



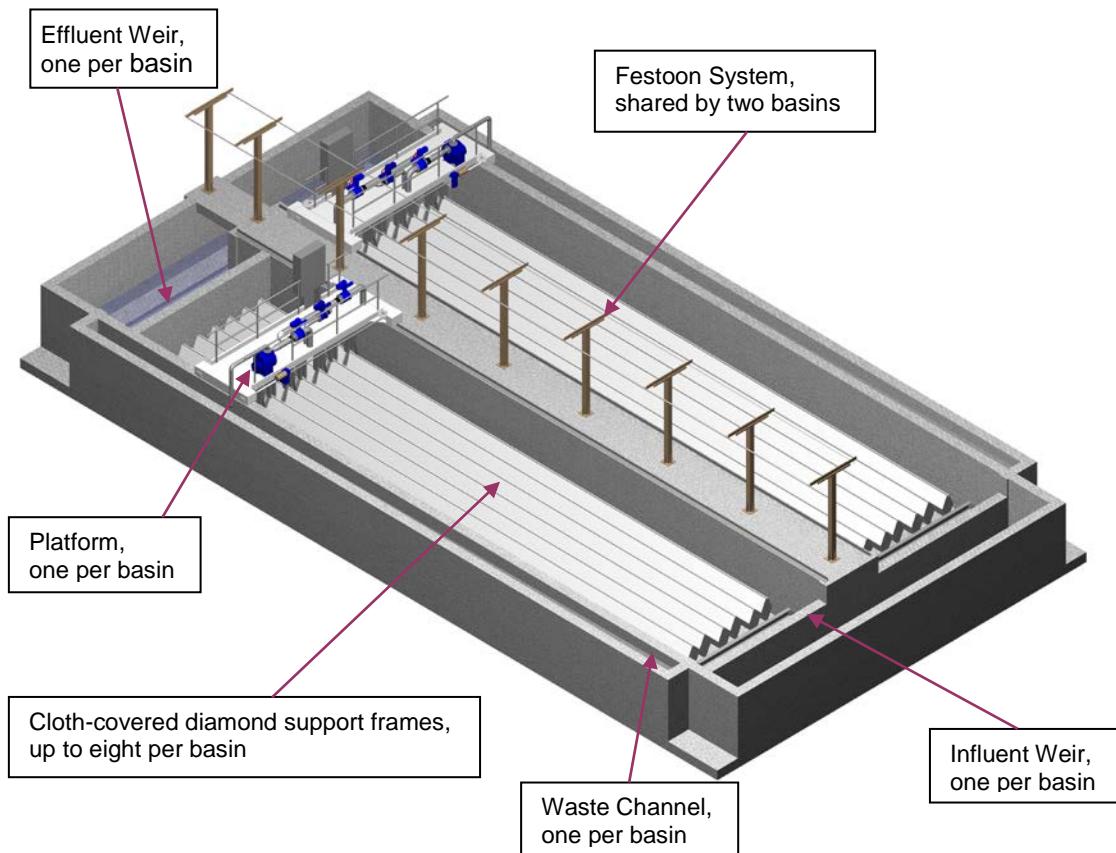
AquaDiamond® Cloth Media Filter Operational Description

Introduction

Overview

The AquaDiamond® Cloth Media Filter has been specifically designed to filter large wastewater flows. The installation for this site will be a two-basin system. A filter basin measures approximately 16 feet wide by 63.3 feet long, and contains up to eight diamond sections of cloth media. The design flow for the filter system is 15.0 MGD, with a peak flow capacity of 37.5 MGD.

The picture below portrays a typical two-basin installation.



