FINAL DRAINAGE REPORT

FALCON MEADOWS AT BENT GRASS
FILING NO. 4

GALLOWAY RESPONSE

El Paso County, Colorado

PCD-ENGINEERING REVIEW COMMENTS IN BLUE BOXES WITH BLUE TEXT

PREPARED FOR:
Challenger Communities
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:
July 01, 2022

Engineering Review
08/19/2022 2:53:24 PM
dsdrice
JeffRice@elpasoco.com
(719) 520-7877
EPC Planning & Community Development Department

PCD Filing No.: SF22XX

REVISED AS REQUESTED

023

ENGINEER'S STATEMENT

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____ _____

Grant Dennis, PE 51622 Date
For and on behalf of Galloway & Company, Inc.

DEVELOPER'S CERTIFICATION

I, The developer, have read and will comply with all of the requirements specified in this drainage report and plan.

By:_____ _____

Date

Address: Challenger Communities, LLC
8605 Explorer Dr., Suite 250
Colorado Springs, CO 80920

EL PASO COUNTY CERTIFICATION

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

_____ _____

Joshua Palmer, P.E. Date
Interim County Engineer/ECM Administrator

Conditions:

Delete "Interim"

REVISED AS REQUESTED

TABLE OF CONTENTS

Appendices:

A. Exhibits and Figures
B. Hydrologic Computations
C. Hydraulic Computations
D. Pond Analysis
E. Drainage Maps

ADDED THE PROVIDED SENTENCE UNDER "II. GENERAL DESCRIPTION"

State that channel construction and the LOMR need to be completed prior to recording the FIling 4 plat.

I. Purpose

The intent of the developer is to develop the residential portion of the Bent Grass Subdivision. The purpose of this Final Drainage Report is to identify on and offsite drainage patterns, locate and identify tributary or downstream drainage features and facilities that impact the site, and to identify which types of drainage facilities will be needed and where they will be located. This report will remain in compliance with the MDDP for the site, prepared by Galloway & Company, September 2021.

II. General Description

The Falcon Meadows at Bent Grass Filing No. 4 is approximately 10.42 acres within the Bent Grass development. It is located along the northern boundary line of the overall Bent Grass development and is bisected by the existing West Tributary of the Falcon Basin. The project is a single-family residential development of 39 lots, located in the Falcon area of El Paso County, Colorado. The site is located in the Northwest ¼ and Southwest ¼ of Section 1, Township 13S, Range 65W, of the Sixth Principal Meridian, County of El Paso, State of Colorado. The subject property is located on either side of the existing West Tributary of the Falcon Basin with the majority of the site located to the north of Bent Grass Meadows Drive, sandwiched between Bent Grass Residential Filing No. 2 (to the east) and Falcon Meadows at Bent Grass Filing Nos. 1 through 3 (to the west). 11 lots are located to the south of Bent Grass Meadows Drive and are situated to the west of the existing West Tributary of the Falcon Basin immediately adjacent to Falcon Meadows at Bent Grass Filing No. 1. A Vicinity Map is included in Appendix A.

A Planned Unit Development Plan Amendment was approved for the site, PUD-14-002 in July 2014. An additional Amendment to this PUD has also been approved (PUD-SP-205). The overall Bent Grass site consisted of approximately 103.4 acres and included 309 dwelling units.

The existing soil types within the proposed site as determined by the NRCS Web Soil Survey for El Paso County Area consist of Columbine gravelly sandy loam and Blakeland loamy sand. All soils are defined as having a hydrologic soil group of A. See the soils map included in Appendix A.

III. Previous Reports

The proposed site has been included in multiple drainage studies in the past. The following is a composite list of the existing reports pertaining to this site analysis.

1. *Falcon Drainage Basin Planning Study*, by Matrix Design Group, September 2015.
2. *Master Development Drainage Plan – Bent Grass Residential Subdivision*, by Galloway & Company, September 2021.
3. *Master Development Drainage Plan and Preliminary Drainage Plan – Bent Grass Subdivision*, by Kiowa Engineering Corporation, December 2006.
4. *Final Drainage Report for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2014.
5. *Final Drainage Report Addendum for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2015.
6. *Master Development Drainage Plan for The Ranch*, by Classic Consulting Engineers & Surveyors, LLC, November 2018.
7. *Falcon Highlands Master Development Drainage Plan & Preliminary Drainage Report & Final Drainage Report for Filing 1*, by URS, January 2005.

8. *Final Drainage Report and Erosion Control Plan – Latigo Business Center Filing No. 1 A Re-subdivision of a Portion of Latigo Business and Research Center Filing No. 1*, by Kiowa Engineering Corporation, November 2004.
9. *Final Drainage Letter Report for Lot 1, Latigo Business Center Filing No. 1*, by Colorado Design Concepts, April 2005.
10. *Final Drainage and Erosion Control for The Meadows Filing Three Subdivision,* by LADD Engineering, July 2000.
11. *Final Drainage Report Bent Grass Residential Subdivision, Filing No. 2,* Galloway & Company, March 2020.
12. *Preliminary Drainage Report Falcon Meadows at Bent Grass,* by Galloway & Company, February 2021.
13. *Final Drainage Report for Falcon Meadows at Bent Grass Filing No. 1,* by Galloway & Company, September 2021.
14. *Final Drainage Report for Falcon Meadows at Bent Grass Filing No. 2,* by Galloway & Company, April, 2022.
15. *Final Drainage Report for Falcon Meadows at Bent Grass Filing No. 3,* by Galloway & Company, June, 2022. Update if necessary

IV. Drainage Criteria

UPDATED TO AUGUST

Hydrology calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014 and the El Paso County Engineering Criteria Manual (ECM) as revised in July 2019.

The drainage calculations were based on the criteria manual Figure 6-5 and IDF equations to determine the intensity and are listed in Table 1 below.

Table 1 - Precipitation Data

Return Period	One Hour Depth (in).	Intensity (in/hr)
5-year	1.50	5.17
100-year	2.52	8.68

The rational method was used to calculate peak flows as the tributary areas are less than 100 acres. The rational method has been proven to be accurate for basins of this size and is based on the following formula:

Q = CIA

Where:

Q = Peak Discharge (cfs)
C = Runoff Coefficient
I = Runoff intensity (inches/hour)
A = Drainage area (acres)

The runoff coefficients are calculated based on land use, percent imperviousness, and design storm for each basin, as shown in the drainage criteria manual (Table 6-6). Composite percent impervious and C

values were calculated using the residential, streets, roofs, and lawns coefficients found in Table 6-6 of the manual.

The 100-year event was used as the major storm event for pipes and inlets. The 5-year event was used as the minor event.

The UD-Detention spreadsheet was utilized for to check the existing the water quality ponds still function with the revised tributary areas and impervious values. This spreadsheet was also utilized for the original design of the on-site water quality ponds, Pond (North) and Pond (South).

UD-Inlet was utilized to calculate both the street capacities and the inlet capacities.

StormCAD was utilized to size the storm sewer systems.

V. Historic Drainage Conditions

The site is contained fully within the Falcon Drainage Basin, more specifically the West Falcon Tributary. The site generally drains from north to south with an average slope of 2%. The rational method was used to analyze the individual basins within the site as the proposed drainage basins are less than 100 acres. The project site was studied in the Falcon Basin Drainage Basin Planning Study (DBPS) and in the Master Development and Drainage Plan (MDDP) for Bent Grass.

Per the Falcon DBPS by Matrix, the site lies within the basins, WT200, WT210, and WT220. These basins connect to channel reaches RWT202, RWT204, and RWT210. Both the RWT204 and RWT210 sections of channel currently exist and appear as a drainageway when visiting the site. Reach RWT202 appears to be a shallow overland flow through the project site. It is nearly unrecognizable through the site from a visual standpoint.

A historic basin map has been prepared for this site to analyze the historic basins as well as the offsite basins contributing to the site. Historic basins have been discussed in the Bent Grass Residential Filing No. 2 Final Drainage Report, El Paso County Project # SF-19-014. Copies of the hydrology calculations have been included in Appendix B and a copy of the historic map is included in Appendix E. Efforts have been made to comply with the recommendations set forth in the approved DBPS and MDDP.

VI. Existing Drainage Conditions

With respect to the existing/current conditions, developed conditions maps from previous studies are being utilized as these portions of the overall development have been constructed prior to Falcon Meadows at Bent Grass Filing No. 4 and will be the existing condition as Filing No. 4 begins construction. Under this scenario, it is assumed that Bent Grass Residential Filing No. 2 and Falcon Meadows at Bent Grass Filing No. 1 and Filing No. 2 are developed. This should be very similar to the proposed conditions from the Falcon Meadows at Bent Grass Filing No. 2 Final Drainage Report. The Falcon Meadows at Bent Grass Filing No. 3 proposed drainage maps are included in Appendix E and the basins are described below.

