

**STRUTHERS RANCH SUBDIVISION, FILING NO. 5**

**EL PASO COUNTY, COLORADO**

**STORMWATER MANAGEMENT FACILITY  
OPERATION AND MAINTENANCE MANUAL**

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**add PCD Filing Number: VR-21-001**

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include appendix for construction drawings.

**Stormwater Management Facility  
Extended Detention Basin  
Operation and Maintenance (O&M) Manual**

**I. Background**

This document provides General Guidelines and Standard Operating Procedures (SOPs) for Operation and Maintenance (O&M) of stormwater facilities. Additional information regarding O&M of site specific features may be found on approved Construction Drawings and in the Drainage Letter Report.

A. Compliance with the El Paso County Drainage Criteria Manual

Owners or managers of developed property located within El Paso County are required to comply with the El Paso County's Drainage Criteria Manual (DCM) in order to ensure property owners follow proper operation and maintenance procedures for stormwater management facilities located on their sites. Requirements for inspection and maintenance are located in these O&M Standard Guidelines.

B. Preventive and Prompt Maintenance Activities Reduce Overall Maintenance Costs

The most effective way to maintain your stormwater facility is to prevent pollutants from entering the facility in the first place. Common pollutants include sediment, trash and debris, chemicals, pet wastes, runoff from stored materials, illicit discharges into the storm drainage system and many others. A thorough maintenance program will include measures to address these potential contaminants, and will save money and time in the long run. Key points to consider in your maintenance program include:

- Educate employees/residents on how their actions impact water quality and how they can help reduce maintenance costs.
- Keep properties, streets, curb & gutters and parking lots free of trash, debris and lawn clippings.
- Ensure the proper disposal of hazardous wastes and chemicals.
- Plan lawn care to minimize the use of chemicals and pesticides.
- Sweep or blow grass clippings from paved surfaces and put the clippings in a compost pile or back on the lawn.
- Be aware of automobiles leaking fluids. Use absorbents such as clay cat litter to soak up drippings and dispose of properly. Re-vegetate disturbed and bare areas to maintain vegetative stabilization.
- Clean out the upstream components of the storm drainage system, including inlets, storm sewers and outfalls.
- Do not store materials outdoors (including landscaping materials) unless they are properly protected from stormwater runoff.

## II. General Description of Stormwater Management Facilities

The following are brief descriptions of commonly used stormwater management facilities. For more detailed information refer to the El Paso county DCM.

### A. Volume Reduction Facilities (Filtration Control Measures)

1. Grass Buffers and Swales – Grass buffers are densely vegetated strips of grass designed to provide filtration, infiltration and settling to reduce runoff pollutants through sheet flow over the grass. Grass swales are densely vegetated trapezoidal or triangular channels designed to slow runoff, promote infiltration and facilitate sedimentation while limiting erosion. Buffers differ from swales in that they are designed to accommodate overland sheet flow rather than concentrated or channelized flow.

### B. Water Quality and Flood Control Facilities

1. Extended Detention Basins (EDBs) – EDBs are sedimentation basins with forebays, micropools and a slow release outlet designed to detain stormwater for many hours after storm runoff ends. The basins are considered to be “dry” because the majority of the basin is designed not to have a significant permanent pool of water remaining between runoff events.

## III. Ownership and Easements

Maintenance responsibility lies with the owner of the land, except as modified by specific agreement. Maintenance responsibility shall be defined on Final Plats and Final Development Plans. The property owner or designee shall be responsible for the maintenance of all drainage facilities including inlets, pipes, culverts, channels, ditches, hydraulic structures, and detention basins located on their land unless modified by specific agreement. Maintenance access for all facilities must be adequate for the anticipated maintenance vehicles and equipment and should be shown on the Final Plats and Final Development Plans. The Operation and Maintenance Manual, shall define those entities responsible for the maintenance and management of stormwater facilities. If the property owner fails to maintain a facility, El Paso County will complete maintenance and may charge the owner for the cost of maintenance.

Drainage easements are required in order to ensure for the proper construction, maintenance and access to drainage improvements that have the potential to affect the public drainage system and other properties. Drainage easements shall be granted to the El Paso County for inspection and maintenance purposes and shall be shown on the Drainage Plan, Final Plat and Site Improvement Plan, as

please be specific to the site, including location of facilities.

applicable. The drainage easement shall state that El Paso County has the right of access on the easements for inspection and maintenance purposes. In general, easements are required for detention or retention ponds, water quality enhancement ponds and other Best Management Practice facilities, storm sewers, swales, channels, parking lot areas that convey runoff from adjacent properties (blanket type easements), major drainageways and floodplains. Easement requirements are specific to the type of stormwater management facility and are discussed in more detail in later chapters.

#### **IV. Access**

Refer to approved Plat, Drainage Plan and/or Site Plan for location of designated maintenance access.

