El Paso County MS4 Post Construction Detention / Water Quality Facility Documentation Form

This document **must be completed and submitted** with required attachments to the County for projects requiring a detention and/or a water quality facility. A separate completed form must be submitted for each facility.

Project name: Bent Grass Residential Filing No. 2 - Pond (North)
Owner name: Bent Grass Metropolitan District
Location Address: NW of E Woodmen Rd. and Meridian Rd., El Paso County
Latitude and Longitude:
Latitude: 38°56'55.46"N, Longitude: 104°37'16.49"W

Assessor's Parcel #: 5301000020 Section: 1 Township: 13 South Range: 65 West

Expected Completion date: February, 2019

Project acreage: 50.79 acres Design Ponding Acres: 0.14 acres Design Storm: WQCV

Design Engineer Email Address: GrantDennis@GallowayUS.com

To ensure compliance with C.R.S. 37-92-602(8), the completed Stormwater Detention and Infiltration Design Data Sheet **must be attached**. The form can be found here: https://maperture.digitaldataservices.com/gvh/?viewer=cswdif# (click on Download SDI Design Data Sheet)

List all permanent water quality control measure(s) (EDBs, rain gardens, etc):

Pond (North) will be providing water quality treatment for the WQCV of the north half of the project site.

For all projects for which the constrained redevelopment sites standard is applied, provide an explanation of why it is not practicable to meet the full design standards. Answer:

The proposed development includes improvements to the regional Pond WU south of the project site.

Attach Operations and Maintenance (O&M) Plan describing the operation and maintenance procedures that ensure the long-term observation, maintenance, and operation of control measure(s), including routine inspection frequencies and maintenance activities. If multiple, different water quality control measures are used at the same location, a separate O & M Plan must be provided for each facility.

Attach Private Detention Basin / Stormwater Quality Best Management Practice Maintenance Agreement and Easement addressing maintenance of BMPs that shall be binding on all subsequent owners of the permanent BMPs.

Attachments:

Stormwater Detention and Infiltration Design Data Sheet
O & M Plan

Review Engineer

EPC Project File No.

Stormwater Detention and Infiltration Design Data Sheet

Workbook Protected Worksheet Protected

Stormwater Facility Name: **Bent Grass Residential Filing No. 2 - Pond (North)**

Facility Location & Jurisdiction: **NW of E Woodmen Rd and Meridian Rd, El Paso County**

User Input: Watershed Characteristics

Watershed Slope =	0.020	ft/ft
Watershed Length =	1700	ft
Watershed Area =	19.12	acres
Watershed Imperviousness =	47.9%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =		percent
Percentage Hydrologic Soil Groups C/D =		percent

Location for 1-hr Rainfall Depths (use dropdown):

