral and filter housing during this process.

The air release is critical for the proper functioning of the siphon. The siphon draws flow through the BayFilter during periods of low water in the vault.
B. Filtration: Water enters the Filter from the bottom of the filter housing and travels into the inlet-flow conduit-spiral. From the inlet spiral, untreated water flows horizontally through the engineered media. Treated water exits the engineered media and flows into the outlet-flow conduit-spiral. Treated water flows vertically, fills the BayFilter and starts to drain through the outlet pipe—please see product specifications (pg.6) for operating head levels. Finally, filtered water leaves the system via the outlet manifold below the inlet plate.

C. Siphon Filtration: After the water level in the vault falls below the top of the filter cartridge-operating head level, a siphon is established and water will continue to flow until the siphon is broken. During siphon, the water level in the vault will decrease until it reaches the base of the BayFilter; air then enters the filter cartridge and breaks the siphon.

D. When air enters the filter, the siphon breaks, and a gravity-driven backwash occurs with all of the water flowing from the outlet chamber backwards through the filter media. This backwash has the effect of dislodging particles captured in the filtration layers and re-establishing porosity. Dislodged particles are transported back in to the filter vault and accumulate on the filter vault floor.

Each BayFilter has a maximum nominal flow rating. At this flow, each cartridge can treat the specified total sediment load before maintenance. BayFilter flow may also be custom regulated to meet specified design parameters by modifying the flow disk. As the flow is lowered, the treated sediment load increases. For example, when the BayFilter 730 flow is lowered to 15 GPM, the cartridge is able to treat 300 lbs of the total sediment load before maintenance. Please contact BaySaver for custom loading requirements.
VI. System Design and Sizing

A BayFilter design is easily completed in four phases:

1. BayFilter System Configuration
2. BayFilter Site Plan Placement
3. BayFilter System Sizing
4. Final Check

The design process can be iterative until the determined design parameters are satisfied. Some of the items to consider when designing a stormwater filtration system:

- Site specific constraints and proposed BayFilter system location
- BayFilter system configuration—on-line or off-line
- Pretreatment requirements
- Treatment efficiency requirements and local regulations
- Pollutant loading (sediment load)
- Treatment flow rates and hydraulics
- Maintenance intervals

VI.1. BayFilter System Configuration

BayFilter systems can accommodate any treatment flow requirement and are usually designed to treat moderate to low flow rates. Generally, the peak design flow through the storm drain system will be significantly greater than the treatment design flow through BayFilter. It is a best practice to only convey the required treatment flow through a stormwater filter and this may help extend the filter’s life cycle. Conveying the peak design flow around a stormwater filter is considered off-line treatment.

Off-Line Design

A schematic of an off-line BayFilter system is shown in Figure 1 below. The bypass structure diverts low flows to the BayFilter system and allows high flows to pass to a separate outfall. The bypass structure will feature flow controls designed by an engineer to ensure that the required treatment flows are sent to the BayFilter. The two effluent streams (the treated effluent from the BayFilter and the high intensity bypass) may be combined into a single stream or discharged to separate outfalls.

In stormwater filter system installations, sediment will accumulate in the vault as well as in the filter cartridges. In offline installations high intensity flows are routed away from the vault minimizing the risk of re-suspending this accumulated sediment. In online applications it is possible for high flows to mobilize and release this sediment.
Pretreatment
Regional regulations may require pretreatment of stormwater flows prior to flow entering filters. Pretreatment will remove a portion of the influent pollutant load. This will lessen the pollutant load received by a filter and potentially increase the maintenance interval duration. The BaySeparator™ system is an ideal hydrodynamic separator that removes sediments and floatables from stormwater runoff. Figure 2 shows a schematic of a typical BayFilter installation with pretreatment.

Operating Head
Head is required to activate BayFilter flow and establish siphon flow. The height of individual BayFilter cartridges will determine the operating head. Please consult product specifications for individual operating head levels. The drainage system and network does not need to provide the operating head. Filter systems can easily be designed on sites where the elevation drop of the hydraulic grade line is less than the required operating head of the filter. Consult BaySaver Technologies. Engineering Department for verification based on your particular site conditions.