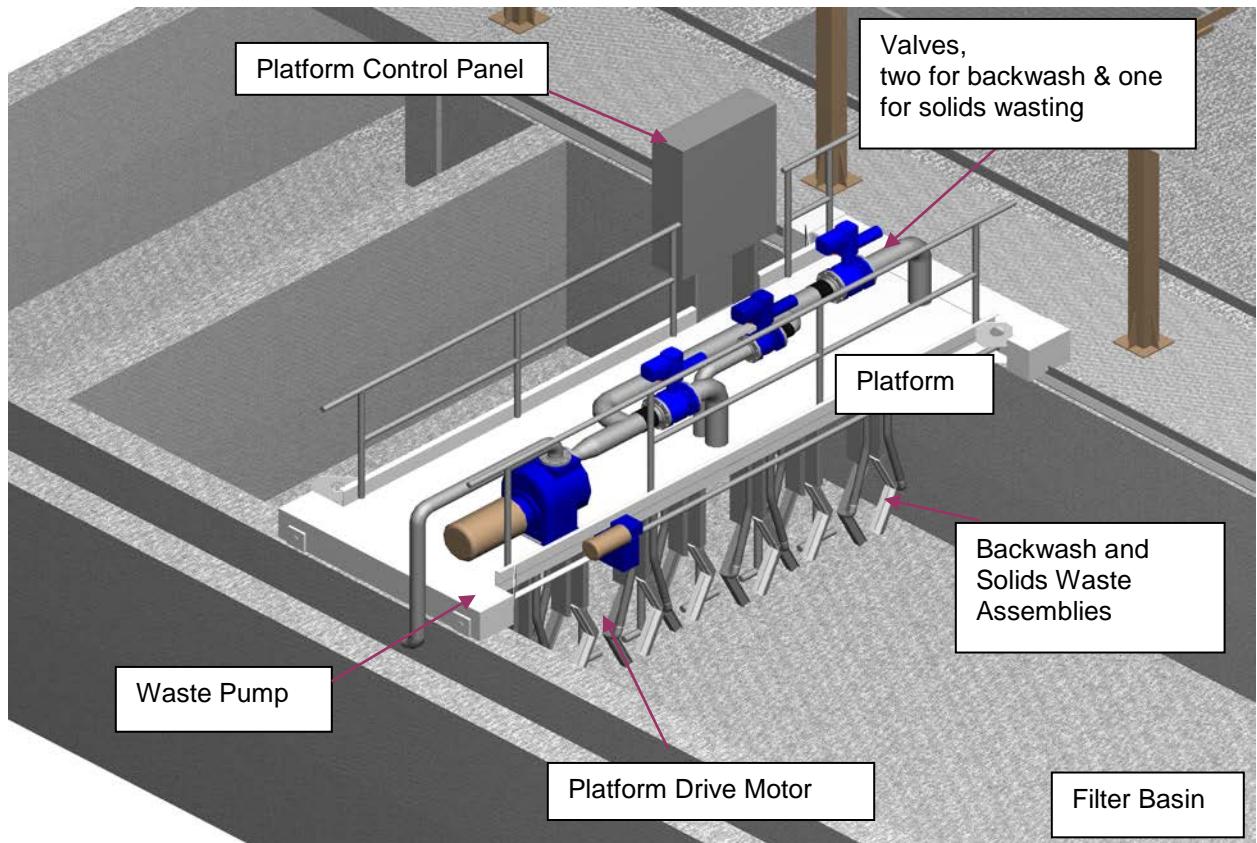
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Primary Components

The picture below calls out some of the primary components. The diamond frames (with cloth media) are not shown for clarity of the platform components.



Filter Basin

The filter basin distributes the influent flow to the diamond sections and provides a means for the heavy particulates to settle to the bottom to for solids waste removal.

Platform

The platform supports the backwash and solids wasting assemblies, local control panel, platform drive motor/reducer, waste pump, and all associated plumbing. During the backwash and solids wasting cycles, the platform will traverse over the length of the basin.

Platform Drive Motor

The platform drive motor and gear reducer are used in combination with a variable frequency drive (VFD) for controlling motion of the platform.

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Waste Pump

The waste pump is a direct-drive, variable speed, self-priming centrifugal pump. It has a flow meter mounted in the discharge line to measure pump flow. It will automatically operate and adjust flow accordingly during the backwash and solids wasting cycles.

Diamond Frames and Cloth Media

The diamond frames support the cloth media and route the effluent to the effluent chamber. The cloth media covers the diamond frames and removes particulates from the water.

