

# CHAPTER 12 – MAINTENANCE, TRACTS AND EASEMENTS



## Chapter Organization [TO BE UPDATED]

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## **12.1 MAINTENANCE**

### **12.1.1 INTRODUCTION**

Insufficient maintenance of stormwater management facilities can lead to poor performance, shortened life, increased maintenance and replacement costs, possible property damage, and regulatory non-compliance.

The local jurisdiction maintains the stormwater system structures located within the public road right-of-way (ROW) and structures located within border easements that serve public road runoff, unless a formal written agreement assigns the responsibility to a different entity. Unless otherwise established through formal written agreement, the project proponent is to provide for the perpetual maintenance of all elements of the stormwater system located outside of the public ROW. When applicable, the following items shall be submitted for all land actions:

- A copy of the Conditions, Covenants and Restrictions (CC&R's) for the Homeowner's Association (HOA) or other legal entity in charge of operating and maintaining all elements of the stormwater system;
- A Maintenance Agreement formalizing the maintenance responsibility for privately maintained stormwater facilities;
- An Operations and Maintenance (O&M) Manual; and
- A Financial Plan outlining the funding mechanism for the operation, inspection, maintenance, repair, and replacement of the private stormwater system, including contingencies.

### **12.1.2 HOMEOWNER'S AND PROPERTY OWNER'S ASSOCIATION**

For privately maintained stormwater systems in residential neighborhoods, an HOA, or another legal entity shall be formed to maintain the facilities located outside of the public ROW. Alternatively, the HOA or other legal entity may contract with the local jurisdiction to maintain the facilities for an agreed upon reimbursement rate.

A draft copy of the CC&R's for the HOA in charge of operating and maintaining the facilities associated with the stormwater system shall be submitted as part of the Drainage Submittal review package. The CC&R's are to summarize the maintenance and fiscal responsibilities of the HOA. The CC&R's should include the O&M Manual (Section 12.1.3) outlining the maintenance requirements for all stormwater facilities included on the drainage plan, a copy of the sinking fund calculations and Financial Plan (Section 12.1.4), and a copy of the Maintenance Agreement formalizing the maintenance obligations of the HOA. A sample Maintenance Agreement is included in Appendix 12A.

The annual HOA dues need to include the funds for the annual operation and maintenance of all facilities associated with the stormwater system, and funds for the eventual replacement of these facilities.

For commercial/industrial and multi-family residential developments with joint stormwater systems and multiple owners, a Property Owners Association (POA) or similar entity such as a business association shall be formed, or a reciprocal use agreement executed.

### **12.1.3 OPERATION AND MAINTENANCE MANUAL**

For stormwater systems serving single-family residential neighborhoods, or other land-use actions operated and maintained by an HOA or POA, an O&M Manual is required. The O&M Manual summarizes the tasks required to ensure the proper operation of all facilities associated with the stormwater system and must include, as a minimum:

- Description of the entity responsible for the perpetual maintenance of all facilities associated with the stormwater system, including legal means of successorship;
- Description of inspection and maintenance tasks to be performed;
- Frequency of inspection and maintenance activities;
- Expected design life and replacement schedule of the various components;
- A general site plan (drawn to scale) showing the overall layout of the site and all the facilities associated with the stormwater system;
- Locations and operations of any offsite drainage facilities being installed to accommodate project drainage; and
- Inspection Recording Form.

Where UICs have been registered with DEQ, the O&M Manual should include the Stormwater Management Plan required for UIC approval, as well as instructions and forms for notifying DEQ if a transfer of ownership takes place. Transfer forms are provided on the DEQ web page ([www.deq.state.or.us/wq/uic/uic.htm](http://www.deq.state.or.us/wq/uic/uic.htm)). For projects classified as Large Category Development (ADT  $\geq$ 1,000 or more vehicle trips per day), the O&M Plan should also include the sampling and reporting requirements.