Below is a description of the basins which were developed as part of Falcon Meadows at Bent Grass Filing No. 3 & Bent Grass Residential Filing No. 2:

REVISED TO FILING NO. 3

and Filing No. 3

ADDED AN EXISTING CONDITIONS PLAN

Existing conditions plan not found

Basin EX-1 (1.19 AC, Q_5 = 0.4 cfs, Q_{100} = 2.5 cfs): is associated with the northwestern portion of the Bent Grass Residential Filing No. 2 site east of the existing channel (now the northeast portion of Falcon Meadows at Bent Grass Filing No. 4). The basin is currently undeveloped. Runoff from the basin generally flows to the southwest, into Basins EX-2 and B-1**.**

Basin EX-2 (1.60 AC, Q_5 = 0.5 cfs, Q_{100} = 3.8 cfs): is along the western boundary portion of the Bent Grass Residential Filing No. 2 site and is south of Basin EX-1, east of the existing channel (now the eastern portion of Falcon Meadows at Bent Grass Filing No. 4). The basin is currently undeveloped and receives flows from Basins OS-4 & OS-5. Runoff from the basin generally flows to the southeast into Basin EX-3 at **DP 5** combined with flows from **DP 1, & 2**.

Basin EX-3 (0.66 AC, Q_5 = 0.2 cfs, Q_{100} = 1.6 cfs): is along the western boundary portion of the Bent Grass Residential Filing No. 2 site south of Basin EX-2 and east of the existing channel (now southeast portion of Falcon Meadows at Bent Grass Filing No. 4). The basin currently contains an existing WQCV pond created as part of Bent Grass Residential Filing No. 2 (North Pond). This basin receives flows from **DP 5** and **DP 3**.

Basin C-1e (0.49 AC, Q5 = 2.3 cfs, Q100 = 4.1 cfs): a basin that will include the east half of Henzlee Place. Runoff will flow from the R.O.W. into the existing mountable curb and gutter where it will be conveyed to **DP 12.** Flows will then enter an existing 15' at grade CDOT Type R inlet, part of Storm System B, where it will be piped to the existing north WQCV pond at **DP 13**. Bypass flows from the inlet at **DP 12** will travel to the south, then east in Bent Grass Meadows Drive to **DP 8**, an existing 20' CDOT sump Type R inlet, which releases into the existing WQCV pond in Bent Grass Residential Filing No. 2.

Basin C-5 (0.60 AC, Q5 = 0.3 cfs, Q100 = 1.9 cfs): Is a basin which will encompass the existing north WQCV pond area. The stormwater within the existing north WQCV pond will be released at a controlled rate, via an outlet structure with orifice holes, into the existing channel RWT204.

Basin B-1 (6.59 AC, Q5 = 1.8 cfs, Q100 = 11.8 cfs): a basin that is along the north boundary of the site and through the center of the site, encompassing the existing rerouted channel RWT202 and channel RWT204. Flows will continue south in the existing channel where they will then be conveyed through the existing twin 16' x 6' RCBC's to **DP AA**.

Basin D-4c (1.21 AC, Q5 = 2.4 cfs, Q100 = 5.0 cfs): a basin that is east of Henzlee Place and south of Bent Grass Meadows Drive. It encompasses single-family residential lots, & portions of Nico Way, Jayla Trail, and Henzlee Place. Runoff will flow from each lot onto the existing public R.O.W. where existing mountable curb and gutter will convey flows to **DP 17c**, the north side of **DP 17**. Flows at **DP 17** (combined flows from **DP 17b** & **DP 17c** with bypass from **DP 18**) will then enter an existing sump CDOT Type R inlet, part of Storm System A, where it will then be piped and ultimately outfall in the existing south WQCV pond at **DP 31**. Overflow from this inlet would be to overtop the curb and then continue via an existing swale, following the same path as the existing pipe, to the east until flows are released into the existing south water quality pond.

Basin D-7 (7.65 AC, Q5 = 4.3 cfs, Q100 = 18.2 cfs): a basin that is in the south end of the site, east of Bent Grass Meadows Drive & west of the existing channel. It encompasses the back half of several single-family residential lots as well as the existing south WQCV pond and an existing drainage ditch (Swale F). Runoff will flow, via sheet flow, until it enters the existing swale and is conveyed to the existing south WQCV pond or will directly flow into the existing south WQCV pond at **DP 30**.

Basin D-8 (1.69 AC, Q5 = 2.6 cfs, Q100 = 6.0 cfs): a basin that is west of the existing channel & south of Bent Grass Meadows Drive. It encompasses the back half of single-family residential lots. Runoff will flow

from each lot and discharge into an existing drainage swale (Swale C). The swale will convey flows to the south, ultimately discharging into the existing south WQCV pond at **DP 32**.

Basin OS-4 (4.46 AC, Q5 = 5.6 cfs, Q100 = 14.0 cfs) is associated with The Bent Grass Residential Filing No. 2, lots 152-160, lots 163-168, Tract D, and portions of Thedford Court & Willmore Drive. Runoff from this basin flows via curb & gutter south on Thedford Court then continues flowing west along the northern curb & gutter along Willmore Drive before discharging into Basin EX-2 at **DP 1**. This basin remains unchanged.

Basin OS-5 (0.46 AC, Q5 = 1.1 cfs, Q100 = 2.3 cfs): is associated with The Bent Grass Residential Filing No. 2, lots 161 & 162 along with a portion of Silky Thread Road. Runoff from this basin generally flows to the west via curb & gutter along Silky Thread Road before discharging into Basin EX-2 at **DP 2**. This basin remains unchanged.

Basin OS-6 (1.17 AC, Q5 = 2.0 cfs, Q100 = 4.3 cfs): is associated with The Bent Grass Residential Filing No. 2, the northern halves of Lots 170-178 and a portion of the southern side of Willmore Drive. Runoff from this basin generally flows to the west via curb & gutter along Willmore Drive before discharging into Basin EX-2 at **DP 3**. This basin remains unchanged.

Basin RWT204 (38.4 AC, Q5 = 7 cfs, Q100 = 43 cfs) represents one of the larger offsite basins to the north of the proposed project. This area was studied as part of the Falcon Basin DBPS prepared by Matrix and were also part of the Bent Grass MDDP, approved September 21, 2021. There have been no changes to this basin as it is offsite and existing.

Design Point AA is the location in channel reach RWT204, where flows cross Bent Grass Meadows Drive within the existing twin 16’ x 6’ RCBC. The minor flows are 335.9 cfs and the major flows are 1450 cfs.

Design Point CC is the location in channel reach RWT210, where flows exit the Falcon Meadows development, including the offsite flows from RWT202, RWT204 and WT200. The minor flows are 335.9 cfs and the major flows are 1450 cfs.

VII. Four Step Process

The Four Step Process is used to minimize the adverse impacts of urbanization and is a vital component of developing a balanced, sustainable project. Below identifies the approach to the four-step process:

1. Employ Runoff Reduction Practices

The proposed development uses Low Impact Development (LID) practices to reduce runoff at the source. Rather than creating point discharges that are directly connected to impervious areas, runoff is routed through pervious areas to promote infiltration and minimize directly connected impervious areas (MDCIA). Grass buffers and swales are used where practical.

2. Stabilize Drainageways

This step implements stabilization to channels to accommodate developed flows while protecting infrastructure and controlling sediment loading from erosion in the drainageways. Erosion protection in the form of riprap pads at all outfall points to the channel to prevent scouring of the channel from point discharges. A HEC-RAS model was created and used to evaluate the stability of the existing

update

REVISED AS REQUESTED. SEE SECTION XI FOR MORE DISCUSSION.

channels. The HEC-RAS results are included in previous reports. It was determine channel is stable in its current state and the proposed velocities and Froude numbe those in the existing channel, no improvements will be made to the channel with this filing. This will be further discussed later in this report, see Section XI Channels and Swales.

3. Provide Water Quality Capture Volume (WQCV)

This step utilizes formalized water quality capture volume to slow the release of runoff from the site. The WQCV will release in no less than 40 hours. On-site water quality control volume detention ponds will provide water quality treatment prior to the runoff being released into the channel.

4. Consider Need for Industrial and Commercial BMPs

Industrial and Commercial BMP's are not applicable to this proposed site. Source control BMPs for homeowners include the use of garages as the primary area where pollutants can be stored. The single-family detached homes provide garages which can act as storage areas. The proposed development does not include outdoor storage or the potential for introduction of contaminants to the Counties' MS4, thus no targeted source control BMPs are necessary. The biggest source control BMP is public education which can be found on the El Paso County website and discuss topics such as: pet waste, car washing, lawn care, fall leaves, and snow melt and deicer.

