

# ELK VIEW ESTATE SUBDIVISION PCM MAINTENANCE AGREEMENT

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# QUICK LINKS

[Chapter 3](#): Grass Buffers & Grass Swales (GB/GS)

[Appendix A](#): Inspection Forms

[Appendix B](#): Maintenance Forms

[Appendix C](#): Plan and Detail Sheet Checklists

## REFERENCES

1. Southeast Metro Stormwater Authority (SEMSWA) Operations and Maintenance for Permanent Water Quality Control Measure Facilities, SEMSWA, 2019.  
<https://www.semswa.org/water-quality/stormwater-facilities-and-maintenance/>
2. Urban Storm Drainage Criteria Manual Vol. 3, Urban Drainage & Flood Control District (UDFCD), 2010. [https://mhfd.org/wp-content/uploads/2021/01/01\\_USDCM-Volume-3.pdf](https://mhfd.org/wp-content/uploads/2021/01/01_USDCM-Volume-3.pdf)
3. Storm Drainage Design & Technical Criteria, City and County of Denver, 2013. [https://www.denvergov.org/files/assets/public/doti/documents/standards/pwes-005.1-storm\\_drainage\\_design\\_and\\_technical\\_criteria.pdf](https://www.denvergov.org/files/assets/public/doti/documents/standards/pwes-005.1-storm_drainage_design_and_technical_criteria.pdf)
4. City and County of Denver Ultra-Urban Green Infrastructure Guidelines, 2016. <https://www.denvergov.org/content/denvergov/en/wastewater-management/stormwater-quality/ultra-urban-green-infrastructure.html>
5. Colorado Stormwater Center, Permanent Stormwater Quality Best Management Practice Inspection and Maintenance Field Guide, 2020. [http://stormwatercenter.colostate.edu/wp-content/uploads/2020/02/BMP\\_I-M\\_Manual.pdf](http://stormwatercenter.colostate.edu/wp-content/uploads/2020/02/BMP_I-M_Manual.pdf)

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# GRASS BUFFERS/GRASS SWALES

## 3.1 BACKGROUND

Grass Buffers and Grass Swales are common types of Stormwater Management Facilities utilized within the El Paso County area. Grass Buffers/Swales promote sedimentation, filtration, and infiltration of runoff.

Grass Buffers are uniformly graded and densely vegetated areas of turf grass. They are designed to accommodate sheet flow rather than concentrated or channelized flow. They are typically located adjacent to impervious areas such as parking lots or along highways and roads. Grass Buffers are designed to evenly distribute runoff across the width of the buffer to achieve uniform sheet-flow conditions. A flow spreader may be incorporated for this purpose. In some cases, grass buffers may have underdrain systems.

Grass Swales are densely vegetated drainageways with low-pitched side slopes that collect and convey runoff. Design of their longitudinal slope and cross section forces the flow to be slow and shallow, thereby facilitating sedimentation while limiting erosion. Berms or check dams may be installed perpendicular to the flow to decrease the slope and slow down the flow. Grass swales are used in open space and landscaped areas to collect and convey overland flows, and can be used as an alternative to curb and gutter to collect and convey street flows. Some grass swales are designed with underdrain systems.

Additional design information regarding Grass Swales and Grass Buffers can be found in the MHFD Criteria Manual, Volume 3 or by following these links:

[https://mhfd.org/wp-content/uploads/2019/12/09\\_T-01-Grass-Buffer.pdf](https://mhfd.org/wp-content/uploads/2019/12/09_T-01-Grass-Buffer.pdf)