Maintenance standards for various stormwater facilities (water quality, flow control, and energy dissipaters) are provided in Appendix 12A to assist the project proponents in developing the O&M Manual. The standards are based on guidelines and checklists developed by the City of Portland and the Fairfield-Suisun Urban Runoff Management Program. The maintenance standards are presented in checklist form, so that property owners and municipal staff can utilize the checklists in conducting routine inspections to determine whether maintenance is required at a given time.

### **12.1.4 FINANCIAL PLAN**

The Financial Plan is to provide the following items:

- A list of all stormwater related structures/facilities and their expected date of replacement and associated costs;

- Sinking fund calculations that take into consideration probable inflation over the life of the infrastructure and estimates the funds that need to be set aside annually. The dues collected by the HOA or POA need to include funds for the operation and maintenance of the facilities associated with the stormwater system. An example is provided in Appendix 12B; and,
- A mechanism for initiating and sustaining the sinking fund account needs to demonstrate that perpetual maintenance of all facilities associated with the stormwater system will be sustained.

### **12.1.5 MAINTENANCE ACCESS REQUIREMENTS**

An access road is required when the stormwater system facilities/structures are located 8 feet or more from an all weather drivable surface and are maintained by the local jurisdiction. Privately maintained facilities located 25 feet or more from an all weather drivable surface are also required to have an access road. When required, maintenance access drives shall meet the following minimum requirements:

- Access drives shall consist of an all weather, drivable surface, 12 feet or greater in width on straight sections and 15 feet or greater on curves;
- Access drives shall be located within a 20 feet minimum width (or as required by the horizontal alignment requirements) tract or easement, extending from a public or private road;
- The horizontal alignment shall be designed and constructed to accommodate the turning movements of a Single-Unit Truck design vehicle as defined by AASHTO (See AASHTO-Geometric Design of Highways and Streets, Exhibit 2-4, 2001 Edition). The minimum outside turning radius should be 50 feet;
- A paved apron must be provided where access roads connect to paved public roads; and,
- Gravel maintenance roads shall have a minimum of 6 inches of crushed surfacing top course, in accordance with ODOT Standard Specifications and shall be designed to support the heaviest anticipated maintenance vehicle year round.

The items below are only required when the local jurisdiction has assumed the responsibility of the maintenance and operation of the facilities. However, it is recommended that access drives for privately maintained facilities are also designed to meet the following criteria:

- Access drives shall have a maximum grade of 15 percent;
- If the maintenance access drive is greater than 150 ft. in length, a turn-around is required at or near the terminus of the access drive. Turnarounds are required for long, winding, or steep conditions, regardless of the length of the drive, where backing up would otherwise be difficult; and,
- Turnarounds shall conform to the local fire department requirements.

### 12.1.6 SEDIMENT DISPOSAL

Sediment and debris cleaned from drywells, catch basins, and other stormwater facilities may contain materials that characterize the waste as hazardous or industrial process waste and it must be handled in accordance with regulations that govern those types of wastes. Catch basins and other stormwater system components can periodically receive illegal discharges that make the wastes highly hazardous. Contact the DEQ to determine when and how to test wastes to determine if they are regulated wastes and dispose accordingly. All decant water and other sediment waste should be handled as hazardous until tests prove otherwise. Also, obtain permission from the landfill operator before sending any hazardous or industrial wastes to a landfill. DEQ or landfill rules may require that the wastes be disposed of at a special disposal facility.