VIII. Proposed Drainage Conditions

REVISED THIS SECTION TO SUMMARIZE THE PROPOSED DRAINAGE CONDITION

There are two existing WQCV water quality treatment for the site prior to discharging the runoff directly i WT204/RWT210. One of these WQCV ponds was designed with Falc outh) and the other with Falcon Meadows Filing No. 2 (Pond North).

clarify - overall FMBG site?

As mentioned previously, the site is proposed to be single family residential. The site is designed to provide a large lot buffer between the existing large lots to the north and west of the site and the proposed site. Beyond this buffer the majority of the site is much smaller lots, approximately 1/8 acre lots.

The following basins are offsite basins that impact the Filing 4 site.

Basin OS-4 (4.46 AC, Q5 = 7.7 cfs, Q100 = 16.1 cfs) is associated with Bent Grass Residential Filing No. 2. Runoff from this basin sheet flows to the frontage of the residential lots to Thedford Court and then flows, via existing curb and gutter, to Willmore Drive at **DP 1**. Runoff continues to route to the south to proposed Lemon Grass Road (Flg No. 4), which will direct runoff to a proposed 15' at-grade CDOT Type R inlet at **DP 4**. Runoff is conveyed downstream via proposed 24" RCP to Design Point 5 where flows are combined with runoff generated in sub-basin A-3. Bypass flows are routed via curb & gutter to an existing 20' CDOT Type R sump inlet at DP 8. Emergency overflows will overtop the curb & gutter and be directed to Existing Pond 1.

Basin OS-5 (0.46 AC, Q5 = 1.2 cfs, Q100 = 2.5 cfs) is associated with Bent Grass Residential Filing No. 2. Runoff from this basin sheet flows to the frontage of the residential lots to Willmore Drive and then flows, via existing curb and gutter, to proposed Lemon Grass Road at **DP 2**. Runoff continues to route to the south within proposed Lemon Grass Road (Flg No. 4), which will direct runoff to a proposed 15' at-grade CDOT Type R inlet at **DP 4**. Runoff is conveyed downstream via proposed 24" RCP to Design Point 5 where flows are combined with runoff generated in sub-basin A-3. Bypass flows are routed via curb & gutter to an existing 20' CDOT Type R sump inlet at DP 8. Emergency overflows will overtop the curb & gutter and be directed to Existing Pond 1.

Basin OS-6 (1.17 AC, Q5 = 2.2 cfs, Q100 = 4.6 cfs) is associated with Bent Grass Residential Filing No. 2. Runoff from this basin sheet flows to the frontage of the residential lots to Silky Thread Road and then flows, via existing curb and gutter, to proposed Lemon Grass Road at **DP 3**. Runoff continues to route to the south within proposed Lemon Grass Road (Flg No. 4), which will direct runoff to a proposed 15' at-grade CDOT Type R inlet at **DP 4**. Runoff is conveyed downstream via proposed 24" RCP to Design Point 5 where flows are combined with runoff generated in sub-basin A-3. Bypass flows are routed via curb & gutter to an existing 20' CDOT Type R sump inlet at DP 8. Emergency overflows will overtop the curb & gutter and be directed to Existing Pond 1.

Below is a description of the basins that encompass Falcon Meadows at Bent Grass Filing No. 4.

Basin A-1 (2.19 AC, Q5 = 4.4 cfs, Q100 = 9.1 cfs): a basin that includes residential lots and the east half of Lemon Grass Road. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to a proposed 15' at-grade CDOT Type R inlet at **DP 4.** Runoff is conveyed downstream via proposed 24" RCP to Design Point 5 where flows are combined with runoff generated in sub-basin A-3. Bypass flows are routed via curb & gutter to an existing 20' CDOT Type R sump inlet at DP 8. Emergency overflows will overtop the curb & gutter and be directed to Existing Pond 1.

Basin A-2 (0.71 AC, Q5 = 1.8 cfs, Q100 = 3.8 cfs): a basin that includes the rear portion of residential lots along proposed Lemon Grass Road. Runoff from this basin will sheet flow directly to the West Tributary channel RWT204/RWT210. All roof drains (for lots 13-21) within this sub-basin will be directed toward Lemon Grass Road, no impervious surfaces will be allowed within the rear lot setbacks and runoff reduction will be implemented within this sub-basin.

describe riprap to be removed and revegetation of rear lots

Basin A-3 (1.08 AC, Q5 = 2.2 cfs, Q100 = 4.5 cfs): a basin that includes residential lots and the west half of Lemon Grass Road. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to a proposed 15' at-grade CDOT Type R inlet at **DP 5.** Runoff is conveyed downstream via proposed 24" RCP to Design Point 6 where flows are combined within Existing Pond 1. Bypass flows are routed via curb & gutter to an existing 20' CDOT Type R sump inlet at DP 8. Emergency overflows will overtop the curb & gutter and be directed to Existing Pond 1.

ADDED A DESCRIPTION TO REMOVE RIPRAP LINED SWALE

Basin A-4 (0.81 AC, Q5 = 0.0 cfs, Q100 = 0.9 cfs): a basin that includes undeveloped land and Existing Pond 1. Runoff will sheet flow directly to Existing Pond 1 at **DP 6**. This basin receives flows from **DP 5** and **DP 8**.

Basin B-1 (4.32 AC, Q5 = 0.1 cfs, Q100 = 2.8 cfs): a basin that is along the north boundary of the site and through the center of the site, encompassing the existing rerouted channel RWT202 and channel RWT204. This basin has been reduced in size from the existing condition with the development of areas immediately adjacent to the channel. Flows will continue south in the existing channel where they will then be conveyed through the existing twin 16' x 6' RCBC's to **DP AA**.

Basin C-1e (0.49 AC, Q5 = 2.3 cfs, Q100 = 4.1 cfs): a basin that includes the east half of Henzlee Place. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to an existing 15' CDOT Type R sump inlet at **DP 12.** Runoff is conveyed downstream via existing 42" RCP to Design Point 13 where flows are combined within Existing Pond

North. Emergency overflows will overtop the curb & gutter and be directed to Existing Pond North. This basin remains unchanged from the existing condition.

C-1g?

Basin C-2 (0.87 AC, Q5 = 2.1 cfs, Q100 = 4.3 cfs): a basin th… ich drain to the east half of Henzlee Place. Runoff will flow from each lot onto … where proposed mountable curb and gutter will convey flows to an ex… p inlet at **DP 12.** Runoff is conveyed downstream via existing 42" RCP to D… are combined within Existing Pond North. Emergency overflows will overtop the curb & gutter and be directed to Existing Pond North

REMOVED BASIN C-2 AND C-6, REPLACED WITH BASINS C-1G AND C-1H

REMOVED BASIN C-2 AND C-6, REPLACED WITH BASINS C-1G AND C-1H

ADDED MAINTENANCE RESPONSIBIILITY FOR SWALE A

Basin C-5 (0.51 AC… s): a basin th… rth. Runoff will sheet flo… orth at **DP 13**. This basin receives flows from **DP 12** and **DP 19**.

C-1h?

State district maintenance of Swale A

Basin C-6 (1.12 AC, Q5 = 1.7 cfs, Q100 = 4.0 cfs): basin that includes the rear portion of residential lots along existing Henzlee Place. Runoff from this basin will sheet flow to the rear property line and be captured by proposed Swale A. Runoff is routed to a proposed CDOT Type C inlet at **DP 19**. Flows are directed to Existing Pond North via proposed 18" RCP to Design Point 13.

DP 17?

YES, REVISED ACCORDINGLY

Basin D-4c (3.00 AC, Q5 = 5.4 cfs, Q100 = 11.2 cfs): a basin that inclu… ots and the east half of Jayla Trail. Runoff will flow from each lot onto the proposed pub… existing mountable curb and gutter will convey flows to an existing 15' CDOT T… at **DP 17c.** Runoff is conveyed downstream via existing 24" RCP to Design Point 17 where flows are combined with runoff generated from DP 17b and DP 18. Emergency overflows will overtop the curb & gutter and be directed to Existing Pond South via the existing maintenance access road.

add other roads included

show these DPs on the plan

ADDED JAYLA TRAIL AND HENZLEE PLACE

Basin D-7 (0.91 AC, Q5 = 1.7 cfs, Q100 = 10.0 cfs): a basin that includes the rear portion of residential … and Jayla Trail, respectively. The po… proposed design …at Bent Grass Filing No. 4 will sheet fl… en onward directly to Existing Pond South.

