

**PRIVATE DETENTION BASIN /  
STORMWATER QUALITY BEST MANAGEMENT PRACTICE  
MAINTENANCE AGREEMENT AND EASEMENT**

This PRIVATE DETENTION BASIN / STORMWATER QUALITY BEST MANAGEMENT PRACTICE MAINTENANCE AGREEMENT AND EASEMENT (Agreement) is made by and between EL PASO COUNTY by and through THE BOARD OF COUNTY COMMISSIONERS OF EL PASO COUNTY, COLORADO (Board or County) and CARUBIA PROPERTIES LLC. (Developer). The above may occasionally be referred to herein singularly as "Party" and collectively as "Parties."

Recitals

A. WHEREAS, Developer is the owner of certain real estate (the Property) in El Paso County, Colorado, which Property is legally described in Exhibit A attached hereto and incorporated herein by this reference; and

B. WHEREAS, Developer desires to develop on the Property a land use to be known as CARUBIA PROPERTIES - SITE DEVELOPMENT PLAN; and

C. WHEREAS, the development of this Property will substantially increase the volume of water runoff and will decrease the quality of the stormwater runoff from the Property, and, therefore, it is in the best interest of public health, safety and welfare for the County to condition approval of this land use on Developer's promise to construct adequate drainage, water runoff control facilities, and stormwater quality structural Best Management Practices ("BMPs") for the land use; and

D. WHEREAS, Chapter 8, Section 8.4.5 of the El Paso County Land Development Code, as periodically amended, promulgated pursuant to Section 30-28-133(1), Colorado Revised Statutes (C.R.S.), requires the County to condition approval of all subdivisions on a developer's promise to so construct adequate drainage, water runoff control facilities, and BMPs in subdivisions; and

E. WHEREAS, the Drainage Criteria Manual, Volume 2, as amended by Appendix I of the El Paso County Engineering Criteria Manual (ECM), as each may be periodically amended, promulgated pursuant to the County's Colorado Discharge Permit System General Permit (MS4 Permit) as required by Phase II of the National Pollutant Discharge Elimination System (NPDES), which MS4 Permit requires that the County take measures to protect the quality of stormwater from sediment and other contaminants, requires subdividers, developers, landowners, and owners of facilities located in the County's rights-of-way or easements to provide adequate permanent stormwater quality BMPs with new development or significant redevelopment; and

F. WHEREAS, Section 2.9 of the El Paso County Drainage Criteria Manual provides for a Developer's promise to maintain a subdivision's drainage facilities in the event the County does not assume such responsibility; and

G. WHEREAS, developers in El Paso County have historically chosen water runoff detention basins as a means to provide adequate drainage and water runoff control in subdivisions, which basins, while effective, are less expensive for developers to construct than other methods of providing drainage and water runoff control; and

H. WHEREAS, Developer desires to construct for the land use one grass swale detention basin/stormwater quality BMP(s) ("detention basin/BMP(s)") as the means for providing adequate

drainage and stormwater runoff control and to meet requirements of the County's MS4 Permit, and to operate, clean, maintain and repair such detention basin/BMP(s); and

I. WHEREAS, Developer desires to construct the detention basin/BMP(s) on property that is or will be platted as LOT 2, BENT GRASS EAST COMMERCIAL FILING NO. 4, as indicated on the final plat of the subdivision, and as set forth on Exhibit A attached hereto; and

J. WHEREAS, Developer shall be charged with the duties of constructing, operating, maintaining and repairing the detention basin/BMP(s) on the Property described in Exhibit A; and

K. WHEREAS, it is the County's experience that subdivision developers and property owners historically have not properly cleaned and otherwise not properly maintained and repaired these detention basins/BMPs, and that these detention basins/BMPs, when not so properly cleaned, maintained, and repaired, threaten the public health, safety and welfare; and

L. WHEREAS, the County, in order to protect the public health, safety and welfare, has historically expended valuable and limited public resources to so properly clean, maintain, and repair these detention basins/BMPs when developers and property owners have failed in their responsibilities, and therefore, the County desires the means to recover its costs incurred in the event the burden falls on the County to so clean, maintain and repair the detention basin/BMP(s) serving this land use due to the Developer's failure to meet its obligations to do the same; and

M. WHEREAS, the County conditions approval of this land use on the Developer's promise to so construct the detention basin/BMP(s), and conditions approval on the Developer's promise to reimburse the County in the event the burden falls upon the County to so clean, maintain and/or repair the detention basin/BMP(s) serving this Property; and

N. WHEREAS, the County could condition land use approval on the Developer's promise to construct a different and more expensive drainage, water runoff control system and BMPs than those proposed herein, which more expensive system would not create the possibility of the burden of cleaning, maintenance and repair expenses falling on the County; however, the County is willing to forego such right upon the performance of Developer's promises contained herein; and

O. WHEREAS, the County, in order to secure performance of the promises contained herein, conditions approval of this land use upon the Developer's grant herein of a perpetual Easement over the Property for the purpose of allowing the County to periodically access, inspect, and, when so necessary, to clean, maintain and/or repair the detention basin/BMP(s).