Slurries must be separated into liquid and solid components before appropriate disposal. Untreated decant water should not be conveyed to the storm sewer or nearby surface water for disposal. Options for managing decant water include the following:

- Decant water can be contained (e.g. in a facility with a concrete pad, berms, and roof) and conveyed to the sanitary sewer system after sanitary sewer pre-treatment requirements have been met and permission has been obtained from the sanitary sewer authority. Pre-treatment may include containing decant water for a minimum of 24 to 48 hours to allow settling of particulate matter. Note that clay, pumice, and cinder particles may be difficult to settle prior to discharge to the sanitary sewer system. Centrifugation, chemical coagulation, or filtration may be required to achieve the appropriate liquid/solid separation efficiency.
- Slurry removed from catch basins or other facilities can be placed in a concrete basin or other containment system to allow the water to evaporate. Once the sediments are dry they can be tested to determine hazardous waste status and disposed accordingly.
- The volume of decant water can be reduced by reducing the amount of liquids removed from stormwater facilities during maintenance. When possible, perform maintenance when systems have little or no standing water present.
- Decant water can be transported to decant stations for treatment, eliminating discharges in the field.
- Field settling sumps can be used to promote gravity settling and reduce decant water contamination.

Research by the Federal Highway Administration, ODOT, and Multnomah County indicates that sediments removed from roadway catch basins could potentially contain high levels of chemicals such as heavy metals, organics, and petroleum products. When managing sediment removed from stormwater facilities, the pollutant concentrations should be determined and the environmental health risks associated with the pollutant concentrations should be evaluated. Once pollutant risks are known, an appropriate management or disposal option can be chosen. DEQ has not specifically approved guidelines for these management options. Heavily polluted

sediment management options include landfilling, high temperature thermal treatment, and in some cases composting/microbial degradation. Reuse, such as for soil amendment, construction fill, and landfill cover are options that need to be carefully investigated and discussed with DEQ.

## **12.2 TRACTS AND EASEMENTS**

### **12.2.1 TRACTS**

Tracts shall be granted to the entity responsible for maintaining the stormwater system. Unless otherwise approved by the local jurisdiction, a tract will be granted for:

- All facilities associated with a stormwater system that serves residential developments, therefore located outside of the public ROW; and,
- Drainage ditches located in residential neighborhoods not adjacent to public streets. The limits of the tract may be required to be delineated with a permanent fence when the ditch is located near property lines.

Tracts shall be of sufficient width to provide access to, and maintain, repair or replace elements of the stormwater system without risking damage to adjacent structures or utilities and without incurring additional costs for shoring or specialized equipment.

Tracts shall be recorded along with a maintenance agreement outlining the long term maintenance obligations of the property owner. A sample Maintenance Agreement is provided in Appendix 12A.

### **12.2.2 EASEMENTS**

A drainage easement for access, maintenance, operation, inspection, and repair shall be dedicated to the entity in charge of the maintenance and operation of the stormwater system. The easement shall grant to the local jurisdiction the right to ingress/egress over the easement for purposes of inspection or emergency repair. The following infrastructure shall be placed within drainage easements:

- Elements of a stormwater system, such as a pipe, located outside of the public ROW. Easements for stormwater conveyance pipes shall be of sufficient width to be able to access and maintain, repair or replace the pipe and appurtenances without risking damage to adjacent structures and incurring increased costs for shoring. No storm pipe in a drainage easement shall have its centerline closer than 10 feet to a private rear or side property line. The storm drain shall be centered in the easement. The minimum drainage easement shall be 20 feet;
- Drainage ditches and natural drainage channels. The easement width shall be wide enough to contain the runoff from a 50 year, SCS Type I 24 hour storm event, for the contributing stormwater basin, plus a 30% freeboard. For natural channels, the minimum easement width is 25 feet and all others shall be a minimum of 20 feet wide; and,

- Access roads and turnarounds. Access road easements shall be at least 20 feet wide.

Stormwater facilities must be located within the ROW, within a border easement parallel to the road or within an individual tract. Stormwater facilities may not be located within a drainage easement on private property. A stormwater facility, as defined for this section, is meant to imply a swale or pond. It is acceptable for a pipe to be in a drainage easement, for example.