User Input

WQCV Treatment Method = Extended Detention

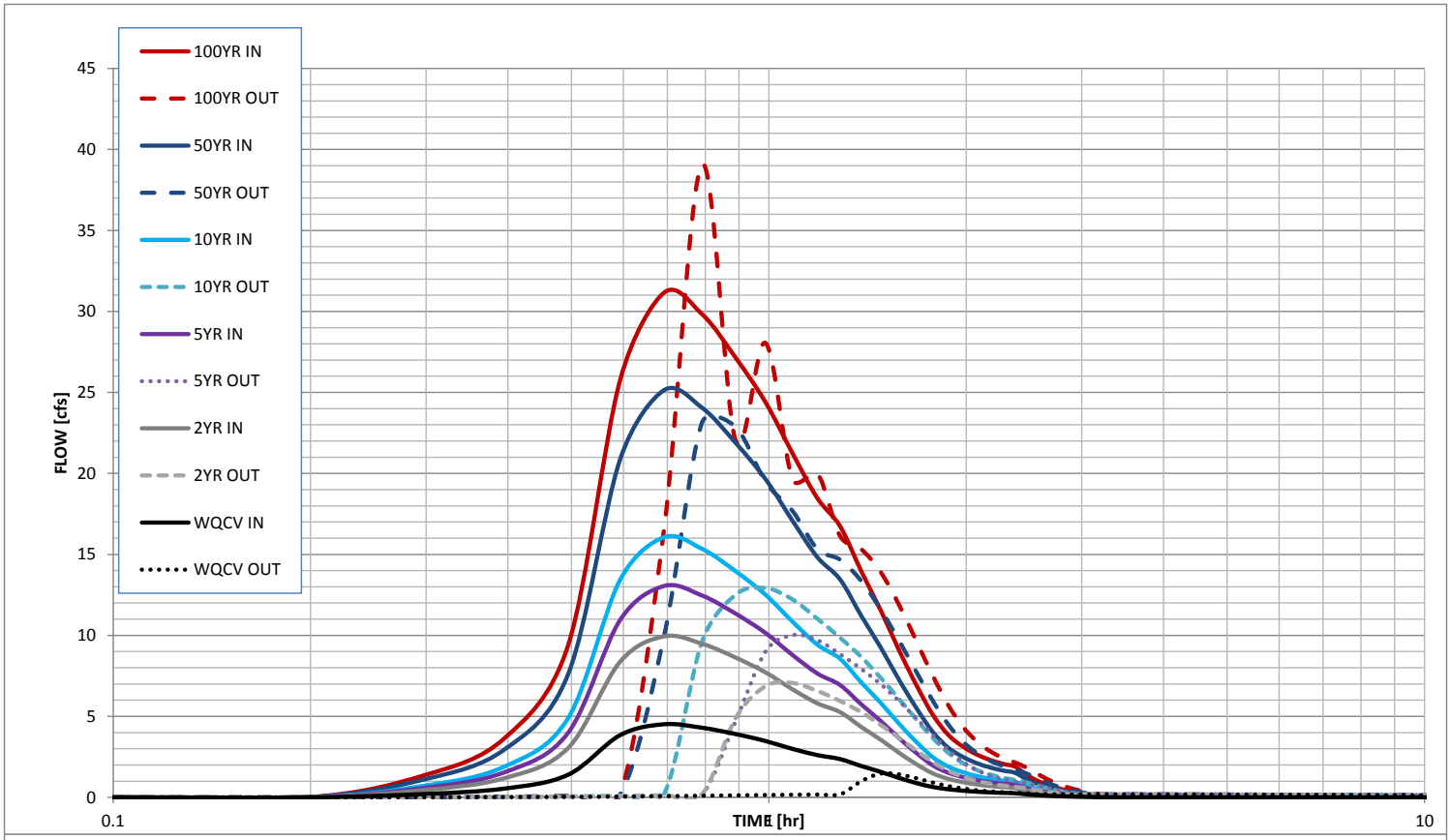
User Defined Stage [ft]	User Defined Area [ft^2]	User Defined Stage [ft]	User Defined Discharge [cfs]
0.00	0	0.00	0.00
0.50	3,500	0.50	0.04
1.50	4,637	1.50	0.11
2.50	5,865	2.50	0.19
3.50	7,177	3.50	15.56
4.50	8,559	4.50	184.78
5.50	10,013	5.50	478.25