<https://mhfd.org/wp-content/uploads/2019/12/T-02-Grass-Swale.pdf>

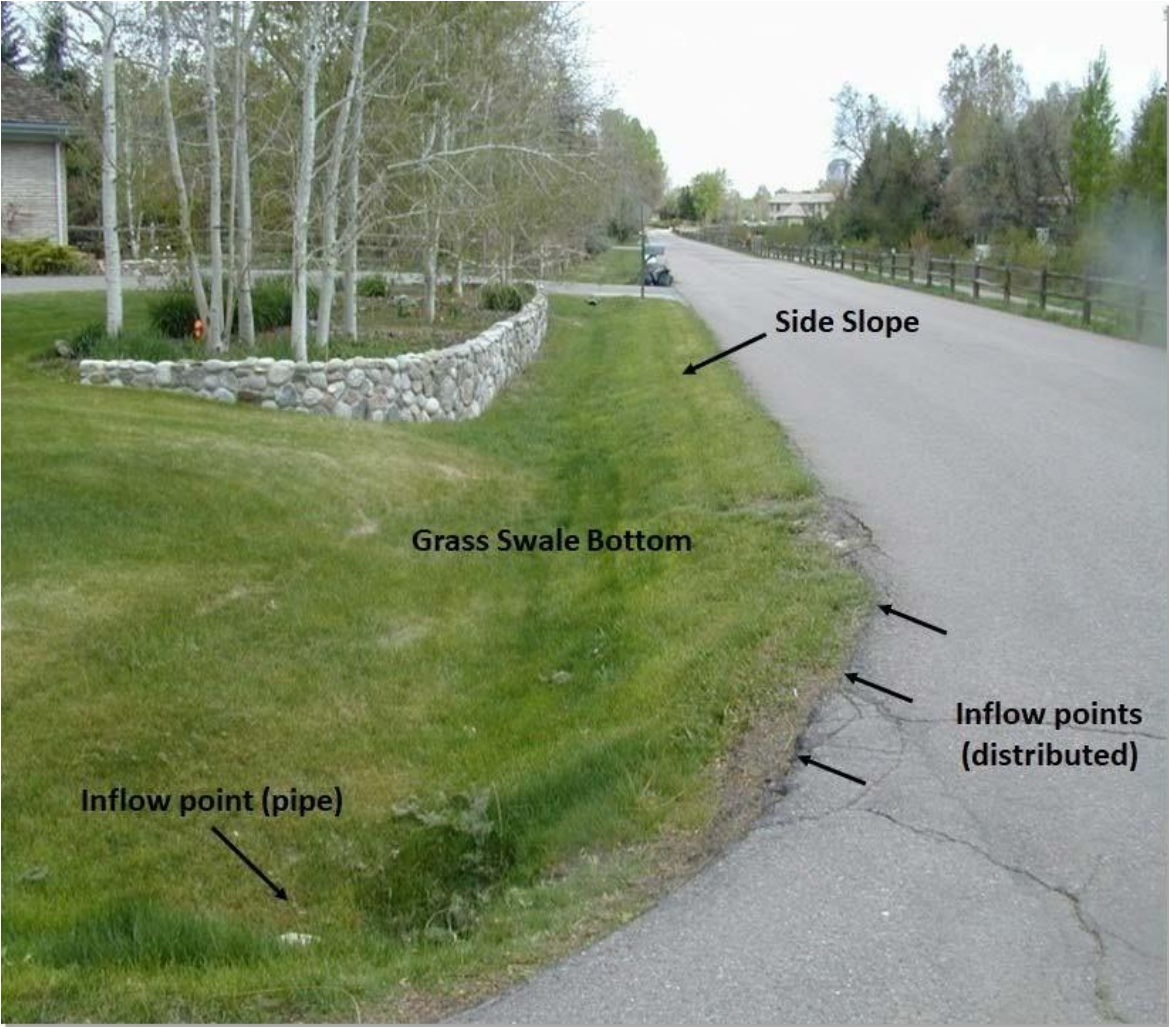
## 3.2 INSPECTING GRASS BUFFERS AND SWALES

Grass Buffers/Swales are often overlooked as water quality treatment facilities because they blend into common landscaping. Grass Buffers/Swales have various features designed to serve a particular function. It is important for maintenance personnel to understand the function of each of these features. Table 9 summarizes common features of a Grass Buffer/Swale and the corresponding inspection and maintenance items that can be anticipated. Figure 4 provides an example of typical Grass Buffer/Swale features.