### ***Offsite Easements***

When a land action proposes infrastructure outside of the property boundaries, an offsite easement shall be recorded separately from plat documents. The easement language shall grant the local jurisdiction the right to ingress and egress for purposes of routine or emergency inspection and maintenance. Legal descriptions and plat and easement exhibits shall conform to the local jurisdiction guidelines.

# APPENDIX 12A – SAMPLE MAINTENANCE AGREEMENT

## STORMWATER MANAGEMENT FACILITIES MAINTENANCE AGREEMENT

This Stormwater Management Facilities Maintenance Agreement (“Agreement”) is between the City/County of \_\_\_\_\_, Oregon (“City/County”) and [---insert full legal name of Property Owner---] (“Property Owner”).

### RECITALS

- A. To comply with the City/County’s obligations under the Clean Water Act, Safe Drinking Water Act, and other federal and state Law, and permit requirements; the City/County must assure that all stormwater facilities are adequately operated and maintained by entities responsible for those facilities. The City/County needs information and access in order to comply with its responsibilities.
- B. Property Owner is the owner of real property commonly known as [---insert Assessor’s Parcel Number ---] (the “Property”), and more particularly described in the attached Exhibit 1 upon which stormwater facilities (the “Facilities”) are located or to be constructed.
- C. The City/County is the permittee public agency with jurisdiction over the Property.
- D. The Property Owner recognizes that the stormwater management facility (-ies) shown on Exhibit 1 must be installed and maintained as provided in this Agreement. Property Owner must build, maintain and operated the Facilities according with the City/County approved plans for those facilities.
- E. The City/County and the Property Owner agree that the health, safety and welfare of the citizens of the City/County require that the Facilities be constructed and maintained on the Property and that Property Owner is responsible for construction and maintenance of the Facilities.

### TERMS OF AGREEMENT

#### SECTION 1: CONSTRUCTION OF FACILITIES

The Facilities shall be constructed by the Property Owner in strict accordance with the approved plans and specifications.

**SECTION 2: OPERATION AND MAINTENANCE RESPONSIBILITY**

The Property Owner accepts responsibility for operation and maintenance of Facilities. This responsibility runs with the land and is binding on subsequent property owners as set forth in Section 13 of this Agreement.

**SECTION 3: MAINTENANCE OF FACILITIES**

Property Owner shall not destroy or remove the Facilities from the Property nor modify the Facilities in a manner that lessens their effectiveness, and shall, at its sole expense, adequately maintain the Facilities in good working order acceptable to the City/County and in accordance with the maintenance plan attached as Exhibit 2. This includes all pipes, channels or other conveyances built to convey stormwater to treatment measures(s), as well as all structures, improvements, and vegetation provided to control the quantity and quality of the stormwater. Adequate maintenance is defined as maintaining the described facilities in good working condition so that these facilities continue to operate as originally designed and approved. The maintenance plan shall include a detailed description of an schedule for long-term maintenance activities.

**SECTION 4: SEDIMENT MANAGEMENT**

Sediment accumulation resulting from the normal operation of the Facilities will be managed appropriately by the Property Owner. The Property Owner will provide for the removal and disposal of accumulated sediments. Disposal of accumulated sediments shall not occur on the Property, unless otherwise provided for in the maintenance plan. Any disposal or removal of accumulated sediments or debris shall be in compliance with all federal, state and local law and regulations.

**SECTION 5: ANNUAL INSPECTION AND REPORT**

The Property Owner shall, on an annual basis, complete the Stormwater Facility Operation and Maintenance Inspection Report (annual report), attached to this agreement as Exhibit 3. The annual report shall include all completed Inspection and Maintenance Checklists for the reporting period and shall be submitted to the City/County in order to verify that inspection and maintenance of the applicable Facilities have been conducted pursuant to this agreement. The annual report shall be submitted no later than December 31<sup>st</sup> each year, under penalty of perjury, to the City/County of \_\_\_\_\_, {contact person title}, {address}, {City}, OR {zip}. The Property Owner shall provide a record of the volume of all accumulated sediment removed from the treatment measures(s) and control measures in the annual report. The Property Owner shall conduct a minimum of one annual inspection of the stormwater Facilities before the wet season. This inspection shall occur between August 1<sup>st</sup> and October 15<sup>th</sup> of each year. More frequent inspections may be required by the maintenance plan (Exhibit 2). The results of the inspections shall be recorded on the Inspection and Maintenance Checklist(s) included in Exhibit 3.