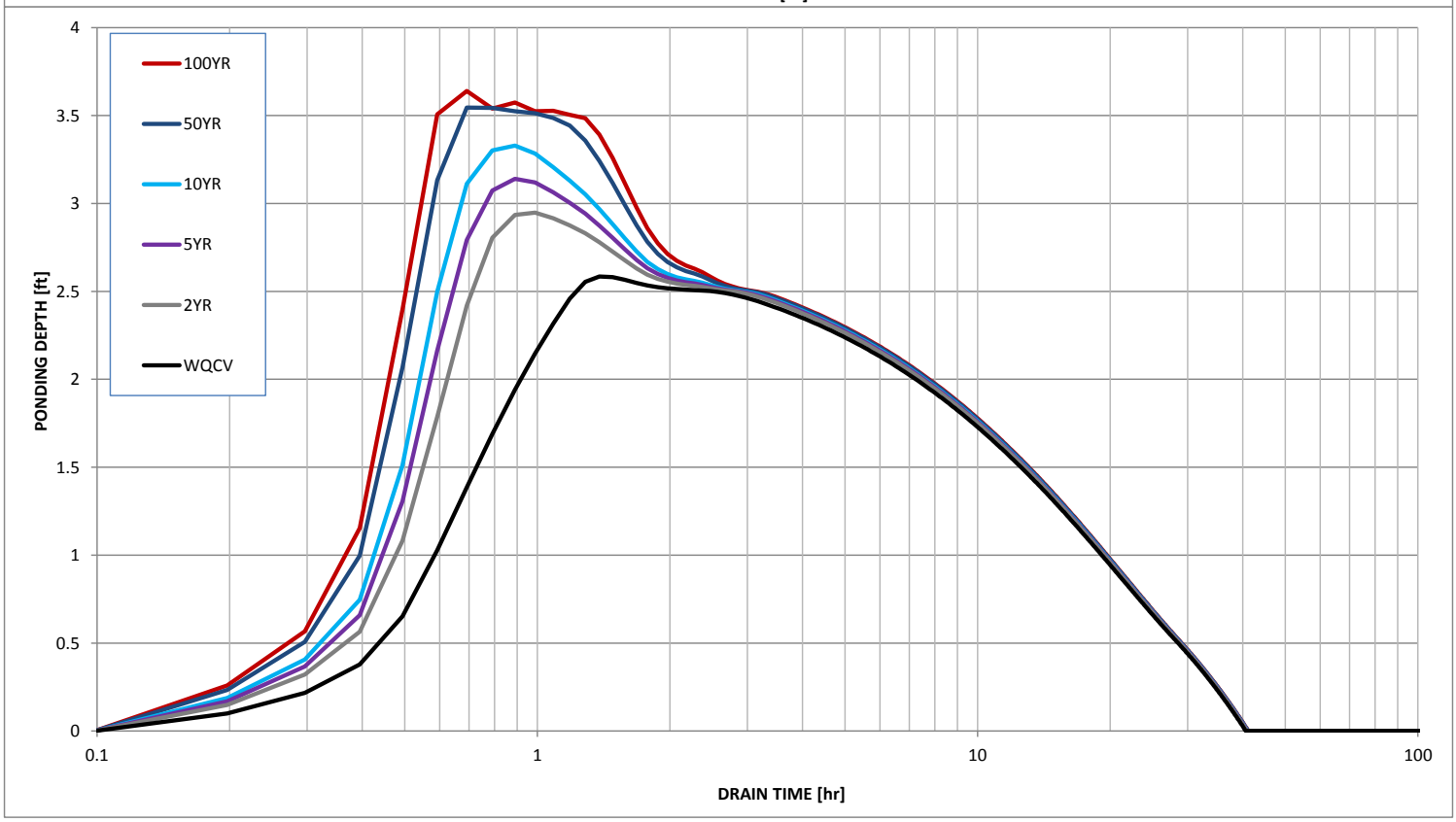
After completing and printing this worksheet to a pdf, go to:
https://maperture.digitaldataservices.com/gvh/?viewer=cswdif
create a new stormwater facility, and
attach the pdf of this worksheet to that record.