Backwash Assembly

The backwash assembly consists of the platform, backwash shoes, plumbing, and the waste pump. The backwash shoes draw water at high velocity from the clean-water side of the cloth media. The platform runs the length of the basin such that the entire cloth area passes under the backwash shoes. The waste pump provides the necessary suction and discharges the flow to the designated location.

Solids Waste Assembly

The solids waste assembly utilizes several of the components from the backwash assembly. The solids waste assembly consists of seven solids wasting drop legs with one residing between each adjacent diamond frame. Each solids wasting drop leg has slotted openings facing the bottom of the basin. The platform runs the length of the basin. The waste pump provides the necessary suction and discharges the waste to the designated location.

The solids waste assembly uses the waste pump connected to manifolds to remove settled solids from the bottom of the basin.

Platform Control Panel

The platform control panel contains the Programmable Logic Controller (PLC) and associated electronics to control the filter. The platform control panel allows manual positioning of the platform and manual operation of the waste pump.

Shore Panel

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The shore control panel contains the Human-Machine Interface (HMI) and Remote I/O. The HMI is located on the door of this enclosure.

Level Sensors

The level sensors measure the liquid level in the filter basin and effluent chamber. The level is used to trigger backwash cycles.

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Operation Summary

The AquaDiamond® Cloth Media Filter is a complete system for continuously removing particulates from a flow stream. The influent channel routes flow to the filter basin where the filtration occurs. The filter basin contains a series of diamond-shaped elements. Each diamond is covered with a specialized cloth media. The cloth media traps particulates within its interior as well as forming a particulate layer upon its outer surface. Water passing through the media collects within the interior of each diamond which connects to the effluent chamber.

During all modes of operation, the diamond frames, cloth media, and seals remain completely stationary. During normal filtration, the platform remains parked at one end of the basin.

The influent flow is displayed on the HMI. If no influent flow meter exists (or the flow meter is in alarm), the influent flow is calculated based on the difference between the basin and effluent levels. For large filters (with influent flow $\geq 12\text{MGD}$), the higher flow causes a greater level differential, even under normal operating conditions. Therefore, an adjustment is made to the differential level based on the influent flow; to prevent false high differentials from triggering a backwash cycle. This prevents unnecessary backwash cycles from being triggered based on the differential level. Both the differential level and the adjusted differential level are displayed on the HMI.

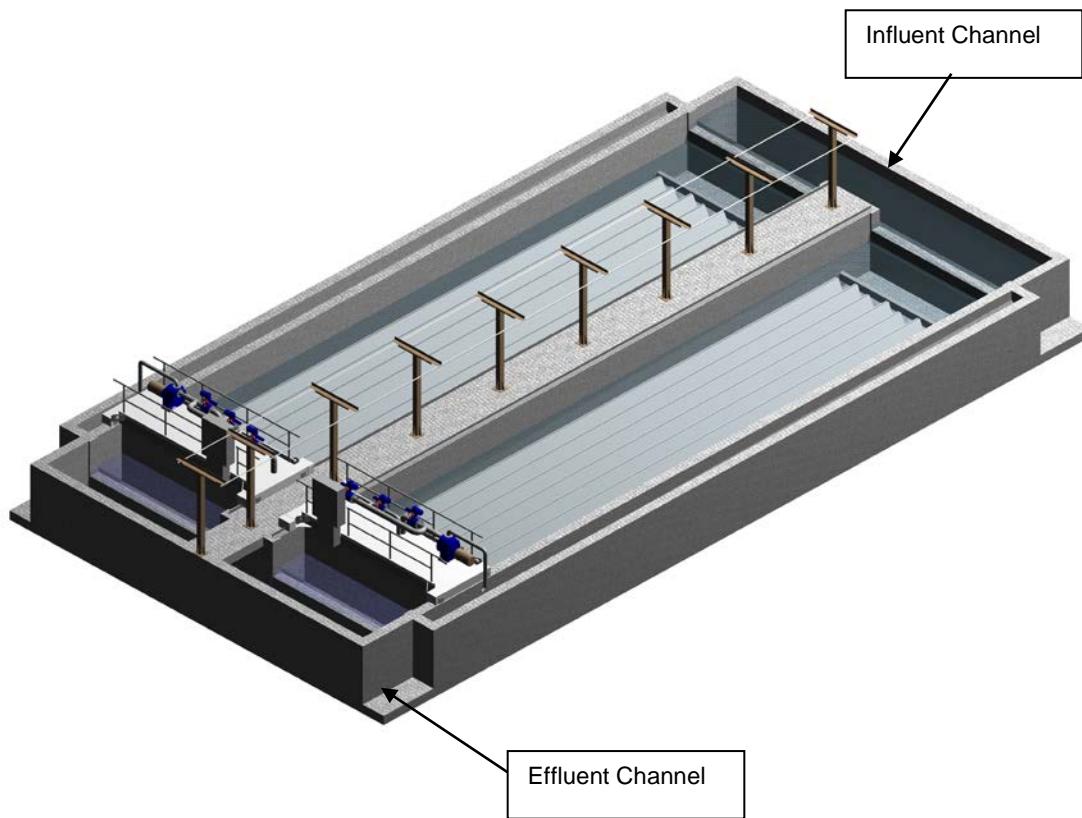
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Backwash