#### Agreement

NOW, THEREFORE, in consideration of the mutual Promises contained herein, the sufficiency of which are hereby acknowledged, the Parties agree as follows:

1. Incorporation of Recitals: The Parties incorporate the Recitals above into this Agreement.

2. Covenants Running with the Land: Developer agrees that this entire Agreement and the performance thereof shall become a covenant running with the land, which land is legally described in Exhibit A attached hereto, and that this entire Agreement and the performance thereof shall be binding upon itself, its successors and assigns.

3. Construction: Developer shall construct the Property described in Exhibit A attached hereto and incorporated herein by this reference, ONE detention basin/BMP(s). Developer shall not commence construction of the detention basin/BMP(s) until the El Paso County Planning and Community Development Department (PCD) has approved in writing the plans and specifications for the detention basin/BMP(s) and this Agreement has been signed by all Parties and returned to the PCD. Developer shall complete construction of the detention basin/BMP(s) in substantial compliance with the County-approved plans and specifications for the detention basin/BMP(s).

Failure to meet these requirements shall be a material breach of this Agreement, and shall entitle the County to pursue any remedies available to it at law or in equity to enforce the same. Construction of the detention basin/BMP(s) shall be substantially completed within one (1) year (defined as 365 days), which one year period will commence to run on the date the approved plat of this Property is recorded in the records of the El Paso County Clerk and Recorder. In cases where a subdivision is not required, the one year period will commence to run on the date the Erosion and Stormwater Quality Control Permit (ESQCP) is issued. Rough grading of the detention basin/BMP(s) must be completed and inspected by the El Paso County Planning and Community Development Department prior to commencing road construction.

In the event construction is not substantially completed within the one (1) year period, then the County may exercise its discretion to complete the project, and shall have the right to seek reimbursement from the Developer and its successors and assigns, for its actual costs and expenses incurred in the process of completing construction. The term actual costs and expenses shall be liberally construed in favor of the County, and shall include, but shall not be limited to, labor costs, tool and equipment costs, supply costs, and engineering and design costs, regardless of whether the County uses its own personnel, tools, equipment and supplies, etc. to correct the matter. In the event the County initiates any litigation or engages the services of legal counsel in order to enforce the Provisions arising herein, the County shall be entitled to its damages and costs, including reasonable attorney fees, regardless of whether the County contracts with outside legal counsel or utilizes in-house legal counsel for the same.

4. Maintenance: Developer agrees for itself and its respective successors and assigns, that it will regularly and routinely inspect, clean and maintain the detention basin/BMP(s) in compliance with the County-reviewed Operation and Maintenance Manual, attached hereto as Exhibit B and incorporated herein by reference, and otherwise keep the same in good repair, all at their own cost and expense. No trees or shrubs that will impair the structural integrity of the detention basin/BMP(s) shall be planted or allowed to grow on the detention basin/BMP(s).

5. Creation of Easement: Developer hereby grants the County a non-exclusive perpetual easement upon and across that portion of the Property described in Exhibit A. The purpose of the easement is to allow the County to access, inspect, clean, repair and maintain the detention basin/BMP(s); however, the creation of the easement does not expressly or implicitly impose on the County a duty to so inspect, clean, repair or maintain the detention basin/BMP(s).

6. County's Rights and Obligations: Any time the County determines, in the sole exercise of its discretion, that the detention basin/BMP(s) is not properly cleaned, maintained and/or otherwise kept in good repair, the County shall give reasonable notice to the Developer and its successors and assigns, that the detention basin/BMP(s) needs to be cleaned, maintained and/or otherwise repaired. The notice shall provide a reasonable time to correct the problem(s). Should the responsible parties fail to correct the specified problem(s), the County may enter upon the Property to so correct the specified problem(s). Notice shall be effective to the above by the County's deposit of the same into the regular United States mail, postage pre-paid. Notwithstanding the foregoing, this Agreement does not expressly or implicitly impose on the County a duty to so inspect, clean, repair or maintain the detention basin/BMP(s).

7. Reimbursement of County's Costs / Covenant Running With the Land: The Developer agrees and covenants, for itself, its successors and assigns, that it will reimburse the County for its costs and expenses incurred in the process of completing construction of, cleaning, maintaining, and/or repairing the detention basin/BMP(s) pursuant to the provisions of this Agreement.

The term "actual costs and expenses" shall be liberally construed in favor of the County, and shall include, but shall not be limited to, labor costs, tools and equipment costs, supply costs, and engineering and design costs, regardless of whether the County uses its own personnel, tools, equipment and supplies, etc. to correct the matter. In the event the County initiates any litigation or engages the services of legal counsel in order to enforce the provisions arising herein, the County shall be entitled to its damages and costs, including reasonable attorney's fees, regardless of whether the County contracts with outside legal counsel or utilizes in-house legal counsel for the same.

8. Contingencies of Land Use/Land Disturbance Approval: Developer's execution of this Agreement is a condition of land use/land disturbance approval.

The County shall have the right, in the sole exercise of its discretion, to approve or disapprove any documentation submitted to it under the conditions of this Paragraph, including but not limited to, any separate agreement or amendment, if applicable, identifying any specific maintenance responsibilities not addressed herein. The County's rejection of any documentation submitted hereunder shall mean that the appropriate condition of this Agreement has not been fulfilled.