Routed Hydrograph Results

Design Storm Return Period =	WQCV	2 Year	5 Year	10 Year	50 Year	100 Year	
One-Hour Rainfall Depth =	0.53	1.19	1.50	1.75	2.25	2.52	in
Calculated Runoff Volume =	0.320	0.711	0.936	1.154	1.817	2.259	acre-ft
OPTIONAL Override Runoff Volume =							acre-ft
Inflow Hydrograph Volume =	0.319	0.710	0.935	1.154	1.816	2.258	acre-ft
Time to Drain 97% of Inflow Volume =	32.3	28.5	**26.7**	25.1	21.1	19.1	hours
Time to Drain 99% of Inflow Volume =	35.9	33.7	32.7	31.8	29.6	**28.4**	hours
Maximum Ponding Depth =	2.58	2.95	3.14	3.33	3.55	3.64	ft
Maximum Ponded Area =	0.14	0.15	0.15	0.16	0.17	**0.17**	acres
Maximum Volume Stored =	0.245	0.297	0.326	0.356	0.391	0.406	acre-ft

Stormwater Detention and Infiltration Design Data Sheet





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This document **must be completed and submitted** with required attachments to the County for projects requiring a detention and/or a water quality facility. A separate completed form must be submitted for each facility.

Project name: Bent Grass Residential Filing No. 2 - Pond (South)
Owner name: Bent Grass Metropolitan District
Location Address: NW of E Woodmen Rd. and Meridian Rd., El Paso County
Latitude and Longitude:
Latitude: 38°56'55.46"N, Longitude: 104°37'16.49"W

Assessor's Parcel #: 5301000020 Section: 1 Township: 13 South Range: 65 West

Expected Completion date: February, 2019

Project acreage: 50.79 acres Design Ponding Acres: 0.22 acres Design Storm: WQCV

Design Engineer Email Address: GrantDennis@GallowayUS.com

To ensure compliance with C.R.S. 37-92-602(8), the completed Stormwater Detention and Infiltration Design Data Sheet **must be attached**. The form can be found here: https://maperture.digitaldataservices.com/gvh/?viewer=cswdif# (click on Download SDI Design Data Sheet)

List all permanent water quality control measure(s) (EDBs, rain gardens, etc):

Pond (South) will be providing water quality treatment for the WQCV of the south half of the project site.

For all projects for which the constrained redevelopment sites standard is applied, provide an explanation of why it is not practicable to meet the full design standards. Answer:

The proposed development includes improvements to the regional Pond WU south of the project site.

Attach Operations and Maintenance (O&M) Plan describing the operation and maintenance procedures that ensure the long-term observation, maintenance, and operation of control measure(s), including routine inspection frequencies and maintenance activities. If multiple, different water quality control measures are used at the same location, a separate O & M Plan must be provided for each facility.

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Workbook Protected Worksheet Protected

Stormwater Facility Name: **Bent Grass Residential Filing No. 2 - Pond (South)**

Facility Location & Jurisdiction: **NW of E Woodmen Rd and Meridian Rd, El Paso County**

User Input: Watershed Characteristics

Watershed Slope =	0.020	ft/ft
Watershed Length =	1800	ft
Watershed Area =	29.31	acres
Watershed Imperviousness =	53.2%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =		percent
Percentage Hydrologic Soil Groups C/D =		percent

Location for 1-hr Rainfall Depths (use dropdown):

User Input

WQCV Treatment Method = Extended Detention

User Defined Stage [ft]	User Defined Area [ft^2]	User Defined Stage [ft]	User Defined Discharge [cfs]
0.00	0	0.00	0.00
0.50	5,438	0.50	0.07
1.50	7,249	1.50	0.17
2.50	9,448	2.50	0.30
3.50	11,635	3.50	19.47
4.50	13,951	4.50	226.91
5.50	16,542	5.50	579.15