**Table 9. Typical Inspection and Maintenance Requirements for Grass Buffers & Swales**

	<b>Sediment Removal</b>	<b>Mowing/ Weed control</b>	<b>Trash &amp; Debris Removal</b>	<b>Erosion</b>	<b>Removal/ Replacement</b>	<b>Structural Repair</b>
<b>Swale Bottom</b>	X	X	X	X		
<b>Side Slope</b>		X	X	X		
<b>Buffer Strip</b>	X	X	X	X		
<b>Inflows</b>	X	X	X	X	X	X
<b>Underdrain System</b>					X	
<b>Grade Control/Level Spreader</b>				X		X
<b>Irrigation System</b>					X	

Figure 4. Typical Grass/Buffer/Swale Features



### 3.2.1 Grass Swale Bottom, Side Slopes, and Grass Buffer Strips

Grass Buffers/Swales require general maintenance of the turf grass and repair of any rill or gully development. The bottom and side slopes of Grass Swales and the area of Grass Buffer strips should be maintained with dense vegetative cover and should not be eroded or bare. Particularly during vegetation establishment over the first few years, regular inspection will help to identify and correct erosion problems before they become major issues

#### **Typical maintenance items at the side slopes and bottoms of grass swales and grass buffer areas:**

- a.* **Sediment Accumulation** – The purpose of the grass swale or buffer is to slow down flow and allow sedimentation to occur. To prevent a loss in performance of the swale or buffer, accumulated sediment must be removed a minimum of twice per year, occurring before and after the rainy season and after any significant storm event.
- b.* **Sparse Vegetation** – Grass Buffers/Swales rely on a healthy, dense cover of grass to decrease the flow velocities and promote sedimentation and infiltration. Grasses that are diseased, dying or otherwise damaged should be replaced. All bare areas should be reseeded or patched. Causes of damaged grass cover such as lack of adequate irrigation, pedestrian or vehicular traffic, uncontrolled weeds, etc., should be identified and remedied.
- c.* **Erosion Present** – Lack of adequate vegetative cover or excessive flow velocities may result in rill or gully development, and erosion of the swale or buffer strip. Erosion will require maintenance to prevent further damage and to prevent sediment transport.
- d.* **Standing Water/Boggy Areas** – Grass Buffers/Swales are generally intended to drain and be dry in between rain events. If areas of standing water are present, the swale or buffer may need to be evaluated for proper grade to ensure drainage. In some cases, where underdrains are used, the underdrains should be inspected to ensure that they are not clogged.

### 3.2.2 Inflow Points

Inflow points are the points of stormwater discharge into the swale or buffer. Inflow points are typically pipe outlets, other grass swales or buffers, or curb cuts from upstream impervious areas, such as parking lots. Some form of energy dissipation is typically provided immediately downstream of the inflow point into the grass swale or buffer. Energy dissipation devices may include riprap aprons, or flow spreaders.

#### **Typical maintenance activities at Inflow Points**

- a. Sediment Accumulation** – The purpose of the grass swale or buffer is to slow down flow and allow sedimentation to occur. To prevent a loss in performance of the swale or buffer, accumulated sediment must be removed a minimum of twice per year, occurring before and after the rainy season and after any significant storm event.
- b. Erosion Present/Outfall Undercut** – Erosion in the vicinity of the inflow point will require maintenance to prevent damage to the structure(s) and subsequent sediment transport. In some cases, erosion may be present because energy dissipation features were not provided or may not have been sized, constructed, or maintained appropriately.
- c. Sediment Accumulation** – Sediment often deposits immediately downstream of the inflow point. To prevent a loss in performance, sediment that accumulates in this area must be removed on a timely basis.

### 3.2.3 Underdrain System

Underdrain systems are sometimes installed for Grass Buffers/Swales that have a flatter slope, compact soils that inhibit infiltration, or a continuous base flow. Underdrains typically consist of a gravel storage area and perforated PVC pipe. The gravel storage area allows for storage of treated stormwater runoff prior to the discharge of the runoff through the perforated PVC pipe.