ADDED DP'S TO PROPOSED DRAINAGE MAPS

Basin D-8 (1.46 AC, Q5 = 0.6 cfs, Q100 = 2.3 cfs): a basin that includes the rear portion of residential lots along Jayla Trail. Runoff will sheet flow towards the rear property line to proposed Swale C, where runoff … Existing Pond South at **DP 32**.

ADDED JAYLA TRAIL AND HENZLEE PLACE

State district maintenance of Swale C

… is the location in channel reach RWT204, where flows are conveyed under Bent Grass Meadows Drive within an existing twin 16' x 6' … fs and the major flows are 1450 cfs. The MDDP Amendment, from the … 1.8 cfs and 1075.3 cfs for the 5- and 100-year flows under proposed/future conditions analysis. The FEMA FIS report has a total flow of 1400 cfs in channel reach RWT210. Falcon Meadows at Bent Grass Filing No. 4 will not increase these flows.

ADDED MAINTENANCE RESPONSIBIILITY FOR SWALE C

Address the bypass flows from DP4 and 5 and capacity of Bent Grass Meadows Drive with the total combined flows in BGM Drive to DP 8

IX. Storm Sewer System

All development is anticipated to be urban and will include storm sewer & street inlets. Storm sewers collect storm water runoff and convey the water to … charging. Storm sewer systems will be designed to the 100-… orm. Inlets will be placed at sump areas and intersections wh… . The

ADDED "DESIGN POINT 8" TO ADDRESS CAPACITY OF EXISTING STORM INLET ALONG BENT GRASS MEADOWS DRIVE

UDFCD Inlet spreadsheet will be used to determine the size of all at-grade and sump inlets. There will be a minimum of 1 proposed storm system and three existing systems within the site.

REVISED TO "IS"

The proposed storm system (Storm System A), collects flows northeast of Bent Grass Meadows Drive, over to Existing Pond 1 just west from Lemon Grass Road. These flows are routed directly to Existing Pond 1, constructed as part of Bent Grass Residential Filing No. 2. The design of the proposed system has been included in the appendix. Flows not intercepted from this area, reach the existing sump inlet at DP 8, which releases into the existing WQCV pond in Bent Grass Residential Filing No. 2. All design calculations (StormCAD, inlet design & street capacity spreadsheets, etc.) have been included in Appendix C for this system.

The inlets located within Bent Grass Meadows Drive (DP-8), Henzlee Place (DP-12), and Jayla Trail (DP-17) were all designed under the FDRs for Bent Grass Residential Filing No. 2, Falcon Meadows at Bent Grass Filing No. 3, and Falcon Meadows at Bent Grass Filing No. 2, respectively. The inlets were "rechecked" based on updated flows reaching each of these design points. The analysis of these inlets is included in Appendix C. Analysis of the existing inlets, have also been included in Appendix C, to ensure inlets still perform adequately.

The proposed inlets located within Lemon Grass Drive (DP-4 & DP-5) are each 15' at-grade CDOT Type R inlets designed to intercept as much runoff as is possible with bypass flows being routed downstream via curb & gutter to an existing 20' CDOT Type R sump inlet at DP 8. The analysis of these inlets is included in Appendix C.

and proposed inlets at DP 4 and DP 5

X. Proposed Water Quality Detention Ponds

REVISED AS REQUESTED

There are 3 facilities which provide water quality for this site. One facility was constructed as part of the Bent Grass Residential Filing No. 2 project and is located north of Bent Grass Meadows Drive (*Existing Pond 1*). An existing inlet at DP 8 releases collected runoff into this facility. The second WQCV (*Existing Pond South*) was constructed as part of the Falcon Meadows at Bent Filing No. 1 project and is situated north of the southern property line and west of the existing channel. Design Points 30, 31 and 32 are the releasing into this facility. The final WQCV facility (*Existing Pond North*) was constructed

REVISED TO WEST

Meadows at Bent Grass Filing No. 2 and is located north of Bent Grass Meadows Drive and east of the existing facility built with Bent Grass Residential Filing No. 2. Ultimate release points into this facility are DP 19 and 12. An analysis of the existing pond facilities (*Existing Pond 1, Existing Pond South, and Existing Pond North)* is included in Appendix D to ensure they function adequately with minor revisions made to hydrology routing with this filing.

Show on plan

All three facilities release treated waters to the exiting c Grass Meadows Drive) or RWT210 (south of Bent Grass Meadows Driv

DP 12 & 19 PROVIDED ON THE PROPOSED DRAINAGE MAPS

There is s not provide on-site water quality, as stated previously. Basins B-1 and A-2 (combine) represents the area of the West Tributary Channel (RWT204/RWT210) for the Falco es the project site. Basin B-1 is undeveloped, will remain undeveloped, and release onto undeveloped land (continuation of channel reach RWT210). This project is not a stream stabilization site as a standalone project has been designated for this (CDR 21-014). This area is not to be detained in a PBMP per section I.7.1.B.7 (Land disturbance to undeveloped land that will remain undeveloped). Therefore, it does not "count" towards the 1 acre of area being able to be released untreated from the site.

CORRECTED THIS PARAGRAPH

Clarify this paragraph to more accurately describe the exclusions shown on the map on pdf pg 109. Basin A-2 does not county towards the exclusion !.7.1.B.7 as this paragraph states. Basin A-2 utilizes WQ exclusion I.7.1.C.1.

The measures discussed in this paragraph are unnecessary since Basin A-2 is excluded from needing WQ treatment. So you can delete/modify this paragraph. The use of runoff reduction must be supported by calcs.

All roof drains (for lots 13-21) within Basin A-2 will be directed toward Lemon Grass Road, surfaces will be allowed within the rear lot setbacks and runoff reduction will be implement sub-basin.

CORRECTED THIS PARAGRAPH

Total non-excluded area which will not be treated via on-site facilities is less than 1.0 acre, as required.

XI. Channel and Swales

Swales

Swale A and Swale C were designed for this CORRECTED he Falcon Meadows at Bent Grass development. Analysis has been provided in Appendix C of this report.

Channel

floodplain is on rear lot lines

REVISED AND COMBINED THIS SENTENCE WITH THE STATEMENT ABOVE

With the proposed development of Falcon Meadows at Bent Grass Filing N ent (50' undisturbed buffer from FEMA floodplain) into the existing channel rea Current channel design and report are being prepared and will be submitte ew under a separate cover.

The wording of this paragraph is a little contradictory to the previous statements about Basin A-2 because Basin A-2 is excluded it wouldn't fall under the "non-excluded area" discussed in this sentence. So clarify/remove this sentence.

XII. Maintenance

The channel is to be a private facility, which will be maintained by the Bent Grass Metropolitan District. After completion of construction and upon the Board of County Commissioners acceptance, all public drainage facilities within easements and public Right-of-Way will be owned and maintained by El Paso County. No channel improvements are proposed with this Filing, as improvements are being provided under a separate cover. Channel improvements and maintenance hannel design report.

REVISED AS REQUESTED

Clarify that channel construction is required prior to approval and recording this plat

XIII. Wetlands Mitigation

No wetlands are located on site.

XIV. Floodplain Statement

Delete?

DELETED ENTIRE PARAGRAPH AS IT WAS NOT APPLICABLE TO THIS PROJECT

A portion of the project site lies within Zone AE Special Flood Hazard Area as d number 08041C0553G effective December 7, 2018. A copy of the FIRM Pane

The portion of channel that has a floodplain designation is only the RWT210 and RWT204 portions of the channel. It is unknown why the western channel, RWT202 is unmapped since it is the larger contributor regarding flow rates. Discussions have occurred with PPRBD and a no rise certificate will be required for the existing channel. Models have been obtained from FEMA which show that the FEMA discharges are higher than the DBPS. Therefore, the culvert crossing at Bent Grass Meadows Parkway was sized per the FEMA flows and not the DBPS. The no rise certification will be provided under a separate report, when channel improvements are addressed with future filings.

XV. Drainage/Bridge Fees and Credits/Reimbursements

The site lies within the Falcon Drainage Basin. The DBPS was approved in 2013 and has drainage and bridge fees associated with the basin.

The project site has a total area of 10.42 acres. The tracts account for a total of 4.05 acres, 39 residential lots are 5.73 acres and 1.04 acres of right-of-way. The following calculations for the imperviousness of this development have been computed as follows:

Average Residential lot size: 5.73 acres / 39 lots = 6,398 sf/lot

Average lot imperviousness = 6,398 sf x 43% = 2,751 sf

Average Residential imperviousness: 2,751/6,398 = 43.0%

ROW area is 100% impervious
Open Space is 0% impervious

Average imperviousness for developed area:
(0.43 x 5.73) + (1.0 x 1.04) + (0 x 4.05) / 10.42 = 0.3363

10.42 acres x 33.63% = 3.5039 Impervious Acres

The following calculations are based on the 2022 Falcon Basin drainage/bridge fees:

Drainage Fees

$34,117 x 3.5039 Imp. Acres = $119,542.56

Bridge Fees

$4,687 x 3.5039 Imp. Acres = $16,422.78

Per discussions with El Paso County the fees will be offset by drainage improvements. The tables below provide a tabular summary of previous fees and offsets for the overall Bent Grass development.