VI.2. BayFilter Site Plan Placement
Once the BayFilter system has been selected, the chosen system must be included on the site plans. Locating a BayFilter system on your site will be determined by giving consideration to several factors including: maintenance access, the unit’s footprint, available head, available depth, and the surface elevation of the receiving waters. A BayFilter system must be installed in an area that is accessible to maintenance equipment. The maintenance of a BayFilter system requires a vacuum truck as well as the removal and replacement of
the filter cartridges. The manhole covers, and or Access Hatches of the BayFilter must be placed in locations that can be easily reached by such a vehicle. Consult the BaySaver Technologies Engineering Department for expert assistance.

VI.3. BayFilter System Sizing

Each BayFilter system relies on a collection of individual BayFilter cartridges to achieve the desired removal efficiency. Accurately determining the required number of filters is important to efficient operation. Performance specifications may be compromised with too few cartridges, and too many cartridges results in excessive cost.

A valuable stormwater treatment system will be provided when the three design parameters listed below are given consideration. Each parameter results in a required number of BayFilter cartridges. After computing the number of filters for each parameter, determine which requires the most filters, and this is your limiting parameter and the number of required BayFilter cartridges for your drainage area.

• Jurisdiction – specific sizing requirements
• Flow capacity of the system
• Treated sediment load of the system

Jurisdiction
Local regulatory requirements play a significant role in any BayFilter design. Depending on the jurisdiction in which the project site is located, the engineer may have to meet minimum treatment flow rates, treatment volumes or some other criteria such as filter bed area. Some jurisdictions specify a methodology for calculating a minimum treatment flow rate for a given site.

Flow Capacity
Regulatory requirements will determine water quality treatment values. The BayFilter system is simply applied by the design professional to their computed values. Typically, the primary treatment value is treatment flow rate (QTRT). This value tells us the rate at which flow must pass through a filter system. Other common treatment values are water quality volume and phosphorous load reduction. Please contact BaySaver Technologies Engineering Department when designing to volume or phosphorous requirements.

The minimum number of BayFilter cartridges can be determined by dividing the treatment flow rate by flow rate of the BayFilter you have chosen. This calculation provides the minimum number of BayFilters that will be necessary to fully treat the water quality flow from the site. The step-by-step procedure is shown below.

1. Determine the required treatment flow rate (QTRT) based on locally approved methodologies for the project site. This may involve the use of the Rational Method, TR-55 or another locally specified hydrologic model. If a locally approved methodology is not specified, BaySaver Technologies recommends using one of these commonly accepted models.

2. Using the treatment flow rate, calculate the minimum numbers of BayFilter cartridges required to treat that flow using Equation 1. Refer to the product specifications for BayFilter flow rates.

\[
\text{Cartridges} = \frac{Q_{TRT} \ (cfs) \times 448.8 \ \frac{gpm}{cfs}}{Q_{BayFilter}}
\]

\[\text{Equation 1}\]

The minimum number of BayFilters is equal to the maximum treatment flow rate divided by QBayFilter, rounded up to the next whole number.
Sediment Load Capacity

A Filter’s sediment load capacity allows the professional designer to establish the maintenance interval for their stormwater system. Establishing a sediment load is a straightforward computation which may be completed once the number of BayFilter cartridges required to treat the flow is known. With the known filter quantity, a designer will establish the sediment load capacity for the BayFilter system, and compare this value to the annual sediment load for the site. The following equations may be used to compute these values and help determine BayFilter’s suitability for a specific site design.