#### **Typical maintenance activities for an Underdrain System**

With proper maintenance of the grass areas, there should be a minimum amount of maintenance required on the underdrain system. Generally, the only maintenance performed on the underdrain system is jet-vac cleaning in the event that it becomes clogged.

### 3.2.4 Grade Controls and Level Spreaders

Grass Swales that are installed in areas with steep longitudinal slopes often have grade control checks or drop structures. Grade control structures are typically either concrete walls or riprap structures that provide a reinforced drop at specific locations in the channel, reducing the longitudinal slope between the control structures.

Level Spreaders are installed upgradient of Grass Buffers to evenly distribute flows along the design length of the buffer. Level spreaders may consist of slotted curbing, modular block porous pavement, level walls or other spreader devices.

#### **Typical maintenance activities for Grade Control Structures and Level Spreaders**

- a. Erosion present* – Grade control structures and level spreaders are provided to reduce the potential for erosion of the Grass Buffer/Swale areas. Erosion within the vicinity of the control structure or level spreader indicates that the structure is not functioning as intended and requires maintenance to prevent future erosion and damage.
- b. Structural damage* – Typically, structural damage of level spreaders or grade control structures occurs with the deterioration of concrete, including cracking, spalling or settling, and the erosion and deterioration of the riprap structures. Level spreaders may settle unevenly creating low areas, which concentrate the flows.

### 3.2.5 Irrigation System

Grass Buffers/Swales depend on healthy, dense turf grass to function and may require an irrigation system to provide a consistent water supply, particularly if non-native grasses are used. Typically, the condition of the grass cover will provide evidence of the effectiveness and maintenance needs of the irrigation system

#### **Typical maintenance activities for Irrigation Systems**

Irrigation systems will generally require routine periodic maintenance and adjustment of irrigation rates throughout the growing season to ensure that proper amounts of water are being applied given the weather conditions, and that they are providing coverage to all areas of the grass to eliminate bare spots. Conversely, over-irrigation should be avoided.

### 3.2.6 Miscellaneous

There are a variety of inspection/maintenance issues that may not be attributed to a single feature within the Grass Buffer/Swale. This category on the inspection form is for maintenance items that are commonly found in Grass Buffers and Grass Swales, but may not be attributed to an individual feature.

#### **Typical maintenance activities for Grade Control Structures and Level Spreaders**

- a.* **Encroachment in Easement Area** – Property owners sometimes place landscaping, trash, fencing, or other items within the easement area that may affect maintenance or the operation of the facility. These encroachments should be identified during inspection and removed.
- b.* **Public Hazards and Vandalism**– Public hazards such as unknown/suspicious substances, exposed metal/jagged concrete on structures or damage due to vandalism should be reported to El Paso County.
- c.* **Burrowing Animals/Pests**– Prairie dogs and other burrowing rodents may cause damage to the Grass Buffer/Swale features and negatively affect the vegetation. Where burrowing animals are causing damage, contact El Paso County.
- d.* **Other** – Any miscellaneous inspection/maintenance items not contained on the form should be entered here.

## 3.3 MAINTAINING GRASS BUFFERS & GRASS SWALES

### 3.3.1 Maintenance Categories (Levels) and Activities

A typical Grass Buffer/Swale maintenance plan will consist of three broad categories (levels): Routine, Minor and Major. Within each level, a variety of maintenance activities may be necessary. Table 10 highlights the common activities associated with each level.