Bent Grass Residential Filing No. 2 - Final Drainage Report
FALCON DRAINAGE BASIN
2019 Original Drainage and Bridge Fees

	Impervious Area (acres)	*	Fee Per Impervious Acre	=	Total Fee	- (	Total Collateral from FAE	+	Remaining Fee Offset from Previous Filings	) =	Remaining Fee Offset	OR	Fee Due at Platting
Drainage Fee	23.45		$ 29,622.00		$ 694,635.90		$ 1,270,481.00		$ -		$ 575,845.10		
Bridge Fee	23.45		$ 4,069.00		$ 95,418.05		$ 480,000.00		$ -		$ 384,581.95		

NOTED Once vetted and credits established

Falcon Meadows at Bent Grass Filing No. 1 - Final Drainage Report
FALCON DRAINAGE BASIN
2021 Original Drainage and Bridge Fees

	Impervious Area (acres)	*	Fee Per Impervious Acre	=	Total Fee	- (	Total Collateral from FAE & Phase 1 Channel	+	Remaining Fee Offset from Previous Filings	) =	Remaining Fee Offset	OR	Fee Due at Platting
Drainage Fee	5.73		$ 31,885.00		$ 182,701.05		$ 194,705.00		$ 575,845.10		$ 587,849.05		
Bridge Fee	5.73		$ 4,380.00		$ 25,097.40		$ -		$ 384,581.95		$ 359,484.55		

NOTE: FALCON MEADOWS AT BENT GRASS FILING NO. 1 INCLUDES COLLATERAL OFFSETS FOR PHASE 1 OF THE FALCON MEADOWS AT BENT GRASS DRAINAGE CHANNEL

Falcon Meadows at Bent Grass Filing No. 2 - Final Drainage Report *FALCON DRAINAGE BASIN* *2021 Original Drainage and Bridge Fees*														
	Impervious Area (acres)	*	Fee Per Impervious Acre	=	Total Fee	- (	Total Collateral from FAE & Phase 2 Channel	+	Remaining Fee Offset from Previous Filings	) =	Remaining Fee Offset	OR	Fee Due at Platting
Drainage Fee	9.6		$ 31,885.00		$ 306,096.00		$ 264,242.50		$ 587,849.05		$ 545,995.55		
Bridge Fee	9.6		$ 4,380.00		$ 42,048.00		$ -		$ 359,484.55		$ 317,436.55		
NOTE: FALCON MEADOWS AT BENT GRASS FILING NO. 1 INCLUDES COLLATERAL OFFSETS FOR PHASE 2 OF THE FALCON MEADOWS AT BENT GRASS DRAINAGE CHANNEL													

Falcon Meadows at Bent Grass Filing No. 3 - Final Drainage Report *FALCON DRAINAGE BASIN* *2022 Original Drainage and Bridge Fees*														
	Impervious Area (acres)	*	Fee Per Impervious Acre	=	Total Fee	- (	Total Collateral from FAE	+	Remaining Fee Offset from Previous Filings	) =	Remaining Fee Offset	OR	Fee Due at Platting
Drainage Fee	6.685		$ 34,117.00		$ 228,072.15		$ -		$ 545,995.55		$ 317,923.41		
Bridge Fee	6.685		$ 4,687.00		$ 31,332.60		$ -		$ 317,436.55		$ 286,103.96		

Below is a cost estimate for the improvements proposed with this filing.

Item	Quantity	Unit	Unit Cost	Cost
Storm Drain Improvements (Public)				
15' CDOT Type R Inlet (Public)	2	EA	$ 9,800.00	$ 19,600.00
CDOT Type C Inlet (Public)	1	EA	$ 5,000.00	$ 5,000.00
18" RCP Storm Drain (Public)	39	LF	$ 60.00	$ 2,340.00
24" RCP Storm Drain (Public)	100	LF	$ 70.00	$ 7,000.00
24" FES (Public)	1	EA	$ 3,000.00	$ 3,000.00
Total				**$ 36,940.00**
Contingency			10%	$ 3,694.00
Grand Total				**$ 40,634.00**

XVI. Conclusion

The Falcon Meadows at Bent Grass Filing No. 4 Subdivision lies within the West Tributary of the Falcon Basin Area Watershed. Detention for the site is provided in three existing WQCV ponds to provide water quality for the entire tributary area. The proposed development will not have any adverse impacts on downstream developments or existing drainageways.

All drainage facilities within this report were size uals. Bent Grass Metropolitan District will own and maintai nal improvements have been constructed. At that ti y owned and maintained and shall be the responsibility of El Paso County. Upon development of future filings within the Bent Grass Residential Subdivision, separate Final Drainage Reports will be required to be submitted and approved by El Paso County.

REMOVED PARAGRAPH AS THERE IS NO DRAINAGE CHANNEL IMPROVEMENTS WITH THIS FILING.

and accepted by EPC

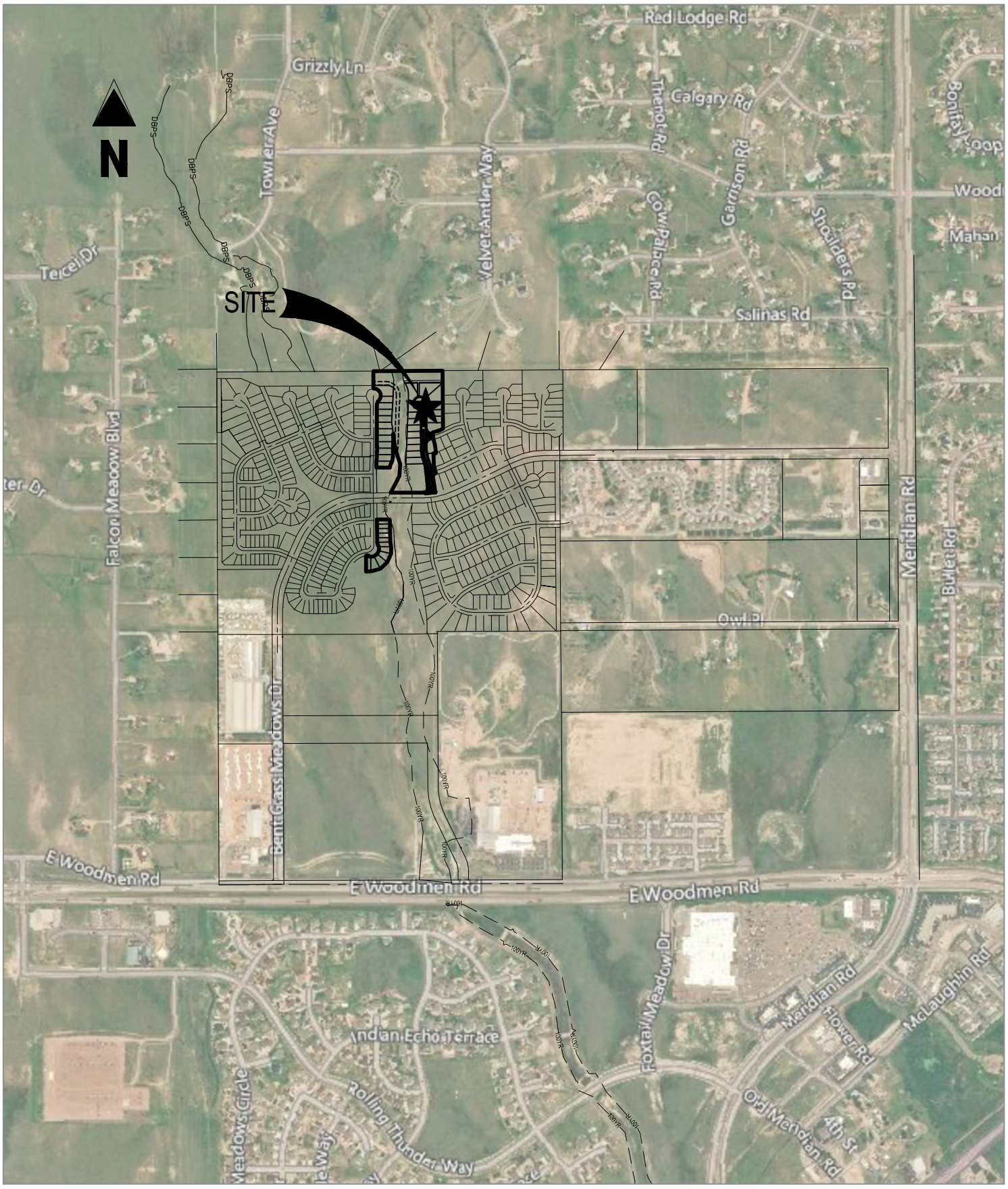
Isn't this the last one?

