

# Open Charter Magnet School Water Retention System

OPERATION, MAINTENANCE & INSPECTION SUPPLEMENT  
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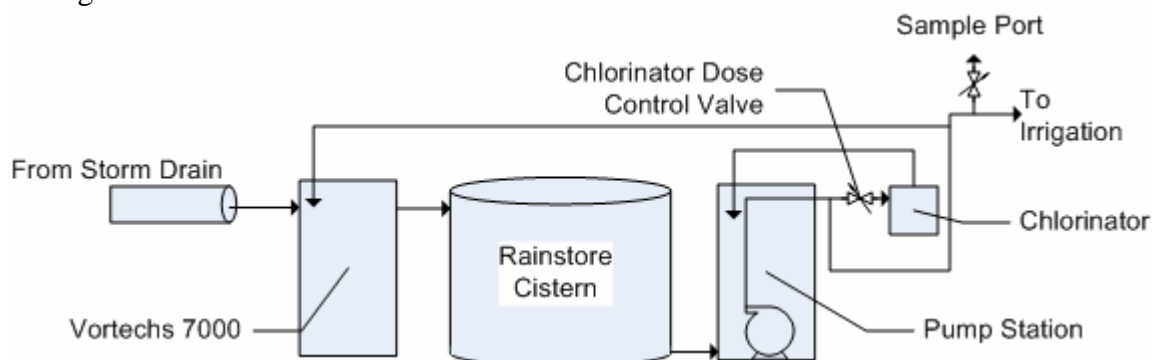
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This supplemental guide has been prepared to provide specific operations, maintenance and inspection guidance to operators of the water retention system at the Open Charter Magnet School.

## Operation, Maintenance, And Inspection

There are several operation, maintenance and inspection tasks that have been identified for this project. The following is a discussion on the specific tasks as well as the assumptions made to complete these tasks. An activity schedule (Table 1) has been developed as well which helps in determining when specific tasks are expected to be done throughout the year.

Figure 1 shows a schematic of the water retention system as it is currently believed to be configured.



**Figure 1: Open Charter School Stormwater Treatment and Retention Process**

## System Operation

Overall system operation is expected to require minimal operator attention. As it rains, the Cistern will fill with water. The Cistern can hold approximately 110,000 gallons. There is an overflow pipe that leads to a stormdrain. If the Cistern overfills, the additional water will drain to the storm drain.

The water level in the pump station should match the water level in the cistern. When the water level in the pump station is **above the low level set**, the valves should be set so that irrigation occurs from cistern water rather than from public water. When the water level in the pump station is **below the low level set**, the valves should be set so that irrigation occurs from public water rather than cistern water. The water level in the pump station **should not be allowed to drop to the low level set**, which requires resetting the pump. During Irrigation, the operator should watch the level lights on the control panel and adjust the valves when the water level drops to the **low level set**.

The chlorinator is designed to work fairly automatically. The valves on the chlorinator allow a portion of the water to flow through the chlorinator and back to the pump station. The remaining pump station water flows to the irrigation system with a portion recycled to the cistern.

The **optimal residual chlorine** in the irrigation water is **0.2 ppm of free chlorine**. The **maximum residual chlorine** that can be in the irrigation water is **2 ppm free chlorine**. Higher spikes of free chlorine are not likely to damage vegetation. However, typical free chlorine concentrations should be managed to be **as close to 0.2 ppm of free chlorine as possible**. Do **not allow the free chlorine levels to drop below 0.2 ppm**. Free chlorine should be measured at the sample port prior to the irrigation system as shown in Figure 1. Free chlorine can be measured with a variety of available test kits or instruments that are typically used for swimming pool system inspections. Note, the instrument should be measuring **free chlorine** and **not total chlorine**.

To manage the chlorine dose, adjust the recycle valve during system operation (i.e. during irrigation) until the free chlorine at the sample port is **near, but above 0.2 ppm**. Note, the amount of chlorine required may vary based on temperature, time of year, and quality of influent water which may vary randomly. It is important to routinely measure free chlorine in the irrigation water to ensure adequate operation.