**Table 10. Maintenance Levels & Activities for Grass Buffers and Swales**

<b>ROUTINE</b>	<b>MINOR</b>	<b>MAJOR</b>
Mowing and Aeration	Minor Sediment Removal	Major Sediment Removal
Trash/Debris Removal	Minor Erosion Repair	Major Erosion Repair
Sediment Removal	Minor Vegetation Removal	Structural Repair
Weed control		

A brief description of routine, minor and major activities for Grass Buffers and Grass Swales includes:

- **Routine Maintenance Activities:** The majority of this work consists of scheduled mowing, trash and debris pickups and landscape care for the Grass Buffer/Swale multiple times during the growing season.
- **Minor Maintenance Activities:** This work consists of a variety of isolated or small-scale maintenance or operational problems. Most of this work can be completed by a small crew, tools, and small equipment.
- **Major Maintenance Activities:** This work consists of larger maintenance/operational problems and failures. This work may also require more specialized maintenance equipment, design/details, surveying, or assistance through private contractors and consultants.

Tables 11 through 13 provide a summary of typical maintenance activities associated with each level of maintenance for Grass Buffers/Swales that can be used for developing the O&M Plan; however, maintenance should always be done when a facility’s performance is compromised, and no later than 6 months following the discovery of need. Most routine and minor maintenance activities do not require coordination with DOTI; however, coordination with DOTI is required for major maintenance activities. Maintenance activity records should be completed and maintained by the owner. Appendix B provides an example maintenance form for Grass Buffers and Grass Swales.

Section 3.3.2 provides a narrative description of the activities in Tables 11 through 13.

**Table 11. Summary of Routine Maintenance Activities for Grass Buffers and Swales**

<b>Maintenance Activity</b>	<b>Minimum Frequency</b>	<b>Indication Action is Needed:</b>	<b>Maintenance Action</b>
<b>Trash/Debris Removal</b>	Twice annually and before mowing, as needed	Trash & debris present	Remove and properly dispose of trash and debris
<b>Sediment Removal</b>	Annual, as needed	Sediment accumulation at inflow areas	Remove sediment with shovel and properly dispose; repair vegetation if needed
<b>Mowing</b>	Routine – as necessary	Excessive height that affects the inlet and/or outlet	Trim around structures and/or within facility to ensure facility can perform as intended.
<b>Irrigation (Automatic)</b>	Minimum three times annually	Areas of insufficient or excess watering; broken or missing parts	<p>SPRING: start up system; test for even coverage and correct timer settings</p> <p>SUMMER: test for even coverage and correct timer settings</p> <p>FALL: drain and winterize system (follow watering regulations)</p>
<b>Irrigation (Not Automatic)</b>	As needed to maintain healthy grass	Areas of insufficient watering; prolonged dry periods	Water as needed to maintain healthy grass (follow watering regulations)
<b>Weed Control</b>	Minimum twice annually	Noxious weeds; Unwanted vegetation	Hand pull; Consult an authorized herbicide applicator
<b>Mosquito Treatment</b>	As needed, based upon inspections	Standing water/ mosquito habitat	Perform maintenance to eliminate standing water; Treat w/ EPA approved chemicals
<b>Level Spreader (Grass Buffer only)</b>	As needed, based upon inspections	Evidence of uneven flow/localized erosion	Look for cause; repair, fill or revegetate areas of erosion
<b>Rodent Damage</b>	As needed, based upon inspections	Holes, small piles of dirt, raised burrows	Evaluate damage; contact Division of Wildlife for guidance

**Table 12. Summary of Minor Maintenance Activities for Grass Buffers and Swales**

<b>Maintenance Activity</b>	<b>Minimum Frequency</b>	<b>Indication Action is Needed:</b>	<b>Maintenance Action</b>
<b>Sediment Removal</b>	As needed, based upon inspection	Sediment build-up	Remove and properly dispose of sediment
<b>Erosion Repair</b>	As needed, based upon inspection	Rills and gullies forming on slopes and other areas	Repair eroded areas and revegetate; address cause
<b>Vegetation Removal</b>	As needed, based upon inspection	Trees, willows, shrubs impeding flow	Remove vegetation; restore correct grade and surface
<b>Revegetation</b>	As needed, based upon inspection	Areas without grass	Replace grass by sodding or seeding
<b>Irrigation (Automatic)</b>	As needed, based upon inspection	Evidence of broken or missing parts	Replace parts and test system
<b>Level Spreader (Grass Buffer Only)</b>	As needed, based upon inspection	Evidence of uneven flow, erosion, or rills/gullies	Repair sections of level spreader and address cause
<b>Fertilization or Soil Amendment</b>	As needed, minimize fertilization	Grass with pale color; areas with poor grass growth not due to irrigation problems	Consult with turf specialist; test soil
<b>Vehicle Tracks (Along Roadways)</b>	As needed, based upon inspection	Depressions from vehicle tracks; vegetation damage	Repair and fill depressions; sod or seed damaged areas