**SECTION 6: NECESSARY CHANGES AND MODIFICATIONS**

At its sole expense, the Property Owner shall make changes or modifications to the Facility(-ies) and/or the long-term maintenance plan (Exhibit 2) as may be determined to be reasonably necessary by the City/County to ensure that Facilities are properly maintained and continue to operate as originally designed and approved.

**SECTION 7: ACCESS TO THE PROPERTY**

The Property Owner hereby grants permission to the City; and it's authorized agents and employees to enter upon the Property at reasonable times and in a reasonable manner to inspect, assess or observe the Facilities in order to ensure that the Facilities are being properly maintained and are continuing to perform in an adequate manner to protect water quality and the public health and safety. This includes the right to enter upon the Property when it has a reasonable basis to believe that a violation of this Agreement or applicable regulations or permits has occurred or threatens to occur. The City/County also has a right to enter the Property when necessary for abatement of a public nuisance or correction of a violation of this Agreement. Whenever possible, the City/County shall provide reasonable notice to the Property Owner before entering the Property.

**SECTION 8: FAILURE TO MAINTAIN STORMWATER MANAGEMENT FACILITIES**

In the event either the Property Owner or assignee fails to maintain the Facilities as approved and in accordance with the maintenance plan, the City/County and its authorized agents and employees with reasonable notice, may enter the Property and take whatever steps it deems necessary and appropriate to return the treatment measure(s) to good working order. Such notice will not be necessary if emergency conditions require immediate remedial action. This provision shall not be construed to allow the City/County to erect any structure of a permanent nature on the Property. It is expressly understood and agreed that the City/County is under no obligation to maintain or repair the Facilities and in no event shall this Agreement be construed to impose any such obligation on the City.

**SECTION 9: REIMBURSEMENT OF CITY/COUNTY EXPENDITURES**

In the event the City/County performs work of any nature under Section 8, or expends any funds in the performance of the work, the Property Owner shall reimburse the City/County for the costs incurred by the City. The City/County may require a bond to secure performance of this agreement. If these costs are not paid within the prescribed time period, the City/County may collect from the surety under the bond provided with this agreement. The actions described in this section are in addition to and not in lieu of any and all legal remedies as provided by law, available to the City/County as a result of the Property Owner's failure to maintain the Facilities.

### **SECTION 10: INDEMNIFICATION**

The Property Owner shall indemnify, hold harmless and defend the City/County and its authorized agents, officers, officials and employees from and against any and all claims, demands, suits, damages, liabilities, losses, accidents, casualties, occurrences, claims and payments, including attorney fees claimed or which might arise or be asserted against the City/County that are alleged or proven to result or arise from the construction, presence, existence or maintenance of the Facilities by the Property Owner. In the event a claim is asserted against the City/County or its authorized agents, officers, officials or employees shall be allowed, the Property Owner shall pay for all costs and expenses. This section shall not apply to any claims, demands, suits, damages, liabilities, losses, accidents, casualties, occurrences, claims and payments, including attorney fees claimed which arise due solely to the negligence or willful misconduct of the City.

### **SECTION 11: NO ADDITIONAL LIABILITY**

It is the intent of this agreement to insure the proper maintenance of the Facilities by the Property Owner; provided, however, that this Agreement shall not be deemed to create or affect any additional liability not otherwise provided by law of any party for damage alleged to result from or caused by stormwater runoff.

