

Open Charter Magnet School

OPERATION, MAINTENANCE & INSPECTION COSTS

Operation, Maintenance, And Inspection Costing

There are several operation, maintenance and inspection tasks which have been identified for this project and serve to assist in the estimate of the annual costs. The following is a discussion on the specific tasks as well as the assumptions made to complete these tasks. An activity schedule has been developed as well which helps in determining when specific tasks are expected to be done throughout the year. Travel time to and from the site are included in the hours associated with all tasks. Based on the tasks and assumptions at Open Charter, costs were estimated and presented as an Equivalent Uniform Annual Cost. Below is a schematic of the project process.

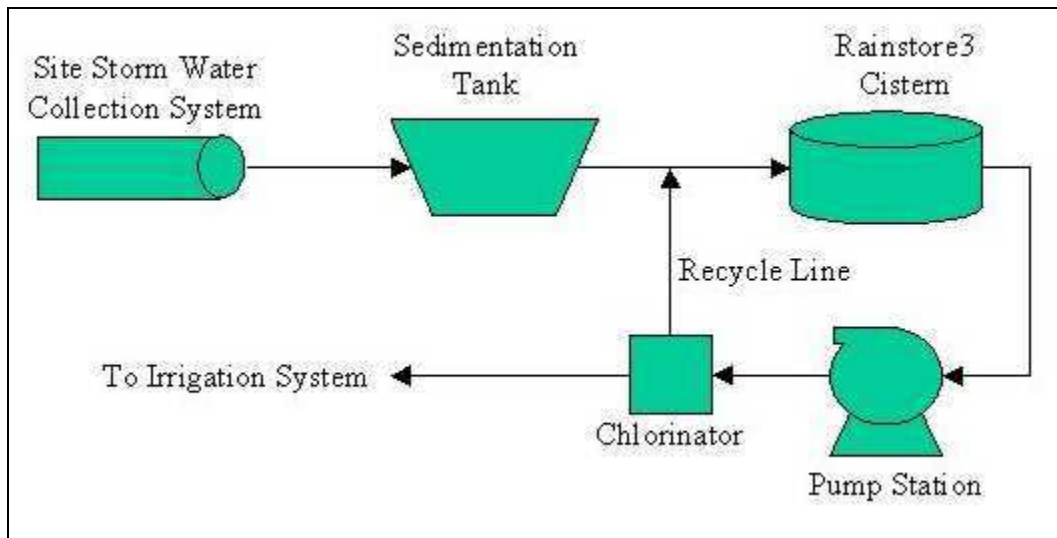


Figure 1
Open Charter School Stormwater Treatment and Retention Process

OPERATION COST ESTIMATE

Pumps

The pumps electrical power consumption is based on turning the pump on once every day (assuming there is enough water in the system) for 20 minutes to sufficiently irrigate at the school. The pumping is required as part of the recycle system, pumping water back to the beginning of the Rainstore3 cistern.

The total volume of the Rainstore3 cistern is 776,000 gallons. Assuming the cistern fills up once a year and that it will be emptied completely by the end of the year, approximately one hour of pumping is required once a day during a six month period. Therefore, for this cost estimate, it is assumed that for 180 days during the year, the pumps will be in operation for one hour and 20 minutes and for 185 days the pumps will be in operation for 20 minutes.

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Chlorinator

Each month, as part of the operation of this system, an operator must replace 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 maintenance 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 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.

Labor Requirements: 24 hours/year

Replacement Parts

The scheduled maintenance of the Local Control Panel (LCP) is expected to require replacement parts. It is estimated that the total cost of these replacement parts for the LCP will be \$250 every five years. These replacement parts will ensure the proper operation of the LCP during the life span of the system.

The duplex filter located on the discharge line of the distribution system has an expected life span of 5 years. The cost of the replacement filter is expected to be \$50. The replacement of the duplex filter is similar to the steps taken during the regular cleaning of the duplex filter. A description of this procedure is located in the Duplex Filter Maintenance Section below.

The replacement of the pumps is expected to occur at the end of their life span. It is estimated that these pumps will require replacement at the end of 10 years.

Replacement Cost: LCP \$250/five years
Replacement Cost: Duplex Filter: \$50/five years
Replacement Cost: Pumps \$11,000 at the end of ten years

MAINTENANCE COST ESIMATE

Pumps

The maintenance of the pumps is vital to the system’s life span. It is assumed that both 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. It is assumed that it will take a crew of two persons one day to remove and inspect both pumps.

Labor Requirements: 16 hours/ year

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Cost Estimate Summary

The annual O&M cost was calculated using the Equivalent Uniform Annual Cost (EUAC). These costs are listed in **Table 2**. The annual interest rate used to calculate the EUAC is 8%. The lifespan of the system is estimated as 20 years.

**Table 2
Open Charter School
Operation, Maintenance, and Inspection Cost Estimate**

ITEM	\$ / Year
Operation	
Pumps	\$251.52
Chlorinator	\$1,440.00
Replacement Parts	\$2,177.95
<i>Operation Subtotal</i>	<i>\$3,869.47</i>
Maintenance	
Pumps	\$960.00
Chlorinator	\$240.00
Collection System	\$1,440.00
Duplex Filters	\$720.00
Local Control Panel	\$480.00
Rainstore3	\$530.97
Sedimentation Tank	\$1,979.64
<i>Maintenance Subtotal</i>	<i>\$6,350.61</i>
Inspection	
Rainstore3 & Sedimentation Tank	\$720.00
Entire System	\$540.00
Chlorine Tablets	\$110.00
<i>Inspection Subtotal</i>	<i>\$1,370.00</i>
<i>Subtotal</i>	<i>\$11,600</i>
Contingency 20 %	\$2,320
TOTAL ANNUAL COST	\$13,920

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Table 3
Yearly Operation, Maintenance & Inspection Activity Schedule*

	January	February	March	April	May	June	July	August	September	October	November	December
OPERATION	Remove & Refill Chlorine Tablets (3)	Remove & Refill Chlorine Tablets (3)	Remove & Refill Chlorine Tablets (3)	Remove & Refill Chlorine Tablets (3)	Remove & Refill Chlorine Tablets (3)	Remove & Refill Chlorine Tablets (3)	Remove & Refill Chlorine Tablets (3)	Remove & Refill Chlorine Tablets (3)	Remove & Refill Chlorine Tablets (3)	Remove & Refill Chlorine Tablets (3)	Remove & Refill Chlorine Tablets (3)	Remove & Refill Chlorine Tablets (3)
MAINTENANCE										Sediment Removal from Sed. Tank		
										Remove & Inspect Pumps		
	Clean Collection System			Clean Collection System						Clean Collection System		
	Cleaning of Duplex Filter	Cleaning of Duplex Filter	Cleaning of Duplex Filter	Cleaning of Duplex Filter	Cleaning of Duplex Filter	Cleaning of Duplex Filter	Cleaning of Duplex Filter	Cleaning of Duplex Filter	Cleaning of Duplex Filter	Cleaning of Duplex Filter	Cleaning of Duplex Filter	Cleaning of Duplex Filter
				Service Chlorinator						Service Chlorinator		
				Service LCP						Service LCP		
INSPECTION	Inspect Sediment Buildup in Rainstore3 & Sed. Tank			Inspect Sediment Buildup in Rainstore3 & Sed. Tank						Inspect Sediment Buildup in Rainstore3 & Sed. Tank		
	Inspect System			Inspect System						Inspect System		

*Does not include removal of oil/grit from the sedimentation tank which is assumed to occur every two years