**Table 13. Summary of Major Maintenance Activities for Grass Buffers and Swales**

<b>Maintenance Activity</b>	<b>Minimum Frequency</b>	<b>Look for:</b>	<b>Maintenance Action</b>
<b>Major Sediment/ Pollutant Removal</b>	As needed – based upon scheduled inspections	Large quantities of sediment	Remove and dispose of sediment. Repair vegetation as needed
<b>Major Erosion Repair</b>	As needed – based upon scheduled inspections	Severe erosion including gullies, excessive soil displacement, areas of settlement, holes	Repair erosion – find cause of problem and address to avoid future erosion
<b>Structural Repair</b>	As needed – based upon scheduled inspections	Deterioration and/or damage to structural components – level spreader, grade control structures, irrigation components, and ponding water	Structural repair to restore the structure to its original design
<b>GB/GS Rebuild</b>	As needed – due to complete failure of all or a portion of facility (Turf replacement may be needed every 10-20 years in some areas.)	Failed system; dead vegetation, ponded water not correctable through minor maintenance	Contact DOTI Engineering Staff

### **3.3.2 Description of Maintenance Activities for Grass Buffers and Swales**

Maintenance activities in Tables 11 through 13 are described below.

#### **3.3.2.1 Trash/Debris Removal**

Trash and debris must be removed from the Grass Buffer/Swale area to allow for proper functioning and to improve aesthetics. This activity must be performed prior to mowing operations.

#### **3.3.2.2 Mowing**

Routine mowing of the turf grass is necessary to maintain an appropriate grass height and to improve the overall appearance and performance of Grass Buffers/Swales. Turf grass should be mowed to a level which re-establishes the functionality and aesthetics of the facility, typically no less than 6 inches in height. The grass height within a 40- to 50-foot radius of the

structural components of the facility is particularly important. Clippings should be collected and disposed of properly. The desirable grass height can vary from facility to facility.

### **3.3.2.3 Irrigation**

Irrigation systems should be maintained in proper working order to provide an adequate water supply to support the grass cover, but without over-irrigating. When automatic irrigation systems are not available, alternate methods for providing a water supply during times of drought must be provided.

Automatic irrigation systems should be maintained routinely throughout the growing season to ensure that they are providing the appropriate amounts of water and uniform coverage of the area. Sprinkler heads should be adjusted as necessary and checked for broken or missing parts.

### **3.3.2.4 Weed Control**

Noxious weeds and other unwanted vegetation must be managed through mechanical means (mowing/pulling) or with appropriate application of herbicide. Herbicides should be utilized sparingly and as a last resort. All herbicide applications should be in accordance with the manufacturer's recommendations and local requirements. The Colorado Department of Agriculture maintains a list of licensed applicators that be searched at, <https://ag.colorado.gov/plants/pesticides/pesticide-applicator-search>.

### **3.3.2.5 Level Spreader (Grass Buffer Only)**

Evidence of uneven flow and localized erosion downstream of the level spreader indicate that the flow is not evenly distributed along the length of the spreader. For both routine and minor maintenance, areas of erosion should be repaired, filled and revegetated. Causes for the erosion should be investigated and corrected. Buildup of grasses along the edge of the spreader may create an uneven flow distribution that can be corrected as part of routine maintenance.

More significant repairs to the level spreader may be required when the level spreader is no longer level, or has developed damaged areas of cracking or spalling, allowing flows to concentrate in depressed areas instead of being distributed over the length of the structure.