1. Calculate the annual treated runoff volume according to Equation 2. $V_{TRT} (ft^3) = P \times A \times c \times \frac{ft}{12 \text{ in}} \times \frac{43,560 \text{ ft}^2}{\text{acre}} \times \% \text{ capture}$

   **Equation 2**

2. Using the annual treated runoff volume, calculate the anticipated total system sediment load to BayFilter according to Equation 3. $L (lbs) = V_{TRT} \times TSS_{in} \times \frac{28.3 \text{ lt}}{ft^3} \times \frac{kg}{10^6 \text{ mg}} \times \frac{2.2 \text{ lbs}}{kg}$

   **Equation 3**

Instructions for equations

1. Calculate the annual treated runoff volume according to Equation 2. $V_{TRT}$ is the annual treated runoff volume, $P$ is the average annual precipitation (in inches), $A$ is the area of the site (in acres), $c$ is the runoff coefficient of the site ($c$ is dimensionless), and $\% \text{ Capture}$ is the fraction of the total runoff that is treated by the stormwater quality system. If $\% \text{ Capture}$ is not otherwise specified, a default value of 0.90 can be used. Please check local regulations.

2. Using the annual treated runoff volume, calculate the anticipated total system sediment load to BayFilter according to Equation 3. In Equation 3, $L$ is the mass of sediment that BayFilter is exposed to annually (in pounds), $V_{TRT}$ is the annual treated runoff volume as calculated in step 1 (in ft3), and $TSS_{in}$ is the influent concentration of TSS in the runoff (in mg/L). The influent TSS concentration ($TSS_{in}$) depends greatly on the site and the surrounding land use.

   In the absence of readily available data, BaySaver Technologies recommends using a minimum event mean concentration (EMC) TSS value of 60 mg/l. The impact on the filter cartridge will also be less if the filtration system is preceded by pretreatment. In these cases, the influent TSS to the BayFilter system need to be reduced to reflect pretreatment sediment removal. The BaySaver Technologies’ Engineering Department can assist with these calculations.

3. Once the total annual system sediment load ($L$) is calculated, the engineer must ensure that the number of cartridges specified will be able to remove that sediment load at the specified design flow rate. Divide the total system sediment load $L$ by the capacity of each BayFilter and note the associated BayFilter flow rate. Round up to the next whole number to get the minimum number of BayFilters required. This quantity of BayFilters will need to treat this sediment load at the required flow rate per BayFilter. The BaySaver Technologies Engineering Department is available to assist with the required calculations.

VI.4. Final Check

It may be beneficial to perform a Final Check to the BayFilter design for your site. Again, the BaySaver Engineering Department stands ready to assist you with this function.
Standard Details and Notes
All of the standard details and notes for the plans are available in AutoCAD and .pdf format from BaySaver Technologies. They are also be available on the Website at www.BaySaver.com or by calling 1.800.229.7283.

BayFilter Configurations
BayFilter Systems include the four typical concrete structures: manhole, precast vault, box culvert, and cast in place. BaySaver Technologies can also design BayFilter systems with Nyloplast structures, HDPE manholes, and HP Pipe manholes.

BayFilter systems in manholes have a small footprint and easily fit into site plans. Manhole BayFilter systems are ideal for applications downstream from water quality detention structures. Please consult with the BaySaver Technologies Engineering Department for more details.

Access to the Manhole BayFilter for inspection or maintenance is achieved through a minimum 30" diameter frame and cover. In each Manhole BayFilter system, the BayFilters are arranged so that a maintenance worker can stand on the floor of the manhole while installing or removing the cartridges.

Example of a manhole BayFilter system

Example of a precast vault BayFilter system
VII. Installation

1. Contact utility locator to mark any nearby underground utilities and make sure it is safe to excavate.

2. Reference the site plan and stake out the location of the BayFilter manhole/vault.

3. Excavate the hole, providing any sheeting and shoring necessary to comply with all federal, state and local safety regulations.

4. Level the subgrade to the proper elevation. Verify the elevation against the manhole/vault dimensions, the invert elevations, and the site plans. Adjust the base aggregate, if necessary.

5. Have the soil bearing capacity verified by a licensed engineer for the required load bearing capacity. On solid subgrade, set the first section of the BayFilter manhole/vault.