9. Agreement Monitored by El Paso County Planning and Community Development Department and/or El Paso County Department of Public Works: Any and all actions and decisions to be made hereunder by the County shall be made by the Director of the El Paso County Planning and Community Development Department and/or the Director of the El Paso County Department of Public Works. Accordingly, any and all documents, submissions, plan approvals, inspections, etc. shall be submitted to and shall be made by the Director of the Planning and Community Development Department and/or the Director of the El Paso County Department of Public Works.

10. Indemnification and Hold Harmless: To the extent authorized by law, Developer agrees, for itself, its successors and assigns, that it will indemnify, defend, and hold the County harmless from any and all loss, costs, damage, injury, liability, claim, lien, demand, action and causes of action whatsoever, whether at law or in equity, arising from or related to its intentional or negligent acts, errors or omissions or that of its agents, officers, servants, employees, invitees and licensees in the construction, operation, inspection, cleaning (including analyzing and disposing of any solid or hazardous wastes as defined by State and/or Federal environmental laws and regulations), maintenance, and repair of the detention basin/BMP(s), and such obligation arising under this Paragraph shall be joint and several.

Nothing in this Paragraph shall be deemed to waive or otherwise limit the defense available to the County pursuant to the Colorado Governmental Immunity Act, Sections 24-10-101, *et seq.* C.R.S., or as otherwise provided by law.

11. Severability: In the event any Court of competent jurisdiction declares any part of this Agreement to be unenforceable, such declaration shall not affect the enforceability of the remaining parts of this Agreement.

12. Third Parties: This Agreement does not and shall not be deemed to confer upon or grant to any third party any right to claim damages or to bring any lawsuit, action or other proceeding against either the County, the Developer, or their respective successors and assigns, because of any breach hereof or because of any terms, covenants, agreements or conditions contained herein.

13. Solid Waste or Hazardous Materials: Should any refuse from the detention basin/BMP(s) be suspected or identified as solid waste or petroleum products, hazardous substances or hazardous materials (collectively referred to herein as "hazardous materials"), the Developer shall take all necessary and proper steps to characterize the solid waste or hazardous materials and properly dispose of it in accordance with applicable State and/or Federal environmental laws and regulations, including, but not limited to, the following: Solid Wastes Disposal Sites and Facilities Acts, §§ 30-20-100.5 – 30-20-119, C.R.S., Colorado Regulations Pertaining to Solid Waste Disposal Sites and Facilities, 6 C.C.R. 1007-2, *et seq.*, Solid Waste Disposal Act, 42 U.S.C. §§ 6901-6992k, and Federal Solid Waste Regulations 40 CFR Ch. I. The County shall not be responsible or liable for identifying, characterizing, cleaning up, or disposing of such solid waste or hazardous materials. Notwithstanding the previous sentence, should any refuse cleaned up and disposed of by the County be determined to be solid waste or hazardous materials, the Developer, but not the County, shall be responsible and liable as the owner, generator, and/or transporter of said solid waste or hazardous materials.

14. Applicable Law and Venue: The laws, rules, and regulations of the State of Colorado and El Paso County shall be applicable in the enforcement, interpretation, and execution of this Agreement, except that Federal law may be applicable regarding solid waste or hazardous materials. Venue shall be in the El Paso County District Court.

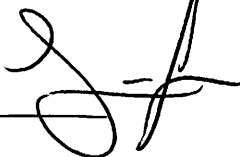
IN WITNESS WHEREOF, the Parties affix their signatures below.

Executed this 15<sup>th</sup> day of July, 2025, by:

CARUBIA PROPERTIES LLC

By: Lucas R. Carubia


[Lucas R. Carubia], [President Owner]

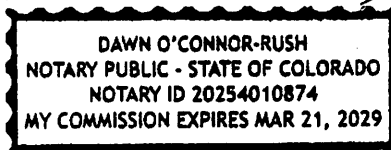


The foregoing instrument was acknowledged before me this 15 day of July, 2025, by [Lucas R. Carubia], [President Owner], [Carubia Properties LLC].

Witness my hand and official seal.

My commission expires: 3.21.2029

  
Notary Public



Executed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by:

BOARD OF COUNTY COMMISSIONERS  
OF EL PASO COUNTY, COLORADO

By: \_\_\_\_\_

Gilbert LaForce, Engineering Manager  
Development Services, Department of Public Works  
Designee of Joshua Palmer, County Engineer  
Authorized signatory pursuant to Resolution No. 24-145

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_,  
20\_\_\_\_, by \_\_\_\_\_, Engineering Manager, El Paso County Department of Public Works.

Witness my hand and official seal.