### **3.3.2.6 Rodent Damage**

Small holes, piles of dirt, and raised burrows are evidence of rodent damage. Damaged areas should be repaired and revegetated. Consultation with an animal control specialist or the Division of Wildlife may be required for persistent problems.

### **3.3.2.7 Sediment Removal**

Sediment removal is necessary to ensure proper function of the Grass Buffer/Swale. Care should be taken when removing sediment to prevent damage to the turf grass and surrounding areas. Excessive amounts of sediment are an indication of upstream erosion or

lack of adequate SCMs during construction activities. Causes for contributions of excess sediment should be investigated and addressed.

Major sediment removal consists of removal of large quantities of pollutants, sediment and/or landscaping material. Vegetated areas need special care to ensure design volumes and grades are preserved or may need to be replaced due to the removal activities.

See Section 1.8.3 for additional information on sediment disposal.

### **3.3.2.8 Erosion Repair**

The repair of eroded areas is necessary to ensure the proper functioning of the Grass Buffer/Swale and to minimize sediment transport. Erosion can vary in magnitude from minor repairs to vegetation, to rills and gullies in the swales and inflow points. Extreme care should be taken when utilizing motorized or heavy equipment to ensure damage to the underdrain system does not occur.

Major erosion repair consists of filling and revegetating areas of severe erosion. Major erosion in a Grass Buffer/Swale is generally the result of excessive velocities caused by steep slopes. It may be necessary to make design improvements to the swale or buffer when erosion becomes a major maintenance item. Determining the cause of the erosion as well as correcting the condition that caused the erosion should also be part of the erosion repair. Care should be given to ensure design grades and volumes are preserved.

### **3.3.2.9 Vegetation Removal**

Weeds, shrubs, willows, cattails and other unwanted vegetation that develops in the Grass Buffer/Swale area may impede the flow and cause standing water or backwater problems. Remove unwanted vegetation soon after identification while it is easier to remove and restore the correct grade. Revegetate with seed or sod.

### **3.3.2.10 Revegetation**

Bare areas should be repaired as soon as possible. Repair bare areas with grass or sod. Causes of the problem, such as inadequate water supply or diseased grasses, should be investigated and resolved.

### **3.3.2.11 Irrigation (Automatic)**

Irrigation systems require routine maintenance in accordance with the manufacturer's recommendations (valves, timer, etc.), and maintenance of the pipe and sprinkler heads to ensure that even coverage is being applied, and that there are no missing or broken parts. Timing systems should be checked to verify that the correct amount of water is being applied to the grass areas for the seasonal conditions.

### **3.3.2.12 Plant Health Care**

Grass Buffers/Swales rely on healthy, dense turf in order to function properly. Aeration of the turf area is recommended in the spring and fall. Fertilizers should be applied in the

minimum amounts and frequencies necessary to maintain healthy vegetation in accordance with the grass type. Colorado State University Extension provides fertilizer recommendations for various turfgrass species and maintenance levels

(<https://cmg.extension.colostate.edu/wp-content/uploads/sites/59/2022/12/LawnCare-Turf-Management.pdf>). In some cases, soil amendments with organic matter may be necessary to enable plant growth.

#### **3.3.2.13 Vehicle Tracks**

Grass Buffers/Swales that are adjacent to roadway sections may be damaged by vehicle tracks. Rutted areas should be filled in and revegetated as soon as possible. Frequent problems associated with vehicle traffic (such as around corners) may require a barrier or sign to avoid vehicular traffic within the grass areas. Contact DOTI Right of Way services for details and or permitting.

#### **3.3.2.14 Structural Repair**

Grass Buffers/Swales may include a level spreader and/or grade control structure that can deteriorate or be damaged during the service life of the facility. These structures are constructed of steel and concrete that can degrade or be damaged and may need to be repaired or re-constructed from time to time. Major repairs to structures may require input from a structural engineer and specialized contractors. Consultation with DOTI Engineering Staff must take place prior to all structural repairs.