Occasionally, chlorine tablets will need to be added as they are consumed. Frequency of addition will depend on chlorine demand of the water and amount of rain and use of the system. It is recommended that chlorine **tablets be inspected monthly**. Each month, as part of the operation of this system, an operator must inspect the chlorine tablets in the chlorinator. The type of chlorine tablets recommended by the manufacturer of the chlorinator is the **Accu-tab tablets**, which have a silica inhibitor added. For the safety of the operator and proper operation of the system, the replacement tablets must be **Accu-Tab Tablet from PPG Industries**, or approved equal. This task begins with the unlocking and lifting the hatch door opening on the chlorinator vault. The inlet valve must then be closed. The lid of the chlorinator is then unscrewed and the canister is then removed from the chlorinator. The tablets in the canister are inspected and, if they are degraded, removed and replaced with three new Accu-Tab tablets. The canister is then placed back into the chlorinator, and the lid is tightly secured to the top of the chlorinator. The operator must ensure that the gasket is clean and properly seated in place. A silicon oil or lubricant may be used on the gasket o-ring. The inlet valve is then returned to its normal "open" position and the vault hatch door closed and locked. Those steps must be repeated every month. The operator must properly dispose of the tablets that were removed from the chlorinator. This procedure is estimated to take one operator two hours to complete.

## MAINTENANCE

When possible, schedule all maintenance activities during dry weather, typically at least 3 days following a rainfall event.

### Collection System

To ensure that the collection system is working properly it is recommended that the stormwater catch basins and overflow drain be cleaned **three times every year** – once **before the rainy season starts** (October 1), once **mid-way through the rainy season**, and once toward the **end of the rainy season** (April). Should inspections show that more frequency maintenance is needed due to accumulation of sediment or debris, increase inspection and maintenance frequencies. The cleaning of the collection system requires the removal of all obstructions from the catch basins and the parkway drains. The cleaning of the catch basin will require the removal of the grating above the catch basins and the extraction of all solid waste in the catch basins. The parkway drain must also be cleaned of all obstacles so flow through the conduits is not blocked. If sediments are accumulated in the catch basins, they are to be removed. A vacuum truck or manual methods may be used.

### Vortechs 7000

There are three chambers in the separator that need periodic cleaning. The upstream chamber is the sedimentation chamber, the second is an oil trash chamber, and the downstream is a flow control chamber that may accumulate some sediments or trash. . The sedimentation chamber must be cleaned when the buildup of sediment reaches within six inches of the water service level in the sedimentation chamber. This is expected to occur once every year and will require a Vac-truck to vacuum out and remove the collected sediment and associated water. Inspect **3 times per rainy season** – once just **before the rainy season** (October 1), once **mid-way through the rainy season**, and once at the **end of the rainy season** (April). If inspections suggest more frequent maintenance is required, increase maintenance frequencies.

The oil and trash and flow control chambers must also be cleaned periodically. When the thickness of the **oil** layer in either of these chambers reaches a thickness of **three inches** then it will **require removal** from the chamber. It is estimated that this will occur every two years, if at all. When **trash** has accumulated in either of these chambers any measurable thickness, it **will require removal**.

The operator may install **oil Sorbent pillows** or pads in accordance with manufacturer's instructions should oil accumulation occur. If oil Sorbent pads or pillows are used, they are to be replaced annually or when a sheen of oil is observed, whichever occurs first.

Before removal of the sediment, trash, and/or oils from Vortechs 7000, its contents must be classified. A licensed disposal company must be contracted to test and classify the contents of the Vortechs unit. After this procedure is completed, the sediment, trash, and/or oil must be removed. Access requires that only the manhole cover over the chamber be removed. Collection and disposal of this material must be conducted by a licensed waste disposal company.

Materials removed are not likely to be hazardous waste. If a spill of hazardous wastes or materials has occurred upstream of the system, then the accumulated materials may be hazardous

waste. If the operator is uncertain, then the materials should be profiled in accordance with applicable hazardous waste regulations.

### **Rainstore3 System**

It is expected that sediments will not accumulate significantly in the Rainstore3. However, given the possibility of sediment accumulation, **3 access ports** have been installed beneath the sod in the field over the Rainstore3. **Once per year**, typically just **prior to the rainy season** (October 1), the Rainstore3 should be inspected by **locating the access ports, removing overlying sod**, opening the ports, and **sounding the depth to the bottom** of the Rainstore3 systems. The **bottoms** of the Rainstore3 systems installed should be approximately **8.5 to 8.75 feet below the finished grade**.

If the depths sounded are significantly less than 8.5 feet below the finished grade (e.g. 7.5 feet below the finished grade), the sediments will need to be removed. This can be accomplished by lowering the stinger of a vacuum truck into the access port to the bottom and removing the sediments as necessary. Water may need to be injected should the sediments be dry. This would need to be done at each of the three access ports.

### **Pumps**

The maintenance of the pumps is vital to the system's life span. Pumps should be **removed and inspected every year**. Each pump must be taken offline, removed from the wet well and inspected. Removal of pumps will require the unlocking of the hatch doors over the wet well and removal of the pumps using a hoist. Inspect impellers, seals, bearings, electrical connections. Replace any damaged parts or replace pumps, if necessary. Repack bearings in fresh grease as necessary. Replace seals as necessary. Reassemble in accordance with manufacturer's instructions.