My commission expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

Approved as to Content and Form:

\_\_\_\_\_  
Assistant County Attorney

**EXHIBIT A**

**LOT 2, BENT GRASS EAST COMMERCIAL FILING NO. 4**



## **EXHIBIT "A"**

Date: June 25, 2025

### **DESCRIPTION**

#### **DRAINAGE EASEMENT NO.1**

BEING A PART OF LOT 2, BENT GRASS EAST COMMERCIAL FILING NO. 4, RECORDED AT RECEPTION NO. 224715331 OF THE RECORDS OF EL PASO COUNTY, COLORADO, LOCATED IN THE NE 1/4 OF SECTION 1, TOWNSHIP 13 SOUTH, RANGE 65 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SAID LOT 2, THENCE S89°38'17"W ON THE NORTH LINE OF SAID LOT 2, A DISTANCE OF 20.00 FEET TO THE POINT OF BEGINNING OF THIS DESCRIPTION;

- 1) THENCE S89°38'17"W CONTINUING ON THE NORTH LINE OF SAID LOT 2, A DISTANCE OF 14.76 FEET;
- 2) THENCE S47°47'45"E A DISTANCE OF 20.08 FEET;
- 3) THENCE N00°30'13"W A DISTANCE OF 13.59 FEET TO THE POINT OF BEGINNING.

THE ABOVE EASEMENT CONTAINS 100 SQUARE FEET, MORE OR LESS.

BASIS OF BEARINGS FOR THIS DESCRIPTION ARE BASED ON THE SOUTH LINE OF LOT 2, BENT GRASS EAST COMMERCIAL FILING NO. 4, RECORDED AT RECEPTION NO. 224715331 OF THE RECORDS OF EL PASO COUNTY, COLORADO, SAID LINE BEARS N89°30'48"E A DISTANCE OF 225.16 FEET FROM THE SOUTHWEST CORNER OF SAID LOT 2, TO THE SOUTHEAST CORNER OF SAID LOT 2 (BOTH MONUMENTED WITH NO.4 REBAR AND YELLOW CAP PLS 34583)

THE FORGOING DESCRIPTION HAS BEEN PREPARED BY OR UNDER MY DIRECT SUPERVISION.

**JAMES F. LENZ PLS 34583  
FOR AND ON BEHALF OF  
RIDGELINE LAND SURVEYING LLC.**



## **EXHIBIT "A"**

Date: June 25, 2025

### **DESCRIPTION**

#### **DRAINAGE EASEMENT NO.2**

BEING A PART OF LOT 2, BENT GRASS EAST COMMERCIAL FILING NO. 4, RECORDED AT RECEPTION NO. 224715331 OF THE RECORDS OF EL PASO COUNTY, COLORADO, LOCATED IN THE NE 1/4 OF SECTION 1, TOWNSHIP 13 SOUTH, RANGE 65 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:  
COMMENCING AT THE SOUTHEAST CORNER OF SAID LOT 2, THENCE N76°27'05"W, A DISTANCE OF 20.62 FEET TO THE POINT OF BEGINNING OF THIS DESCRIPTION;

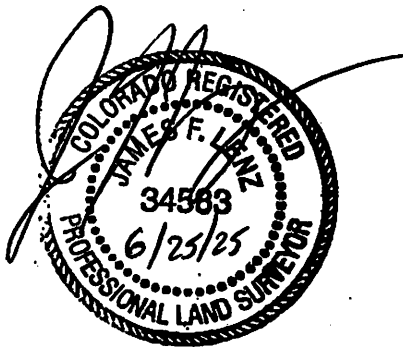
- 1) THENCE N00°30'13"W A DISTANCE OF 20.00 FEET;
- 2) THENCE S89°30'48"W A DISTANCE OF 74.53 FEET;
- 3) THENCE S00°30'13"E A DISTANCE OF 20.00 FEET;
- 4) THENCE N89°30'48"E A DISTANCE OF 74.53 FEET TO THE POINT OF BEGINNING.

THE ABOVE EASEMENT CONTAINS 1,491 SQUARE FEET, MORE OR LESS.