### **SECTION 12: PERFORMANCE FINANCIAL ASSURANCE**

The City/County may request the Property Owner to provide a performance bond, security or other appropriate financial assurance providing for the maintenance of the Facilities pursuant to the City's ordinances, guidelines, criteria or written direction.

### **SECTION 13: TRANSFER OF PROPERTY**

13.1 Agreement Runs with the Land. This Agreement shall run with the title to the land. The Property Owner hereby subjects the Property and the Project to the covenants and restrictions set forth in this Agreement. The City/County and Property Owner declare their express intent that the covenants and restrictions shall be deemed covenants running with the land and shall be binding upon and inure to the benefit of the heirs, administrators, executors, successors in interest, transferees, and assigns of the Property Owner and City, regardless of any assignment, conveyance or transfer of the Property or any part thereof or interest therein. Any successor-in-interest to the Property Owner including without limitation any purchaser, transferee or lessee of the Property shall be subject to all of the duties and obligations imposed by this Agreement for the full term of this Agreement. Each and every contract, deed, ground lease or other instrument affecting or conveying any interest in the Property shall conclusively be held to have been executed, delivered and accepted subject to the covenants, restrictions, duties and obligations set forth herein regardless of whether the covenants, restrictions, duties and obligations are set forth in the contract, deed, ground lease or other instrument. If any such contract, deed, ground lease or other instrument has been

executed prior to the date of this Agreement, the Property Owner hereby covenants to obtain and deliver to City/County an instrument in recordable form signed by the parties to such contract, deed, ground lease or other instrument pursuant to which such parties acknowledge and accept this Agreement and agree to be bound by it.

13.2 Touches and Concerns. The Parties declare that it is their understanding and intent that the burden of the covenants set forth in this Agreement concern the land in that they restrict the use of the Property. The Parties further declare that it is their understanding that the benefit of such covenants concerns the land by guaranteeing the health, safety, and welfare of the citizens of the City. The covenants, conditions and restrictions shall apply uniformly to the Property in order to establish and carry out a common plan for the use, development and improvement of the Property.

#### **SECTION 14: SEVERABILITY**

The provisions of this Agreement shall be severable and if any phrase, clause, section, subsection, paragraph, subdivision, sentence or provision is adjudged invalid or unconstitutional by a court of competent jurisdiction, or the applicability to any Property Owner is held invalid, this shall not affect or invalidate the remainder of any phrase, clause, section, subsection, paragraph, subdivision, sentence or provision of this Agreement.

#### **SECTION 15: RECORDATION**

This Agreement may be recorded by the City/County in the \_\_\_\_\_ County deed records. The Property Owner shall reimburse the City/County for the costs incurred by the City/County to record the Agreement.

#### **SECTION 16: RELEASE OF AGREEMENT**

In the event that the City/County determines that the Facilities located on the Property are no longer required, then the City, at the request of the Property Owner shall execute a release of this Inspection and Maintenance Agreement, which the Property Owner, or the City/County by mutual agreement, shall record in the County Recorder's Office at the Property Owner's expense. The Facility (-ies) shall not be removed from the Property unless the release is executed and recorded.

**SECTION 17: EFFECTIVE DATE AND MODIFICATION**

This Agreement is effective when signed by both parties. This Agreement shall not be modified except by written instrument executed by the City/County and the Property Owner.