#### **V. Safety**

Keep safety considerations at the forefront of inspection and maintenance procedures at all times. Likely hazards should be anticipated and avoided. Never enter a confined space (outlet structure, manhole, etc) without proper training or equipment. A confined space should never be entered without at least one additional person present.

If a highly toxic or flammable substance is discovered, the inspector(s) should leave the immediate area and contact the **Fire Department at 911**. If there is any question about a substance, leave the area immediately and contact the **Fire Department**. Also, never open a sealed container to check the contents.

**Potentially dangerous** (e.g., fuel, chemicals, hazardous materials) substances found in the areas **must be** referred to the **Fire Department** immediately for response by the Hazardous Materials Unit. The emergency contact number is **911**.

Vertical drops may be encountered in areas located within and around the facility. Avoid walking on top of retaining walls or other structures that have a significant vertical drop. If a vertical drop is identified within the stormwater management facility that is greater than 48" in height, make the appropriate note/comment on the maintenance inspection form.

**If any hazard is found within the facility area that poses an immediate threat to public safety, contact the Fire Department immediately!**

#### **VI. Field Inspection Equipment**

It is imperative that the appropriate equipment is taken to the field with the inspector(s). This is to ensure the safety of the inspector and allow the inspections to be performed as efficiently as possible. Below is a list of the equipment that

may be necessary to perform the inspections of a Stormwater Management Facilities:

- County Approved Drainage Report and Construction Drawings
- Typical Inspection & Maintenance Requirements (See Appendix B)
- Protective clothing and boots
- Safety equipment (vest, hard hat, confined space entry equipment)
- Communication equipment
- Clipboard
- Manhole Lid Remover
- Shovel
- First Aid Kit

Some of the items identified above need not be carried by the inspector (manhole lid remover, shovel, and confined space entry equipment). However, this equipment should be available in the vehicle driven to the site.

## **VII. Inspecting and Maintaining Stormwater Management Facilities**

The quality of stormwater discharging to waterways relies heavily on the proper operation and maintenance of permanent Control Measures.

This section contains a general overview of stormwater management facility inspection, operation and maintenance guidelines. Appendix A contains Standard Operating Procedures (SOPs) for the facilities identified in Section II. Refer to the approved Drainage Report and Construction Drawings prior to performing inspections and/or maintenance.

### **A. Inspection Procedures**

All stormwater management facilities shall be inspected by a qualified individual at a minimum of one time per year. Inspections should follow the inspection guidance found in the SOPs located in Appendix A of this manual.

### **B. Maintenance Procedures**

Stormwater Management Facility Maintenance Programs are separated into three broad categories of work. These categories were based largely on the Mile High Flood District's Maintenance Program for regional drainage facilities. The categories are separated based upon the magnitude and type of the maintenance activities performed. A description of each category follows:

please include description of types of work and a maintenance schedule.

1. Routine Work

The majority of this work consists of regularly scheduled mowing and trash and debris pickups for stormwater management facilities during the growing season. This work also includes items such as the removal of debris/material that may be clogging the outlet structure well screens and trash racks. It may also include activities such as weed control, mosquito treatment and algae treatment. These activities normally will be performed numerous times during the year. These items can be completed without any prior notification to the Town.

2. Minor Work

This work consists of a variety of isolated or small-scale maintenance/operational problems. Most of this work can be completed by a small crew, hand tools, and small equipment. **These items require notification, at least 7 days prior to the start of work, to the El Paso County Public Works Department at 719-520-6460.**

3. Major Work

This work consists of larger maintenance/operational problems and failures within the stormwater management facilities. **All of this work requires notification, at least 14 days prior to the start of work, to the El Paso County Public Works Department at 719-520-6460 to ensure the proper maintenance is performed.** Some of this work requires that the engineering staff review the original design and construction drawings to assess the situation and assign the necessary maintenance. This work may also require more specialized maintenance equipment, design/details, surveying, or assistance through private contractors and consultants.

C. Maintenance Personnel

Maintenance personnel must be qualified to properly maintain stormwater management facilities. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs.

**APPENDICES**

Appendix A - Standard Operation Procedures (SOP) for Extended Detention Basin

Appendix B – Stormwater Facility Maintenance Inspection Form

## **Appendix A – Standard Operating Procedures**

provide SOPs for all types of facilities at the Site.

## **Extended Detention Basins (EDBs)**

EDBs have low to moderate maintenance requirements on a routine basis, but may require significant maintenance once every 15 to 25 years. Maintenance frequency depends on the amount of construction activity within the tributary watershed, the erosion control measures implemented, the size of the watershed, and the design of the facility.

### **Inspection**

Inspect the EDB at least twice annually, observing the amount of sediment in the forebay and checking for debris at the outlet structure.