#### **3.3.2.15 Rehabilitation/Rebuild**

In very rare cases, a Grass Buffer/Swale may need to be rebuilt. Generally, the need for a complete rebuild is a result of improper construction, improper maintenance resulting in structural damage to the underdrain system, or extensive contamination of the Grass Buffer/Swale. Consultation with DOTI Engineering Staff must take place prior to any rebuild project.

# **APPENDIX A: INSPECTION FORMS**

**[INSPECTION FORM: GRASS BUFFER & SWALE \(GB/GS\)](#)**



## **APPENDIX B: MAINTENANCE FORMS**

### **MAINTENANCE FORM: GRASS BUFFERS & SWALES (GB/GS)**

**GRASS BUFFER AND GRASS SWALE (GB/GS)  
MAINTENANCE FORM**

Subdivision/Business Name: _____		Completion Date: _____
Subdivision/Business Address: _____		Contact Name: _____
Maintenance Category: (check one)	<input type="checkbox"/> Routine	<input type="checkbox"/> Restoration (Minor) <input type="checkbox"/> Rehabilitation (Major)

**MAINTENANCE ACTIVITIES PERFORMED**

**ROUTINE WORK**

- Mowing
- Trash/Debris Removal
- Outlet Structure Cleaning (Trash Rack/Well Screen)
- Weed Control (Herbicide Application)

**MINOR WORK**

- Sediment Removal
  - Inflow Point
  - Swale Bottom
  - Side Slope
  - Buffer Strip
- Erosion Repair
  - Inflow Point
  - Swale Bottom
  - Side Slope
  - Buffer Strip
  - Grade Control/Level Spreader
- Revegetation
  - Swale Bottom
  - Side Slope
  - Buffer Strip
  - Bottom Stage

**MAJOR WORK**

- Sediment Removal (Dredging)
  - Swale Bottom
  - Inflow Point
- Erosion Repair
  - Inflow Point
  - Swale Bottom
  - Side Slope
  - Buffer Strip
- Structural Repairs
  - Inflow
  - Underdrain
  - Level Spreader

Other: \_\_\_\_\_

**Estimated Total Manhours:** \_\_\_\_\_

**Equipment/Materials Used:** \_\_\_\_\_

**Comments/Additional Info:** \_\_\_\_\_

**THIS INSPECTION FORM MUST BE KEPT INDEFINITELY AND MADE AVAILABLE TO DOTI UPON REQUEST**

## **CHECKLISTS BY SCM TYPE**

### **CHECKLIST: GRASS BUFFERS & SWALES (GB/GS)**

**OPERATION AND MAINTENANCE PLANS  
GRASS SWALES/GRASS BUFFERS (GS/GB)  
CHECKLIST FOR REQUIRED ITEMS**

**COVER SHEET**

- facility name, address/location, facility type, sheet index, standard notes, approvals, date of drawings
  
- Location of grass swale(s) and/or buffer(s)
  - Contours
  - Location and label all access and easements pertaining to maintenance of facilities
  - Linework for right-of-way lines, lot lines, easements, and tracts
  - Labels for streets adjacent to grass swale(s)/buffer(s)
  - Linework for all storm sewer structures
  - Cross-reference to Grass Swale/Buffer Operation and Maintenance Details sheet

**DETAIL SHEET**

- Tables from Chapter 3 of the O&M Manual:
  - Typical Inspection and Maintenance Requirements Matrix
  - Summary of Routine Maintenance Activities
  - Summary of Minor Maintenance Activities
  - Summary of Major Maintenance Activities
- Typical grass swale and/or buffer section including typical horizontal and vertical dimensions, sideslopes, type of fill/media materials, subgrade material, and underdrain (if applicable).
- Underdrain details (if applicable) including trench dimensions, perforated PVC dimensions, and trench fill material.

**INSPECTION AND MAINTENANCE FORMS**

- Inspection Form from Appendix A
- Maintenance Form from Appendix B

**ADDITIONAL DETAILS (if present)**

- Landscape Plan
- Irrigation Plan
- Irrigation Detail