6. Check the level and elevation of the first section to ensure it is correct before adding any riser sections.

7. If additional section(s) are required, add a watertight seal to the first section of the BayFilter manhole/vault. Set additional section(s) of the manhole/vault, adding a watertight seal to each joint.

8. Install the outlet pipe in BayFilter manhole/vault.

9. Install the inlet pipe to the BayFilter manhole/vault.

10. Install the trolley system (if applicable),
   a. Attach the mounting brackets to the track.
   b. Each track is split in sections. The length and number of sections vary depending on the vault. It is generally better to start installing longer track sections first. Hold a section in place and align the top of the brackets with the ceiling of the vault. Mark the center of the hole in each bracket and remove the track.
   c. Using a hammer drill and ¼” bit, drill a hole approximately 3” deep at each mark.
   d. Hold the track back in place and realign the brackets with the holes. Place a plastic spacer block behind each bracket and using the supplied ¼” x 3¼” anchor bolts mount the track in place. Only install one section of track at this stage.
   e. Repeat this procedure on the opposite wall of the vault directly across from the first section.
   f. Bolt the 4 trolleys to the aluminum I-beam as shown in the attached diagram. Make sure that the wheels for each trolley are mounted an equal distance from the top of the I-beam.
   g. Lift the I-beam in to place and insert the trolleys in to the track.
   h. Using the supplied couplers, install the second sections of track via the same procedure. Continue until the track runs the length of the vault or as designed.

11. Install the PVC manifold. Glue all PVC joints with the exception of the BayFilter cartridge coupling. See Parts List drawing.
12. After the site has stabilized, remove any accumulated sediment or debris from the vault.

13. Install the Bayfilter Drain Down Modules (DDM) with red mark aligned to the top of the manifold system (if applicable). Install a row of flow disks and the BayFilter cartridges. Place each cartridge so the handle points across the vault. Make sure the air valve is on the side closer to the outlet.

14. Place one full set of one Hold Down Bar and two Retainer Brackets into place. Mark and drill two 5/8" holes for each bracket. After fully anchoring Retainer Brackets, place the left end of the Hold Down Bar in position. Slide right end into bracket and secure with U-Bolt.

15. Repeat steps 14 and 15 for each set of BayFilter Cartridges and Hold Down Bar until the whole system is installed. See Parts List drawing for Hold Down Bar placement.

**Tool List**
- PVC glue and primer
- Crane/lifting mechanism to lower the cartridges in the vault (each cartridge weighs 230-350 lbs)
- Screwdriver or nut driver for Fernco® couplers
- Hammer and soft blow hammer
- Saw (in case PVC Sch 40 piping length needs to be adjusted)
- Hammer drill
- 1/4" and 5/8" concrete drill bit
- 3/4" wrench

**Installation Services by BaySaver**
BaySaver Technologies offers the added value service of delivering a completely assembled BayFilter system. This minimizes the contractors responsibility to simply connecting the inlet and outlet drainage pipes. The added benefit of this service is quality control and peace of mind.
VIII. Inspection and Maintenance

The BayFilter system requires periodic maintenance to continue operating at the design efficiency. The maintenance process comprises the removal and replacement of each BayFilter cartridge and the cleaning of the vault or manhole with a vacuum truck.

The maintenance cycle of the BayFilter system will be driven mostly by the actual solids load on the filter. The system should be periodically monitored to be certain it is operating correctly. Since stormwater solids loads can be variable, it is possible that the maintenance cycle could be more or less than the projected duration.

BayFilter systems in volume-based applications are designed to treat the WQv in 24 hours initially. Late in the operational cycle of the BayFilter, the flow rate will diminish as a result of occlusion. When the drain down exceeds the regulated standard, maintenance should be performed.

When a BayFilter system is first installed, it is recommended that it be inspected every six (6) months. When the filter system exhibits flows below design levels the system should be maintained. Filter cartridge replacement should also be considered when sediment levels are at or above the level of the manifold system. Please contact the BaySaver Technologies Engineering Department for maintenance cycle estimations or assistance at 1.800.229.7283.