### **Debris and Litter Removal**

Remove debris and litter from the detention area as required to minimize clogging of the outlet.

### **Mowing and Plant Care**

When starting from seed, mow native/drought tolerant grasses only when required to deter weeds during the first three years. Following this period, mowing of native/drought tolerant grass may stop or be reduced to maintain a height of no less than 6 inches (higher mowing heights are associated with deeper roots and greater drought tolerance). In general, mowing should be done as needed to maintain appropriate height and control weeds. Mowing of manicured grasses may vary from as frequently as weekly during the summer, to no mowing during the winter. See Section 4 of this chapter for additional recommendations from the CSU Extension.

### **Aeration**

For EDBs with manicured grass, aeration will supply the soil and roots with air and increase infiltration. It reduces soil compaction and helps control thatch while helping water move into the root zone. Aeration is done by punching holes in the ground using an aerator with hollow punches that pull the soil cores or "plugs" from the ground. Holes should be at least 2 inches deep and no more than 4 inches apart.

Aeration should be performed at least once per year when the ground is not frozen. Water the turf thoroughly prior to aeration. Mark sprinkler heads and shallow utilities such as irrigation lines and cable TV lines to ensure those lines will not be damaged. Avoid aerating in extremely hot and dry conditions. Heavy traffic areas may require aeration more frequently.

### **Mosquito Control**

Although the design provided in this manual implements practices specifically developed to deter mosquito breeding, some level of mosquito control may be necessary if the BMP is located in close proximity to outdoor amenities.

The Town provides annual mosquito control for all public and private facilities. This program includes larvae control only. Mosquitos are more difficult to control when they are adults. This typically requires neighborhood fogging with an insecticide. Therefore, no adult mosquito

#### **Facts on Mosquito Breeding**

Although mosquitoes prefer shallow, stagnant water, they can breed within the top 6 to 8 inches of deeper pools.

Mosquitoes need nutrients and prefer shelter from direct sunlight.

Mosquitoes can go from egg to adult within 72 hours.

control is provided. For questions regarding the Town's mosquito control program, please contact the Utilities Department Stormwater Division at 720-733-6011.

### **Irrigation Scheduling and Maintenance**

Adjust irrigation throughout the growing season to provide the proper irrigation application rate to maintain healthy vegetation. Less irrigation is typically needed in early summer and fall, with more irrigation needed during July and August. Native grass and other drought tolerant plantings should not require irrigation after establishment.

Check for broken sprinkler heads and repair them, as needed. Completely drain the irrigation system before the first winter freeze each year. Upon reactivation of the irrigation system in the spring, inspect all components and replace damaged parts, as needed.

### **Sediment Removal from the Forebay, Trickle Channel, and Micropool**

Remove sediment from the forebay and trickle channel annually. If portions of the watershed are not developed or if roadway or landscaping projects are taking place in the watershed, the required frequency of sediment removal in the forebay may be as often as after each storm event. The forebay should be maintained in such a way that it does not provide a significant source of resuspended sediment in the stormwater runoff.

Sediment removal from the micropool is required about once every one to four years, and should occur when the depth of the pool has been reduced to approximately 18 inches. Small micropools may be vacuumed and larger pools may need to be pumped in order to remove all sediment from the micropool bottom. Removing sediment from the micropool will benefit mosquito control. Ensure that the sediment is disposed of properly and not placed elsewhere in the basin.

### **Sediment Removal from the Basin Bottom**

Remove sediment from the bottom of the basin when accumulated sediment occupies about 20% of the water quality design volume or when sediment accumulation results in poor drainage within the basin. The required frequency may be every 15 to 25 years or more frequently in basins where construction activities are occurring.

### **Erosion and Structural Repairs**

Repair basin inlets, outlets, trickle channels, and all other structural components required for the basin to operate as intended. Repair and vegetate eroded areas as needed following inspection.

## **Appendix B – Stormwater Facility Maintenance Inspection Forms**

## Typical Inspection & Maintenance Requirements

### Grass Buffers and Swales

Features	Sediment Removal	Mowing/ Weed Control	Trash & Debris Removal	Erosion	Overgrown Vegetation Removal	Standing Water (mosquito/algae control)	Structure Repair
Low-flow channel							
Upper Stage							

### Extended Detention Basins (EDBs)

EDB Features	Sediment Removal	Mowing/ Weed Control	Trash & Debris Removal	Erosion	Overgrown Vegetation Removal	Standing Water (mosquito/algae control)	Structure Repair
Inflow Points (outfalls)							
Forebay							
Low-flow channel							
Bottom Stage							
Micropool							
Outlet Works							
Emergency Spillway							
Upper Stage							
Embankment							

Note: For more information regarding facility features refer to the El Paso County DCM or the MHFD Urban Storm Drainage Criteria Manual.