As the amount of particulates on and within the cloth media increases, the pressure required to drive water through the media increases. This results in an increased water level within the filter basin and increased differential pressure on the media. Upon reaching a specific basin level or differential level, a cloth cleaning cycle called a backwash mode will begin.

The differential setting is based upon the design filter flow. At a higher flow, the control system will wait for progressively higher differential to develop prior to initiating a backwash cycle. The added differential is required to overcome the higher dynamic head loss associated with the increased flow rate.

During the backwash mode, the platform traverses the length of the diamonds. Slotted nozzles contact the media surface and the waste pump draws filtered effluent from the diamond interior through the slots. This high-velocity reverse flow draws the particulates from the cloth media, renewing the cleaning capacity and lowering the basin water level and media differential pressure. The waste pump discharges the backwash water into the waste channel.

The valves control where the pump will draw suction. During a backwash mode, the valves operate sequentially with each valve connecting to one half of the backwash assemblies. One-half of the diamonds are cleaned during one direction of travel.

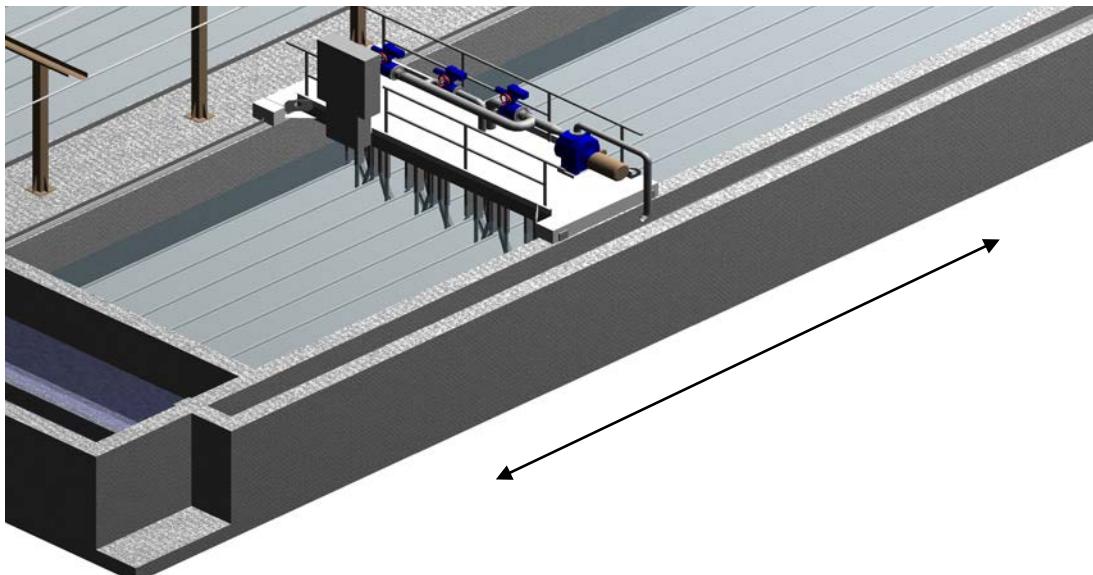
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with the remaining half cleaned on the return trip. Each valve has manual operation buttons on the valve actuator.