XVII. References

1. *City of Colorado Springs/County of El Paso Drainage Criteria Manual*, October 1991.
2. *Drainage Criteria Manual, Volume 2*, City of Colorado Springs, November 2002.
3. *Urban Storm Drainage Criteria Manual*, Urban Drainage and Flood Control District, January 2016 (with current revisions).
4. *Falcon Drainage Basin Planning Study*, by Matrix Design Group, September 2015.
5. *Master Development Drainage Plan and Preliminary Drainage Plan – Bent Grass Subdivision*, by Kiowa Engineering Corporation, December 2006.
6. *Final Drainage Report for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2014.
7. *Final Drainage Report Addendum for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2015.
8. *Master Development Drainage Plan for The Ranch*, by Classic Consulting Engineers & Surveyors, LLC, November 2018.
9. *Falcon Highlands Master Development Drainage Plan & Preliminary Drainage Report & Final Drainage Report for Filing 1*, by URS, January 2005.
10. *Final Drainage Report and Erosion Control Plan – Latigo Business Center Filing No. 1 A Re-subdivision of a Portion of Latigo Business and Research Center Filing No. 1*, by Kiowa Engineering Corporation, November 2004.
11. *Final Drainage Report for Bent Grass Residential (Filing No. 2),* by Galloway & Company, May 2020.
12. *Preliminary Drainage Report-Falcon Meadows at Bent Grass,* by Galloway & Company, February 2021.
13. *Final Drainage Report for Falcon Meadows at Bent Grass Filing No. 1,* by Galloway & Company, September 2021.
14. *Final Drainage Report for Falcon Meadows at Bent Grass Filing No. 2,* by Galloway & Company, April, 2022.
15. *Final Drainage Report for Falcon Meadows at Bent Grass Filing No. 3,* by Galloway & Company, under review.

APPENDIX A

Exhibits and Figures



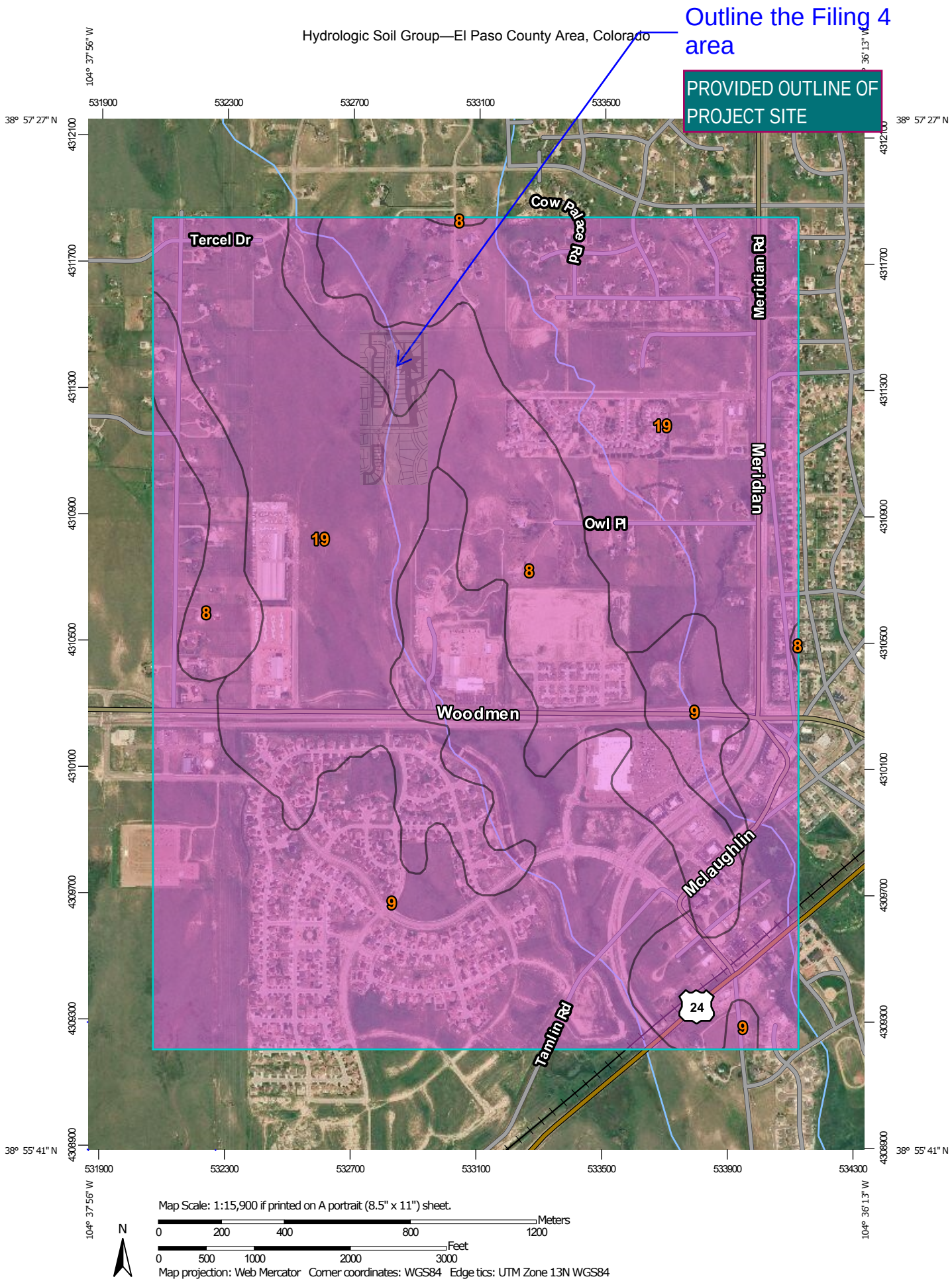
FALCON MEADOWS AT BENT GRASS
FILING NO. 4

BENT GRASS MEADOWS DRIVE
SCALE: 1"=1,000'

VICINITY MAP

Project No:	CLH000021.20
Drawn By:	TJE
Checked By:	CMD
Date:	07/08/2021

Galloway
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220 • GallowayUS.com


Hydrologic Soil Group—El Paso County Area, Colorado
Outline the Filing 4 area
PROVIDED OUTLINE OF PROJECT SITE
104° 37' 56" W
104° 36' 13" W
38° 57' 27" N
38° 55' 41" N
531900
532300
532700
533100
533500
533900
534300
4312100
4311700
4311300
4310900
4310500
4310100
4309700
4309300
4308900
Tercel Dr
Cow Palace Rd
Meridian Rd
Meridian
Owl Pl
Woodmen
Mclaughlin
Tamlin Rd
24
8
19
9
Map Scale: 1:15,900 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 200 400 800 1200
Feet
0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 16, Sep 10, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 7, 2016—Aug 17, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	214.3	16.0%
9	Blakeland-Fluvaquentic Haplaquolls	A	465.8	34.7%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	662.6	49.3%
Totals for Area of Interest			**1,342.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Soil Map—El Paso County Area, Colorado

Map Scale: 1:2,460 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 19, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 11, 2018—Oct 20, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	10.0	63.4%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	5.8	36.6%
Totals for Area of Interest		**15.8**	**100.0%**

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369v
Elevation: 4,600 to 5,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 19, Aug 31, 2021

El Paso County Area, Colorado

19—Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Columbine and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Columbine

Setting

Landform: Flood plains, fan terraces, fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam
C - 14 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit: 1 percent

Landform: Swales
Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 19, Aug 31, 2021

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

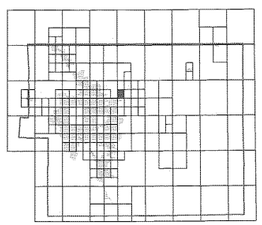
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