### **Chlorinator**

The chlorination system is expected to require **maintenance twice every year**. Note, this is in addition to the monthly inspection and potential addition of chlorine tablets. This maintenance will require the closing of the isolation valves on either side of the chlorinator. After the chlorinator is isolated, the lid and the canister must be removed. The chlorinator is then filled with a **diluted solution of muriatic acid**. After 20 minutes, the solution is completely drained through the drain valve near the chlorinator into a removable bin and disposed of properly. It would also be beneficial to replace the chlorination tablets at this time. After the chlorinator is drained of the acid, the drain valve must be shut. The canister, with the chlorine tablets, is then placed back into the chlorinator and the lid placed tightly. The isolation valves are then returned to their normally open positions and the vault door shut and locked. This maintenance task is expected to take one maintenance personnel two hours to complete.

### **Strainers**

Inspect the strainers **3 times during the rainy season** and, if filled with debris, remove the debris.

### Local Control Panel (LCP)

Maintenance for the LCP has been estimated as requiring **service once a year**. This maintenance involves the tightening of all bolts, checking for corrosion, and the removal/replacement of all parts that are not functioning properly.

## INSPECTION

### Vortechs 7000

The inspection of the Vortechs unit should take place **three times per rain season** – once just **prior to the rainy season** (October 1), once **midway through the rainy season**, and once at the **end of the rainy season** (April). Should inspections reveal that the Vortechs unit is filling and requiring maintenance more frequently, more frequent inspections should be scheduled. The procedures recommended by the manufacture must be followed. It is recommended that **a log be maintained** to determine the buildup of sediments **throughout the life** of the system. A log from the Vortechs unit manufacturer is available. The purpose of the inspection is to measure the accumulation of sediments, trash/debris, and oil and grease in the system and schedule its removal as necessary. Typical inspection procedures would include removing manhole covers and measuring the **depth to sediments, the thickness of accumulated debris, and the thickness of accumulated oils**. If the depth to sediments shows that sediment accumulation is **within 6 inches of the fill line, then removal** is required. If there is measurable thickness of accumulated debris then removal is required, If the oil thickness is 3 inches or more, or oil shows, then removal is required. At a minimum, irrespective of the thickness of oil or debris, **annual removal** is recommended.

### Rainstore3 System

The Rainstore3 system should take place **once every year prior to the rainy season** (October 1). The inspection of the Rainstore3 system requires the removal of the lid of each maintenance port. Also, as part of the inspection of the Rainstore3 system, the distance from the top of the maintenance port to the bottom of the system must be measured. This distance will vary for each port based on the sediment buildup and the finished grade elevation of the port. Based on the as-built drawings, the **depths to the bottom** of the Rainstore3 system from the finished grade are expected to be from **8.5 to 8.75 feet**. Should the depths be significantly less than this (e.g. 7.5 feet), then removal of accumulated sediments is required.

### Entire System

The inspection of the entire system is recommended to occur **three times each year**. This general inspection should include the testing of all check valves, all of the isolation valves, the Pressure Release Valves (PRVs), and all other valves. Valves should be checked to ensure that they are working properly. The sensors and electrical connection of the system should also be checked. Repairs should be made as necessary. Structural elements should be inspected.

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**Table 1**  
**Yearly Operation, Maintenance & Inspection Activity Schedule**

	January	February	March	April	May	June	July	August	September	October	November	December
<b>OPERATION</b>	Inspect & Refill Chlorine Tablets (3)	Inspect & Refill Chlorine Tablets (3)	Inspect & Refill Chlorine Tablets (3)	Inspect & Refill Chlorine Tablets (3)	Inspect & Refill Chlorine Tablets (3)	Inspect & Refill Chlorine Tablets (3)	Inspect & Refill Chlorine Tablets (3)	Inspect & Refill Chlorine Tablets (3)	Inspect & Refill Chlorine Tablets (3)	Inspect & Refill Chlorine Tablets (3)	Inspect & Refill Chlorine Tablets (3)	Inspect & Refill Chlorine Tablets (3)
<b>MAINTENANCE</b>									Sediment, oil, trash removal from Vortechs			
									Sediment removal from Rainstore3			
									Remove & Inspect Pumps			
	Clean Collection System			Clean Collection System					Clean Collection System			
				Service Chlorinator					Service Chlorinator			
<b>INSPECTION</b>	Inspect Vortechs			Inspect Vortechs					Inspect Vortechs			
									Inspect Rainstore3			
	Inspect Strainers			Inspect Strainers					Inspect Strainers			
	Inspect System			Inspect System					Inspect System			