Maintenance Procedures

1. Remove the manhole covers and open all access hatches.

2. Before entering the system make sure the air is safe per OSHA Standards or use a breathing apparatus. Use low O2, high CO, or other applicable warning devices per regulatory requirements.

3. Using a vacuum truck remove any liquid and sediments that can be removed prior to entry.

4. Using a small lift or the boom of the vacuum truck, remove the used cartridges by lifting them out.
5. Any BayFilters that cannot be readily lifted directly out of the vault should be removed from their location and carried to the lifting point using the Trolley system installed in the Vault (if applicable).

6. When all BayFilters are removed, remove the balance of the solids and water; then loosen the stainless clamps on the Fernco couplings in the pipe manifold; remove the drain pipes as well. Carefully cap the manifold and the Ferncos and rinse the floor removing the balance of the collected solids.

7. Clean the manifold pipes, inspect, and reinstall.

8. Install the exchange BayFilters and close all covers.

9. The used BayFilters must be sent back to BaySaver Technologies for exchange/recycling and credit on undamaged units.

10. Contact BaySaver Technologies for Exchange Filter pricing and availability at 1.800.229.7283.
X. BayFilter Availability and Cost

BayFilter systems are available throughout the United States from BaySaver Technologies and their Joint Venture partner Advanced Drainage Systems, Inc. Material, installation, and maintenance costs vary with location. For BayFilter pricing in your area, please contact BaySaver Technologies at 1.800.229.7283.

BayFilter cartridges and outlet components can be shipped anywhere in the world. Manholes and precast vaults are also supplied by BaySaver Technologies as part of a complete stormwater filtration system.

XI. BayFilter Specifications

Products
A. Internal components: all components including concrete structure(s), PVC manifold piping and filter cartridges, shall be provided by BaySaver Technologies, 1030 Deer Hollow Drive, Mount Airy, MD (1.800.229.7283).

B. PVC manifold piping: all internal PVC pipe and fittings shall meet ASTM D1785. Manifold piping shall be provided to the contractor partially pre-cut and pre-assembled.

C. Filter cartridges: external shell of the filter cartridges shall be substantially constructed of polyethylene or equivalent material acceptable to the manufacturer. Filtration media shall be arranged in a spiral layered fashion to maximize available filtration area. An orifice plate shall be supplied with each cartridge to restrict the flow rate to a maximum of 45 gpm.

D. Filter media: filter media shall be by BaySaver Technologies and shall consist of the following mix: a blend of zeolite, perlite and activated alumina.

E. Precast concrete vault: concrete structures shall be provided according to ASTM C. The materials and structural design of the devices shall be per ASTM C478, C857 and C858. Precast concrete shall be provided by BaySaver Technologies.

Performance
A. The stormwater filter system shall be an offline design capable of treating 100% of the required treatment flow at full sediment load conditions.

B. The stormwater filter system’s cartridges shall have no moving parts.

C. The stormwater treatment unit shall be designed to remove at least 85% of suspended solids, 65% of total phosphorus, 65% of turbidity, 60% of total copper, and 60% of total zinc based on field data collected in compliance with the technology acceptance reciprocity partnership tier II test protocol.

D. The stormwater filtration system shall reduce incoming turbidity (measured as NTUs) by 50% or more and shall not have any components that leach nitrates or phosphates.

E. The stormwater filtration cartridge shall be equipped with a hydrodynamic backwash mechanism to extend the filter’s life and optimize its performance.

F. The stormwater filtration system shall be designed to remove a minimum of 65% of the incoming total phosphorus (TP) load.

G. The stormwater filtration system’s cartridges shall have a treated sediment capacity for 80% TSS removal between 150-350 lbs.

When BayFilter is initially installed, we recommend that an inspection be performed on the system in the first six (6) months. After that, the inspection cycle typically falls into a biannual pattern given normal storm occurrence and actual solids loads.

When BayFilter exhibits flows below design levels, the system should be inspected and maintained as soon as practical. Replacing a BayFilter cartridge should be considered at or above the level of the manifold.