\_\_\_\_\_  
Signature for the City/County of \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Type or print name and title

\_\_\_\_\_  
Property Owner Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Type or print Property Owner name and address  
(Property Owner's signature shall be notarized)

State of Oregon

County of \_\_\_\_\_

This instrument was acknowledged before me on \_\_\_\_\_ by  
Date

\_\_\_\_\_ as \_\_\_\_\_ of \_\_\_\_\_.  
Name and Title of Officer (e.g. "Jane Doe, Notary Public")

\_\_\_\_\_  
Signature of Notary Public for Oregon

**(Insert Here)**

**Exhibit 1: Facility Locations**

**Exhibit 2: Stormwater Management Facilities Maintenance Plan**

**Exhibit 3 Operation and Maintenance Inspection Checklist**

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## **APPENDIX 12B – RECOMMENDED MAINTENANCE CRITERIA**

The following maintenance standard checklists were developed based on guidelines and standards from the *Portland Stormwater Management Manual* (August 2008) and the *Fairfield-Suisun Urban Runoff Management Program*. The maintenance criteria are intended to assist project proponents in developing an appropriate O&M Manual for a given project site. The checklists may be included in the O&M Manual for use by field personnel during the routine inspections of stormwater facilities to determine maintenance needs. The following stormwater facilities are included:

- Catch Basin Inserts
- Conveyance Systems
- Drywells
- Energy Dissipaters
- Grassy Swale
- Green Roofs
- Infiltration Swale/Bio-infiltration Basin
- Infiltration Trenches
- Media Filters (e.g. Stormfilter)
- Oil/Water Separators
- Ponds (Detention, Infiltration, Evaporation, etc)
- Porous Pavement
- Sedimentation Manholes/Catch Basins
- Vaults, Tanks, and Pipes
- Vegetated Filter Strips
- Wetponds

**INSERT DOE MANUAL TABLES HERE**

## APPENDIX 12C – EXAMPLE CALCULATION – SINKING FUND

### LIST OF QUANTITIES

Description	Units	Quantity	Unit Price	Total
24" Pipe	LF	175	\$40.00	\$ 7,000.00
21" Pipe	LF	50	\$40.00	\$ 2,000.00
18" Pipe	LF	700	\$26.00	\$ 18,200.00
15" Pipe	LF	650	\$24.00	\$ 15,600.00
12" Pipe	LF	1600	\$22.00	\$ 35,200.00
10" Pipe	LF	50	\$20.00	\$ 1,000.00
			<b>Pipe Total</b>	<b>\$ 79,000.00</b>
Inlets	EA	22	\$500.00	\$ 11,000.00
Drywells	EA	4	\$2,500.00	\$ 10,000.00
			<b>Structure Total</b>	<b>\$ 21,000.00</b>

### ANNUAL MAINTENANCE AND OPERATION COSTS

Description	Units	Quantity	Unit Price	Total
Inspect Structures	DAY	4	\$50.00	\$ 200.00
Flush/Clean Inlets	EA	26	\$100.00	\$ 2,600.00
Flush Pipes				\$ -
Inspect Ponds and Clean Outlets	LS	1	\$500.00	\$ 500.00
Mowing & Irrigation of Ponds	DAY	34	\$250.00	\$ 8,500.00
			<b>Annual Maintenance Cost</b>	<b>\$ 11,800.00</b>

### REPLACEMENT COST & ANNUAL COST PER LOT

Description	Total
Assume 50% of Pipe is Replaced in 20 years (=Pipe Total*0.5)	\$ 39,500.00
Assume 25% of Structures are Replaced in 20 years (=Structure Total*0.25)	\$ 5,250.00
<b>Total Present Value (PV) of Replaced Pipe and Structures</b>	<b>\$ 44,750.00</b>
Future Value of Pipe and Structures (FV), assume inflation=4%, n=20 FV = PV(F/P, 4%, n=20)	\$ 98,052.76
Annual Set-Aside for Future Replacement (A), assume interest=6%, n=20 A = FV(A/F, 6%, n=20)	\$ 2,665.52
Annual Maintenance and Operation Costs (from subtotal above)	\$ 11,800.00
<b>Total Annual Costs</b>	<b>\$ 14,465.52</b>
Total Charge per Lot, assume 100 Lots Charge per Lot = Total Annual Costs / # of Lots	
<b>Charge per Lot</b>	<b>\$ 144.66</b>

NOTE: F/P, A/F factors are from standard interest tables