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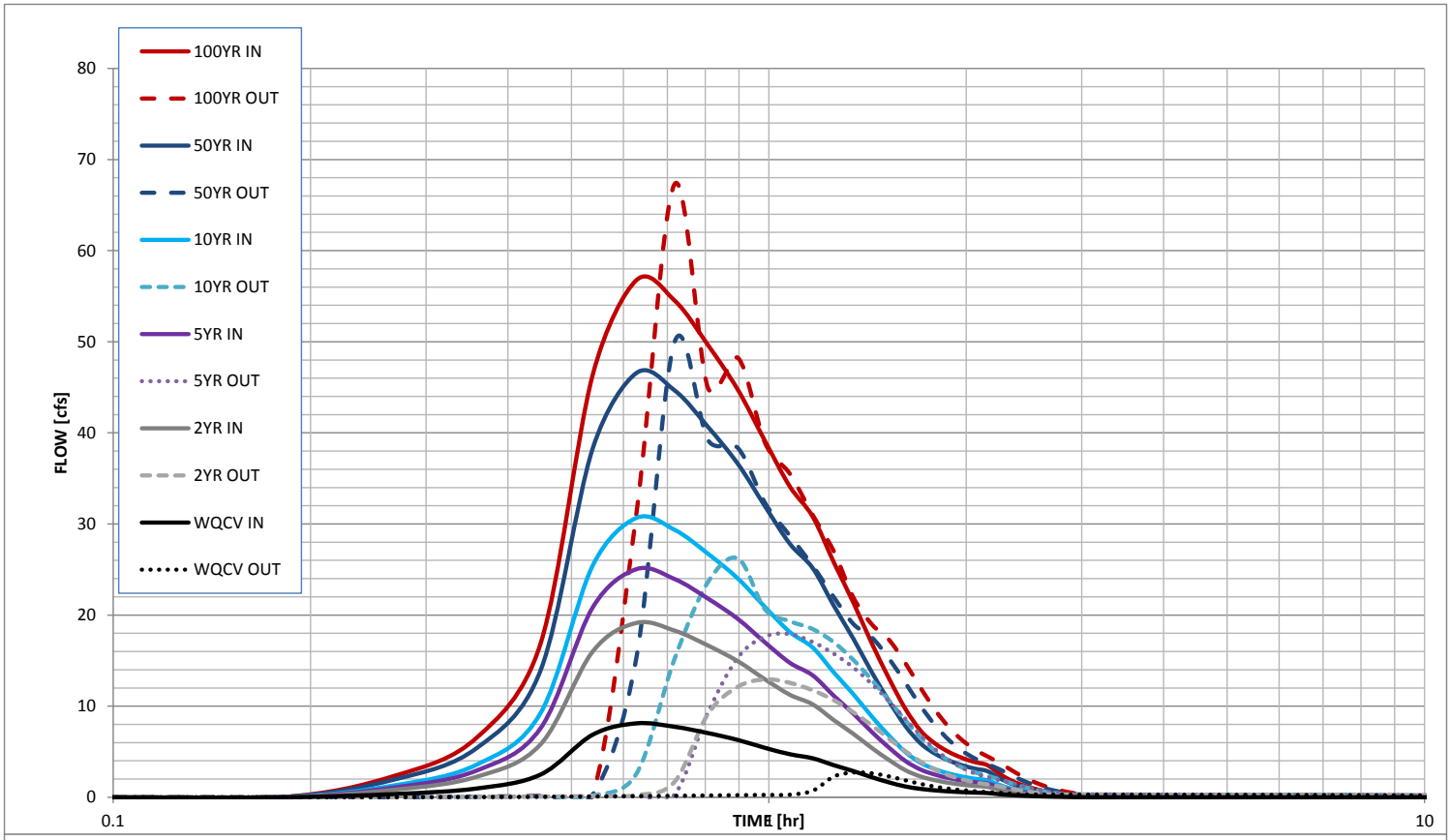
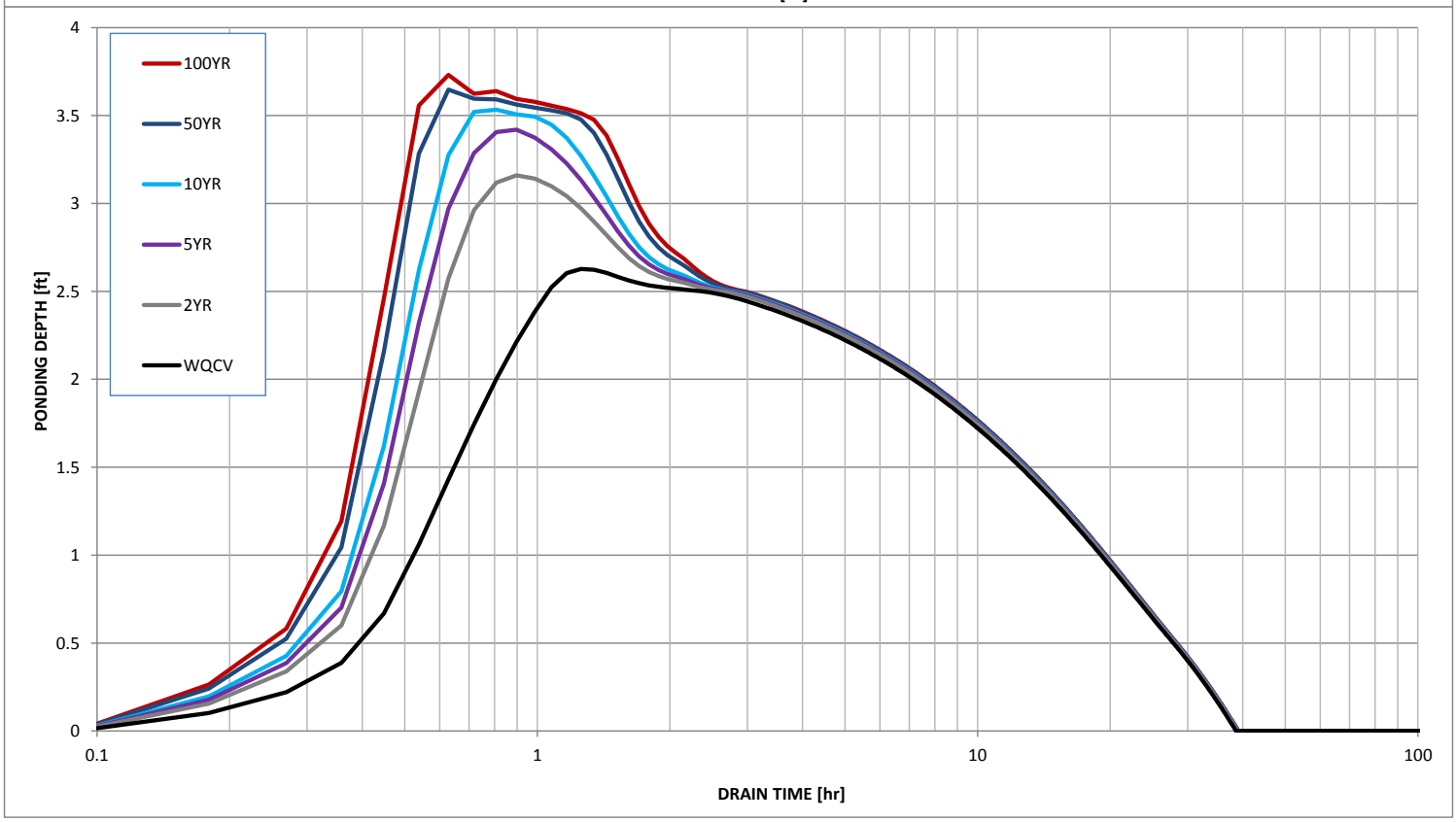
https://maperture.digitaldataservices.com/gvh/?viewer=cswdif
create a new stormwater facility, and
attach the pdf of this worksheet to that record.