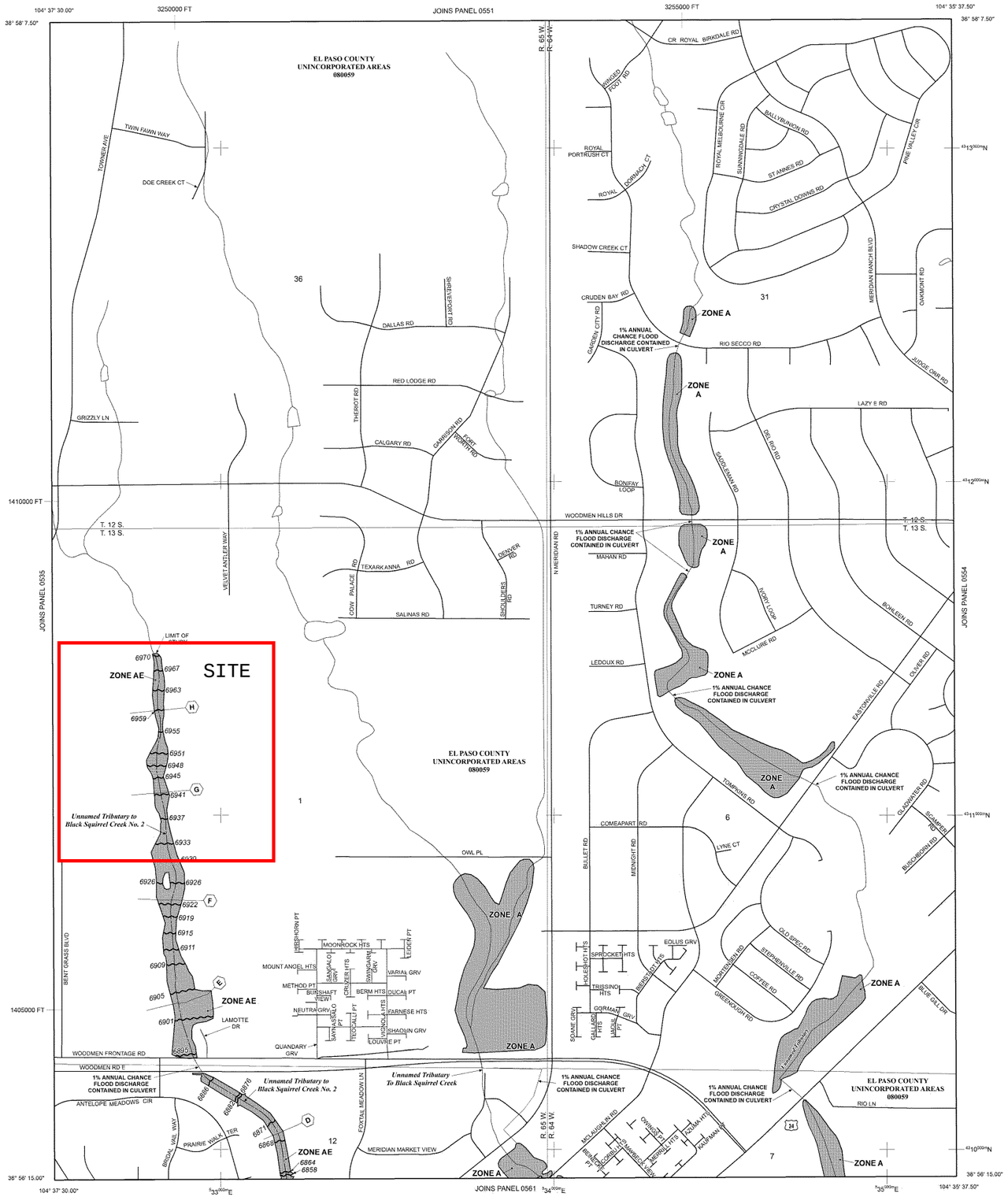
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary

Floodway boundary

Zone D Boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A — Cross section line

23 — 23 — Transect line

97° 07' 30.00" / 32° 22' 30.00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

4275000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 13

6000000 FT — 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection

DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 0553G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 553 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0553	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 08041C0553G

MAP REVISED DECEMBER 7, 2018

Federal Emergency Management Agency

APPENDIX B

Hydrologic Computations

Proposed Computations

COMPOSITE % IMPERVIOUS CALCULATIONS

Subdivision: Falcon Meadows
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass Filing No. 4
Project No.: CLH021
Calculated By: TJE
Checked By: BAS
Date: 6/30/22

Basin ID	Total Area (ac)	Paved Roads			Un-Developed/Lawns			Residential - 1/8 Acre			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
OS-4	4.46	100	0.00	0.0	2	0.00	0.0	65	4.46	65.0	65.0
OS-5	0.46	100	0.00	0.0	2	0.00	0.0	65	0.46	65.0	65.0
OS-6	1.17	100	0.00	0.0	2	0.00	0.0	65	1.17	65.0	65.0
A-1	2.19	100	0.00	0.0	2	0.00	0.0	65	2.19	65.0	65.0
A-2	0.71	100	0.00	0.0	2	0.00	0.0	65	0.71	65.0	65.0
A-3	1.08	100	0.00	0.0	2	0.00	0.0	65	1.08	65.0	65.0
A-4	0.81	100	0.00	0.0	2	0.81	2.0	65	0.00	0.0	2.0
B-1	4.32	100	0.00	0.0	2	4.32	2.0	65	0.00	0.0	2.0
C-1E	0.49	100	0.49	100.0	2	0.00	0.0	65	0.00	0.0	100.0
C-1G	0.87	100	0.00	0.0	2	0.00	0.0	65	0.87	65.0	65.0
C-5	0.51	100	0.00	0.0	2	0.51	2.0	65	0.00	0.0	2.0
C-1H	1.12	100	0.00	0.0	2	0.28	0.5	65	0.84	48.8	49.3
D-4C	3.00	100	0.00	0.0	2	0.00	0.0	65	3.00	65.0	65.0
D-7	8.01	100	0.00	0.0	2	6.58	1.6	65	1.43	11.6	13.2
D-8	1.46	100	0.00	0.0	2	1.05	1.4	65	0.41	18.3	19.7

Galloway

STANDARD FORM SF-2
TIME OF CONCENTRATION

Subdivision: Falcon Meadows
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass Filing No. 4
Project No.: CLH021
Calculated By: TJE
Checked By: BAS
Date: 6/30/22

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					Tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C_{100}	C_5	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH (FT)	Urbanized T_c (MIN)	T_c (MIN)
OS-4	4.46	A	65.0	0.62	0.50	100	2.0	8.7	910	1.2	20.0	2.2	6.9	15.6	1010.0	15.6	15.6
OS-5	0.46	A	65.0	0.62	0.50	15	2.0	3.4	190	1.0	20.0	2.0	1.6	5.0	205.0	11.1	5.0
OS-6	1.17	A	65.0	0.62	0.50	85	0.2	17.3	430	0.9	20.0	1.9	3.8	21.1	515.0	12.9	12.9
A-1	2.19	A	65.0	0.62	0.50	100	4.0	6.9	765	2.5	20.0	3.2	4.0	11.0	865.0	14.8	11.0
A-2	0.71	A	65.0	0.62	0.50	5	2.0	1.9	110	7.0	20.0	5.3	0.3	2.3	115.0	10.6	5.0
A-3	1.08	A	65.0	0.62	0.50	60	2.0	6.8	735	2.5	20.0	3.2	3.9	10.6	795.0	14.4	10.6
A-4	0.81	A	2.0	0.13	0.01	5	2.0	3.5	105	5.7	20.0	4.8	0.4	3.9	110.0	10.6	5.0
B-1	4.32	A	2.0	0.13	0.01	90	6.4	10.2	2000	1.7	15.0	2.0	17.0	27.2	2090.0	21.6	21.6
C-1E	0.49	A	100.0	0.89	0.86	10	2.0	1.1	68	3.4	20.0	3.7	0.3	1.4	78.0	10.4	5.0
C-1G	0.87	A	65.0	0.62	0.50	60	2.0	6.8		2.0	20.0	2.8	0.0	6.8	60.0	10.3	6.8
C-5	0.51	A	2.0	0.13	0.01	5	2.0	3.5		1.0	15.0	1.5	0.0	3.5	5.0	10.0	5.0
C-1H	1.12	A	49.3	0.49	0.35	60	7.5	5.4	595	2.0	20.0	2.8	3.5	8.9	655.0	13.6	8.9
D-4C	3.00	A	65.0	0.62	0.50	70	0.5	11.6	690	1.0	20.0	2.0	5.8	17.3	760.0	14.2	14.2
D-7	8.01	A	13.2	0.21	0.06	200	7.5	13.8	665	1.0	15.0	1.5	7.4	21.2	865.0	14.8	14.8
D-8	1.46	A	19.7	0.26	0.11	125	3.7	13.1	600	1.0	20.0	2.0	5.0	18.1	725.0	14.0	14.0

NOTES:

T_i = (0.395*(1.1 - C_5)*(L)^0.5)/((S)^0.33), S in ft/ft

T_t=L/60V (Velocity From Fig. 501)

Velocity V=Cv*S^0.5, S in ft/ft

Tc Check = 10+L/180

For Urbanized basins a minimum T_c of 5.0 minutes is required.