Filtration continues throughout the backwash cycle. This feature allows continuous filtration while maintaining peak filter performance.



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Solids Waste

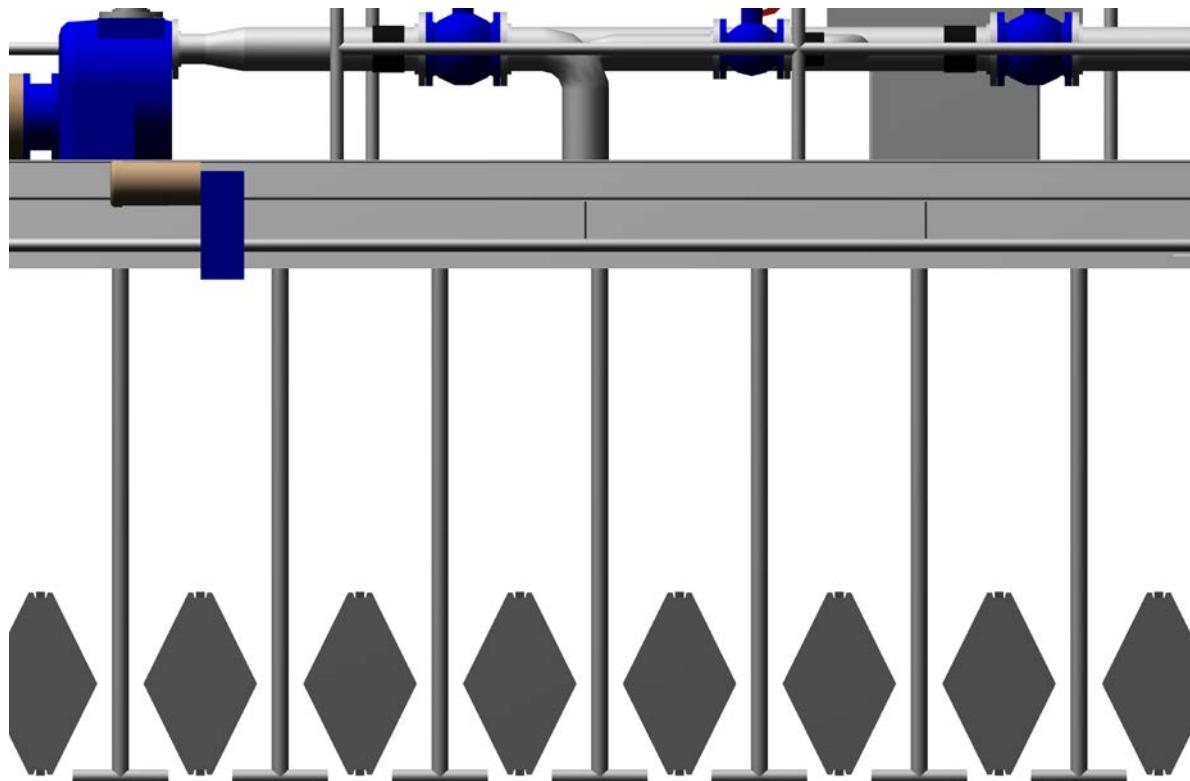
The filter basin also allows heavier particulates to settle to the bottom of the tank. As the amount of particulates coming into the filter increases, the number of solids on the basin floor also increases. Upon reaching a specific number of backwash cycles performed, the solids wasting mode will begin. This will occur right after a backwash cycle is completed (so the waste pump remains on during the backwash to solids waste mode transition).

During the Solids Wasting mode, the platform traverses the length of the diamonds. The waste pump discharges the solids water into the waste channel.

The picture below depicts an end-on view of the diamonds and platform. A series of drop-legs hangs from the platform. There is a small clearance between the bottom of the drop-legs and the basin floor. The platform traverses the length of the basin while the waste pump draws solids through the series of drop-legs.

Solids wasting occurs during only one direction of travel, not in both directions like a backwash cycle.

Filtration continues throughout the solids wasting cycle. This feature allows continuous filtration while maintaining peak filter performance.



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