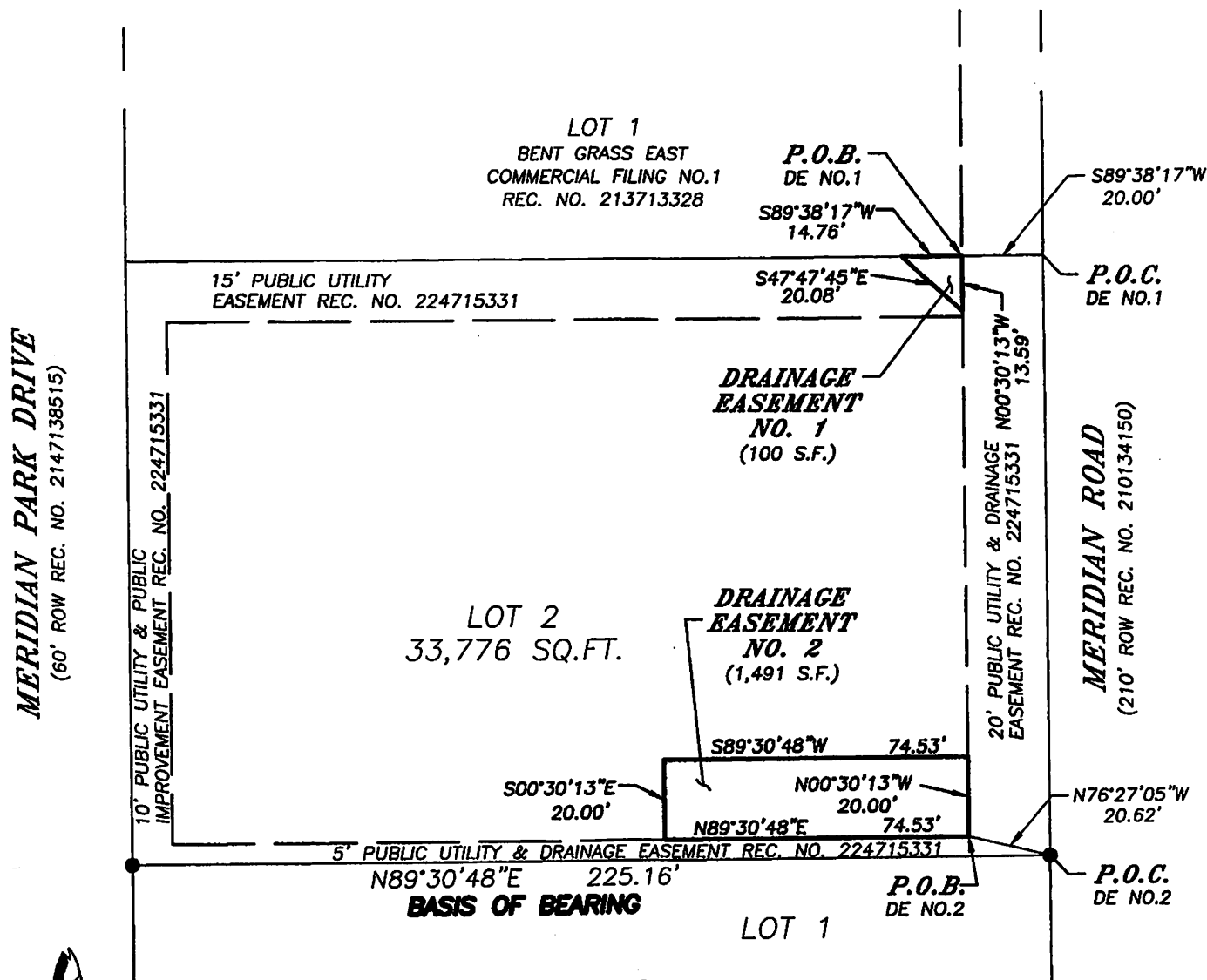
BASIS OF BEARINGS FOR THIS DESCRIPTION ARE BASED ON THE SOUTH LINE OF LOT 2, BENT GRASS EAST COMMERCIAL FILING NO. 4, RECORDED AT RECEPTION NO. 224715331 OF THE RECORDS OF EL PASO COUNTY, COLORADO, SAID LINE BEARS N89°30'48"E A DISTANCE OF 225.16 FEET FROM THE SOUTHWEST CORNER OF SAID LOT 2, TO THE SOUTHEAST CORNER OF SAID LOT 2 (BOTH MONUMENTED WITH NO.4 REBAR AND YELLOW CAP PLS 34583)

THE FORGOING DESCRIPTION HAS BEEN PREPARED BY OR UNDER MY DIRECT SUPERVISION.

**JAMES F. LENZ PLS 34583  
FOR AND ON BEHALF OF  
RIDGELINE LAND SURVEYING LLC.**



**LEGAL DESCRIPTION EXHIBIT "B"**  
**PART OF THE NE 1/4 OF SECTION 1, TOWNSHIP 13 SOUTH, RANGE 66 WEST OF**  
**THE 6TH P.M., EL PASO COUNTY, COLORADO**  
**SHEET 1 OF 1**

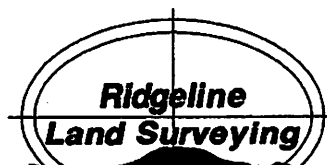


SCALE 1"=40'  
 DATE: 6/25/25



- NO.4 REBAR AND CAP PLS 34583

THIS SURVEY MAP DOES NOT REPRESENT A MONUMENTED SURVEY AND IS ONLY INTENDED TO ILLUSTRATE THE ATTACHED LEGAL DESCRIPTION.



**575 VALLEY STREET, SUITE 3**  
**COLORADO SPRINGS, CO 80915**  
**TEL: 719.238.2917**

**EXHIBIT B**  
**STANDARD OPERATION PROCEDURES**  
**for**  
**INSPECTION AND MAINTENANCE**

# Standard Operation Procedures for Inspection and Maintenance

## Grass Buffers Swales and Grass (GB-GS)



July 2019

## **GB-GS-1 BACKGROUND**

Grass Buffers and Grass Swales are common types of Stormwater Management Facilities utilized within the Front Range of Colorado. Grass Buffers and Grass Swales promote filtration, infiltration, and settling to reduce runoff volume.

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.

## **GB-GS-2 INSPECTING GRASS BUFFERS AND SWALES (GB-GS)**

### **GB-GS-2.1 Access and Easements**

Inspection and maintenance personnel may utilize the stormwater facility map located in Appendix G containing the locations of the access points and maintenance easements of the GB-GSs within this development.

### **GB-GS-2.2 Stormwater Management Facilities Locations**

Inspection and maintenance personnel may utilize the stormwater facility map located in Appendix G containing the locations of the GB-GSs within this development.