Routed Hydrograph Results

Design Storm Return Period =	WQCV	2 Year	5 Year	10 Year	50 Year	100 Year	
One-Hour Rainfall Depth =	0.53	1.19	1.50	1.75	2.25	2.52	in
Calculated Runoff Volume =	0.526	1.250	1.641	2.016	3.079	3.764	acre-ft
OPTIONAL Override Runoff Volume =							acre-ft
Inflow Hydrograph Volume =	0.525	1.250	1.641	2.015	3.079	3.764	acre-ft
Time to Drain 97% of Inflow Volume =	31.0	27.0	**25.3**	23.9	20.2	18.2	hours
Time to Drain 99% of Inflow Volume =	34.3	32.0	31.1	30.3	28.3	**27.3**	hours
Maximum Ponding Depth =	2.63	3.16	3.42	3.53	3.65	3.73	ft
Maximum Ponded Area =	0.22	0.25	0.26	0.27	0.27	**0.28**	acres
Maximum Volume Stored =	0.395	0.522	0.588	0.618	0.650	0.673	acre-ft

Stormwater Detention and Infiltration Design Data Sheet





OPERATIONS AND MANTENANCE MANUAL

BENT GRASS RESIDENTIAL FILING NO. 2

El Paso County, CO

PREPARED FOR:
Challenger Homes, Inc.
8605 Explorer Dr., Suite 250
Colorado Springs, CO 80920

PREPARED BY:
Galloway & Company, Inc.
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920

DATE:
October 20, 2019

TABLE OF CONTENTS

Inspection

Inspection Frequency

- Inspections of the ponds should be, at a minimum, once every week until vegetation is re-established and then once a quarter. Inspections should also occur after major storm events.
- Hydraulic and structural facilities should be thoroughly inspected annually. Also, observations should be made for obvious problems during routine maintenance visits, especially for plugging of outlets.
- Inspections for debris and litter just before annual storm seasons (that is April and May) and following significant rainfall events.
- Results of inspections are to be recorded and kept at a central location for review and recording by the owner.
- Sediment removal should be performed when it occupies more than 20% of the WQCV. This time frame will vary, but should be expected to be done every 2 to 5 years as needed per inspection.
- Forebay and micro-pool will require sediment removal every 1 to 2 years.
- A baseline survey should be performed at the time of construction and comparison surveys conducted every 2 years after.

Inspection Items

- Inspections should evaluate the berm, spillway condition, depth of sediment behind the berm and condition of the downstream face of the pond. A site survey will be the best indication of excessive sediment buildup and degradation of the spillway.
- An inspection of the vegetation on the berm and the downstream face of the spillway should be performed. Bare areas should be noted and repaired using native grasses. Any sloughing or erosion of the embankment should also be noted and repaired.
- Items to record include erosion of the downstream face, excessive buildup of sediment in all areas of the pond (micro-pool, fore bay, etc), and the mowing frequency of the vegetation on the facility.

Inspection Personnel

A qualified engineer and/or surveyor should conduct inspections of the facility.

Operations

No specific operating instructions are required.

Maintenance

Mowing

Mowing shall occur to limit unwanted vegetation. Maintain irrigated turf grass as 2 to 4 inches tall and non irrigated native turf grasses at 4 to 8 inches.

Debris and Litter Removal

Remove debris and litter from the entire pond to minimize outlet clogging and improve aesthetics.

Landscaping Removal and Replacement (PLD)

Not Applicable

Structural

Repair pond inlets, outlets, fore bays, low flow channel liners and energy dissipaters whenever damage is discovered.

Nuisance Control

Address odor, insects and overgrowth issues associated with stagnant or standing water in the bottom zone.

Erosion and Sediment Removal

Repair and revegetate eroded areas in the basin and channels. Remove accumulated sediment from the fore bay, micro-pool and the bottom of the basin.

An Operation and Maintenance Log follows.

Operation & Maintenance Log

Bent Grass Residential F2

OPERATION AND MAINTENANCE LOG

(Record inspections, items found maintenance and corrective actions taken. Also record any training received by Contractor personnel with regard to erosion control, materials handling and any inspections by outside agencies)

DATE	ITEM	SIGNATURE OF PERSON MAKING ENTRY