### **GB-GS-2.3 Grass Buffer - Grass Swale (GB-GS) Features**

GB-GSs are unique stormwater quality facilities, in that they are typically viewed as landscaping or ground cover, and are often overlooked as water quality treatment facilities. GB-GSs have a number of features that are designed to serve a particular function. It is important for maintenance personnel to understand the function of each of these features. Below is a list of the common features of a Grass Swale or Grass Buffer and the corresponding maintenance inspection items that can be anticipated:

**Table GB-GS-1**  
**Typical Inspection & Maintenance Requirements Matrix**

	<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	

**GB-GS-2.3.1     Grass Swale Bottom and Side Slopes; Grass Buffer Strips**

Grass Swales and Grass Buffers 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. Inspection over the first few years will help to determine if any problems are developing.

*The typical maintenance items that are required at the side slopes and bottoms of grass swales and within grass buffer areas are as follows:*

*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, sediment that accumulates must be removed on a timely basis.

*b. Vegetation Sparse* – Grass Swales and Buffers 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 which contribute to the damaged grass cover, including lack of adequate irrigation, traces of 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 to the area and to prevent sediment transport.

d. *Standing Water/Boggy Areas* – Grass swales and buffers 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.

#### GB-GS-2.3.2 Inflow Points

Inflow points are the points of stormwater discharge into the swale or buffer. Inflow points are typically pipe outfalls, 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 spreader devices.

*The typical maintenance items that are required at inflow points are as follows:*

a. *Riprap Displaced/Rundown Damaged* – Often, because of, the repeated impact/force of water, the riprap can shift and settle. If any portion of the riprap rundown or apron appears to have settled, if soil is present between the riprap, or if the riprap has shifted, maintenance may be required to ensure future erosion is prevented.

b. *Erosion Present/Outfall Undercut* – In some situations, an energy dissipater may have not been provided, or may not have been sized, constructed, or maintained appropriately and erosion has occurred. Any erosion within the vicinity of the inflow point will require maintenance to prevent damage to the structure(s) and sediment transport within the facility.

c. *Sediment Accumulation* – Because of the turbulence in the water created by the energy dissipater, 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.

#### GB-GS-2.3.3 Underdrain System

Some grass swales and buffers that have a flatter slope or soils which do not allow adequate percolation or are in areas with a continuous base flow may have been installed with an underdrain system. Underdrains typically consist of a layer of geotextile fabric, gravel storage area and perforated



PVC pipe. The geotextile fabric is utilized to prevent the filter material from entering the underdrain system. The gravel storage area allows for storage of treated stormwater runoff prior to the discharge of the runoff through the perforated PVC pipe.

*The typical maintenance activities that are required for the underdrain system are as follows:*

With proper maintenance of the grassed 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.

#### GB-GS-2.3.4 Grade Control Level Spreader

Grass swales that are installed in areas with steep longitudinal slopes often necessitate the use of grade control checks or drop structures. Grade control structures are typically either concrete walls or rip rap structures that serve to provide a reinforced drop at specific locations in the channel, reducing the longitudinal slope between the control structures.

Level Spreaders are installed on the upstream of grass buffers to evenly distribute flows along the design length. Level spreaders may consist of slotted curbing, modular block porous pavement, level walls or other spreader devices.

*The typical maintenance activities that are required for grade control structures and level spreaders are as follows:*

*a. Erosion present* – Grade control structures and level spreaders are provided to reduce the potential for erosion of the grassed swale or buffer 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* – Structural damage can occur at anytime along the life of the facility. Typically, structural damage 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.

#### GB-GS-2.3.5 Irrigation

Grass Buffers and Grass Swales depend on healthy, dense turf grass to function, and therefore require an irrigation system, to provide a consistent

water supply. Typically, the condition of the grass cover will provide evidence of the effectiveness and maintenance needs of the irrigation system.

*The typical maintenance activities that are required for irrigation systems are as follows:*

Irrigation systems will generally require routine periodic maintenance and adjustment 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.

#### GB-GS-2.3.6 Miscellaneous

There are a variety of inspection/maintenance issues that may not be attributed to a single feature within the GB-GS. This category on the inspection form is for maintenance items that are commonly found in the GB-GS, but may not be attributed to an individual feature.

*a. Encroachment in Easement Area* – SEMSWA requires that GB-GS be located in tracts or drainage easements. Property owners may place landscaping, trash, fencing, or other items within the easement area that may affect maintenance or the operation of the facility.

*b. Public Hazards* – Public hazards include items such as containers of unknown/suspicious substances, and exposed metal/jagged concrete on structures. **If any hazard is found within the facility area that poses an immediate threat to public safety, contact the local Sheriff's Office at 911 immediately.**

*c. Burrowing Animals/Pests*– Prairie dogs and other burrowing rodents may cause damage to the GB-GS features and negatively affect the vegetation within the GB-GS.

*d. Other* – Any miscellaneous inspection/maintenance items not contained on the form should be entered here.

### **GB-GS-3     MAINTAINING GRASS BUFFERS & GRASS SWALES (GB-GS)**

#### **GB-GS-3.1     Maintenance Personnel**

Maintenance personnel must be experienced to properly maintain GB-GSs. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs.

### **GB-GS-3.2      Equipment**

It is imperative that the appropriate equipment and tools are taken to the field with the operations crew. The types of equipment/tools will vary depending on the task at hand. Below is a list of tools, equipment, and material(s) that may be necessary to perform maintenance on a GB-GS:

- 1.) Mowing Tractors
- 2.) Trimmers (extra string)
- 3.) Shovels
- 4.) Rakes
- 5.) All Surface Vehicle (ASVs)
- 6.) Engineers Level (laser)
- 7.) Erosion Control Blanket(s)
- 8.) Mulch
- 9.) Sod or Seed
- 10.) Illicit Discharge Cleanup Kits
- 11.) Trash Bags
- 12.) Stormwater Facility Operation and Maintenance Manual

Some of the items identified above may not be needed for every maintenance operation. However, this equipment should be available to the maintenance operations crews should the need arise.

### **GB-GS-3.3      Maintenance Categories and Activities**

A typical GB-GS Maintenance Program will consist of three broad categories of work: Routine, Minor and Major. Within each category of work, a variety of maintenance activities can be performed on a GB-GS. A maintenance activity can be specific to each feature within the GB-GS, or general to the overall facility. This section of the SOP explains each of the categories and briefly describes the typical maintenance activities for a GB-GS.

A variety of maintenance activities are typical of GB-GSs. The maintenance activities range in magnitude from routine trash pickup to the reconstruction of the GB-GS or underdrain system. Below is a description of each maintenance activity, the objectives, and frequency of actions.

### **GB-GS-3.4      Routine Maintenance Activities**

The majority of this work consists of scheduled mowing, trash and debris pickups and landscape care for the GB-GS during the growing season. It also includes activities such as weed control. These activities normally will be performed numerous times during the year. These items do not require

any prior approval by SEMSWA, however, completed inspection and maintenance forms shall be submitted to SEMSWA for each inspection and maintenance period.

The Routine Maintenance Activities are summarized below, and further described in the following sections.

**Table GB-GS-2**  
**Summary of Routine Maintenance Activities**

<b>Maintenance Activity</b>	<b>Minimum Frequency</b>	<b>Indication Action is Needed:</b>	<b>Maintenance Action</b>
<b>Trash/Debris Removal</b>	Twice annual and before mowing	Trash & debris in GB-GS	Remove and properly dispose of trash and debris
<b>Mowing</b>	Routine – as necessary to maintain 2" – 4" grass height	Excessive grass height/aesthetics	2"-4" grass height for turf grass; 4" to 6" for native grass
<b>Irrigation (Automatic)</b>	Three times annually	Areas of insufficient or excess watering; broken or missing parts	SPRING: start up system; test for even coverage and correct timer settings SUMMER: test for even coverage and correct timer settings FALL: drain and winterized system (follow watering regulations)
<b>Irrigation (Not Automatic)</b>	As needed to maintain healthy grass	Areas of insufficient or excess watering	Water as needed to maintain healthy grass; (follow watering regulations)
<b>Weed Control</b>	Minimum twice annually	Noxious weeds; Unwanted vegetation	Treat w/herbicide or hand pull; consult a local Weed Inspector
<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 Parks Dept. or Division of Wildlife for guidance

#### **GB-GS-3.4.1 Trash/Debris Removal**

Trash and debris must be removed from the GB-GS area to allow for proper functioning and to improve aesthetics. This activity must be performed prior to mowing operations.

*Frequency* – Routine – Prior to mowing operations and a minimum of twice annually.

#### **GB-GS-3.4.2 Mowing**

Routine mowing of the turf grass embankments is necessary to maintain an appropriate grass height and to improve the overall appearance of the

GB-GS. Turf grass should be mowed to a height of 2 to 4- inches (4 – 6- inches for native grass) and shall be bagged to prevent potential contamination of the filter media.

*Frequency* – Routine – as necessary to maintain grass height.

#### GB-GS-3.4.3 Irrigation

Irrigation systems should be maintained in proper working order to provide an adequate water supply to support the grass cover. 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 are providing complete coverage of the area. Sprinkler heads should be adjusted as necessary, and checked for broken or missing parts.

*Frequency* - Routine as needed throughout the growing season, plus the following:

SPRING: Start up the system and test for even coverage and correct timer settings.

SUMMER: Test for even coverage and correct timer settings.

FALL: Drain and winterize the system.

#### GB-GS-3.4.4 Weed Control

Noxious weeds and other unwanted vegetation must be treated as needed throughout the GB-GS. This activity can be performed either through mechanical means (mowing/pulling) or with herbicide. Consultation with a local Weed Inspector is highly recommended prior to the use of herbicide. Herbicides should be utilized sparingly and as a last resort. All herbicide applications should be in accordance with the manufacturer's recommendations.

*Frequency* – Routine – As needed based upon inspections.

#### GB-GS-3.4.5 Mosquito Treatment

GB-GS facilities are intended to drain, and should not have areas of standing water which creates mosquito habitat. Causes of the standing water or boggy conditions should be investigated and remediated as necessary to eliminate the standing water. Only EPA approved chemicals should be applied in accordance with the recommendations of the manufacturer.

*Frequency* – As needed based upon inspections.

**GB-GS-3.4.6 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. Areas of erosion should be repaired, filled and revegetated. Causes for the erosion should be investigated and repaired.

*Frequency* – As needed based upon inspections.

**GB-GS-3.4.7 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.

*Frequency* – As needed based on inspections.

**GB-GS-3.5 Minor Maintenance Activities**

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 approval by SEMSWA. Completed inspection and maintenance forms shall be submitted to SEMSWA for each inspection and maintenance activity.

**Table GB-GS-3  
Summary of Minor Maintenance Activities**

<b>Maintenance Activity</b>	<b>Minimum Frequency</b>	<b>Indication Action is Needed:</b>	<b>Maintenance Action</b>
<b>Sediment Removal</b>	As needed.	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 & 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	Evidence of uneven flow; erosion; or	Repair sections of level spreader and

	inspection.	rills/gullies	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

#### GB-GS-3.5.1 Sediment Removal

Sediment removal is necessary to ensure proper function of the grass swale or buffer. 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 BMPs during construction activities. Causes for contributions of excess sediment should be investigated and addressed.

*Frequency* – As needed based upon inspections.

#### GB-GS-3.5.2 Erosion Repair

The repair of eroded areas is necessary to ensure the proper functioning of the GB-GS, to minimize sediment transport, and to reduce potential impacts to other features. Erosion can vary in magnitude from minor repairs to vegetation and embankments, to rills and gullies in the embankments and inflow points. The repair of eroded areas may require the use of excavators, riprap, concrete, and sod. Extreme care should be taken when utilizing motorized or heavy equipment to ensure damage to the underdrain system does not occur. Major erosion in a GS-GB 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.

*Frequency* – As necessary, based upon inspections.

#### GB-GS-3.5.3 Vegetation Removal

Weeds, Shrubs, Willows and other unwanted vegetation that develops in the grass swale or buffer area may impede the flow and cause standing water or back flow problems. It is necessary to remove unwanted vegetation as soon as it appears. Remove the unwanted vegetation, and restore the correct grade. Revegetate with seed or sod.

*Frequency* – As necessary, based upon inspections.

#### GB-GS -3.5.4 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.

*Frequency* – As necessary, based upon inspections.

#### GB-GS-3.5.5 Irrigation (Automatic)

Irrigation systems require routine maintenance in accordance with the manufacturer's recommendations (valves, timer, etc.), and maintenance of the pipe and 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 grassed areas for the seasonal conditions.

*Frequency* – As necessary, based upon inspections.

#### GB-GS-3.5.6 Level Spreader

Level Spreaders that are no longer level, or have developed damaged areas of cracking or spalling, allow flows to concentrate in these depressed areas instead of being distributed over the length of the structure. Also, build up of grasses along the edge of the spreader may create an uneven flow distribution. Rills, gullies and other erosion that develops downstream of level spreaders should be repaired and reseeded or sodded. Causes of the erosion should be investigated and addressed.

*Frequency* – As necessary, based upon inspections.

#### GB-GS-3.5.7 Fertilization/Soil Amendment

Grass Buffers and Swales rely on healthy, dense turf in order to function properly. Grasses that appear to be diseased, dying or unhealthy may require amendments. Fertilizers should be applied in the minimum amounts recommended by the manufacturer.

*Frequency* – As necessary, based upon inspections.

#### GB-GS-3.5.8 Vehicle Tracks

GB-GSs 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 grassed areas.

*Frequency* – As necessary, based upon inspections.

### **GB-GB-3.6 Major Maintenance Activities**

This work consists of larger maintenance/operational problems and failures within the stormwater management facilities. All of this work requires consultation with SEMSWA Engineering to ensure the proper maintenance is performed. This work requires that SEMSWA 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.

**Table GB-GS-4  
Summary of Major Maintenance Activities**

<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 PLD	Removal of filter media and underdrain system	Contact SEMSWA Engineering

#### GB-GS-3.6.1 Major Sediment/Pollutant Removal

Major sediment removal consists of removal of large quantities of pollutants/sediment /landscaping material. Stormwater sediments removed from GB-GSs do not meet the regulatory definition of "hazardous waste". However, these sediments can be contaminated with a wide array of organic and inorganic pollutants and handling must be done with care to insure proper removal and disposal. Sediments should be transported by motor vehicle only after they are dewatered. All sediments must be taken to a licensed landfill for proper disposal. Should a spill occur during transportation, prompt and thorough cleanup and disposal is imperative. Vegetated areas need special care to ensure design volumes and grades are preserved or may need to be replaced due to the removal activities.

*Frequency* – Non-routine – Repair as needed, based upon inspections.

#### GB-GS-3.6.2 Major Erosion Repair

Major erosion repair consists of filling and revegetating areas of severe erosion. 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.

*Frequency* – Non-routine – Repair as needed, based upon inspections.

#### GB-GS-3.6.3 Structural Repair

A GB-GS generally includes level spreader and 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 SEMSWA Engineering Staff shall take place prior to all structural repairs.

*Frequency* – Non-routine – Repair as needed, based upon inspections.

#### GB-GS-3.6.4 GB-GS Rebuild

In very rare cases, a GB-GS 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 GB-GS. Consultation with SEMSWA Engineering Staff shall take place prior to any rebuild project.

*Frequency* – Non-routine – As needed based upon inspections.

**Reference:**

This Manual is adapted from the Douglas County, Colorado, Standard Operating Procedure for Extended Detention Basin (EDB) Inspection and Maintenance, July 2005