For non-urbanized basins a minimum T_c of 10.0 minutes is required

Galloway

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass Filing No. 4
Project No.: CLH021
Calculated By: TJE
Checked By: BAS
Date: 6/30/22

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	1	OS-4	4.46	0.50	15.6	2.23	3.46	7.7				7.7									
	2	OS-5	0.46	0.50	5.0	0.23	5.17	1.2				1.2									
	3	OS-6	1.17	0.50	12.9	0.59	3.75	2.2				2.2									
	4	A-1	2.19	0.50	11.0	1.10	3.99	4.4	15.6	4.15	3.46	14.4									Total Runoff of DP 1-3 & Basin A-1
	5	A-3	1.08	0.50	10.6	0.54	4.04	2.2				2.2									Total Runoff of Basin A-3
		A-4	0.81	0.01	5.0	0.01	5.17	0.1													Ex. Pond #1
	8											0.7									Bypass Flows to Ex. CDOT Type R Inlet in BGM Road
		A-2	0.71	0.50	5.0	0.36	5.17	1.9													Sheet Flow Off-Site to Ex. Channel
		B-1	4.32	0.01	21.6	0.04	2.97	0.1													Existing Channel
		C-1G	0.87	0.50	6.8	0.44	4.72	2.1													
	12	C-1E	0.49	0.86	5.0	0.42	5.17	2.2	6.8	0.86	4.72	4.1									Total Runoff to Ex. CDOT Type R Inlet
	19	C-1H	1.12	0.35	8.9	0.39	4.30	1.7				1.7									Total Runoff to Ex. CDOT Type C Inlet
		C-5	0.51	0.01	5.0	0.01	5.17	0.1													Ex. Pond North
	17C	D-4C	3	0.50	14.2	1.50	3.60	5.4				5.4									Total Runoff to Ex. CDOT Type R Inlet
	32	D-8	1.46	0.11	14.0	0.16	3.62	0.6				0.6									Swale Flow Entering Ex. Pond South
		D-7	8.01	0.06	14.8	0.48	3.54	1.7													

Galloway

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass Filing No. 4
Project No.: CLH021
Calculated By: TJE
Checked By: BAS
Date: 6/30/22

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	1	OS-4	4.46	0.62	15.6	2.77	5.81	16.1				16.1									
	2	OS-5	0.46	0.62	5.0	0.29	8.68	2.5				2.5									
	3	OS-6	1.17	0.62	12.9	0.73	6.30	4.6				4.6									
	4	A-1	2.19	0.62	11.0	1.36	6.70	9.1	15.6	5.15	5.81	29.9									Total Runoff of DP 1-3 & Basin A-1
	5	A-3	1.08	0.62	10.6	0.67	6.78	4.5				4.5									Total Runoff of Basin A-3
		A-4	0.81	0.13	5.0	0.11	8.68	1.0													Ex. Pond #1
	8											8.8									Bypass Flows to Ex. CDOT Type R Inlet in BGM Road
		A-2	0.71	0.62	5.0	0.44	8.68	3.8													Sheet Flow Off-Site to Ex. Channel
		B-1	4.32	0.13	21.6	0.56	4.99	2.8													Existing Channel
		C-1G	0.87	0.62	6.8	0.54	7.92	4.3													
	12	C-1E	0.49	0.89	5.0	0.44	8.68	3.8	6.8	0.98	7.92	7.8									Total Runoff to Ex. CDOT Type R Inlet
	19	C-1H	1.12	0.49	8.9	0.55	7.21	4.0				4.0									Total Runoff to Ex. CDOT Type C Inlet
		C-5	0.51	0.13	5.0	0.07	8.68	0.6													Ex. Pond North
	17C	D-4C	3	0.62	14.2	1.86	6.04	11.2				11.2									Total Runoff to Ex. CDOT Type R Inlet
	32	D-8	1.46	0.26	14.0	0.38	6.08	2.3				2.3									Swale Flow Entering Ex. Pond South
		D-7	8.01	0.21	14.8	1.68	5.94	10.0													

APPENDIX C

Hydraulic Computations

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Jun 29 2022

Swale A (Basin C-6)

Triangular

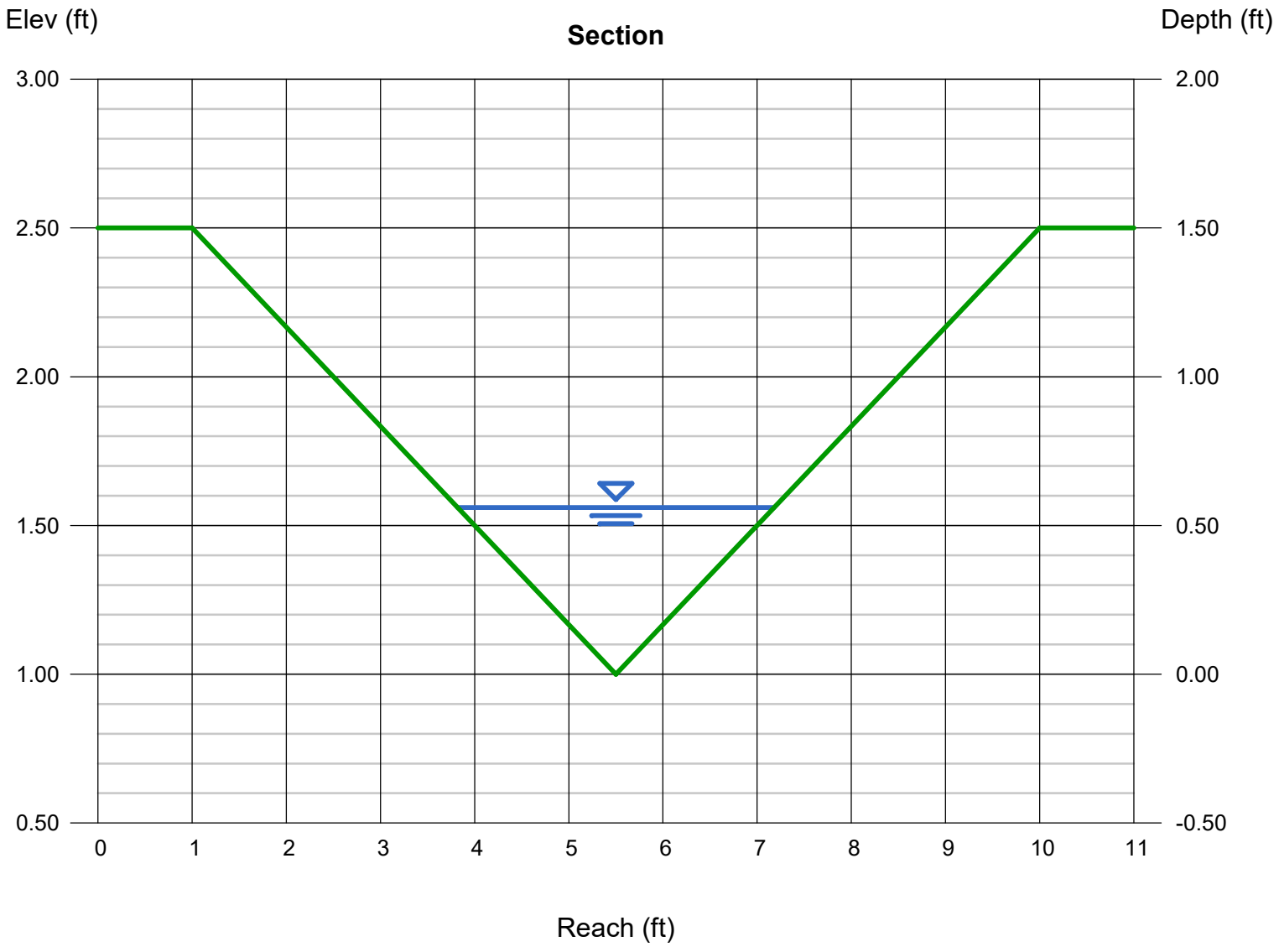
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 1.00
Slope (%)	= 2.00
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.00

Highlighted

Depth (ft)	= 0.56
Q (cfs)	= 4.000
Area (sqft)	= 0.94
Velocity (ft/s)	= 4.25
Wetted Perim (ft)	= 3.54
Crit Depth, Yc (ft)	= 0.65
Top Width (ft)	= 3.36
EGL (ft)	= 0.84



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Jun 29 2022

Swale C (Basin D-8)

Trapezoidal

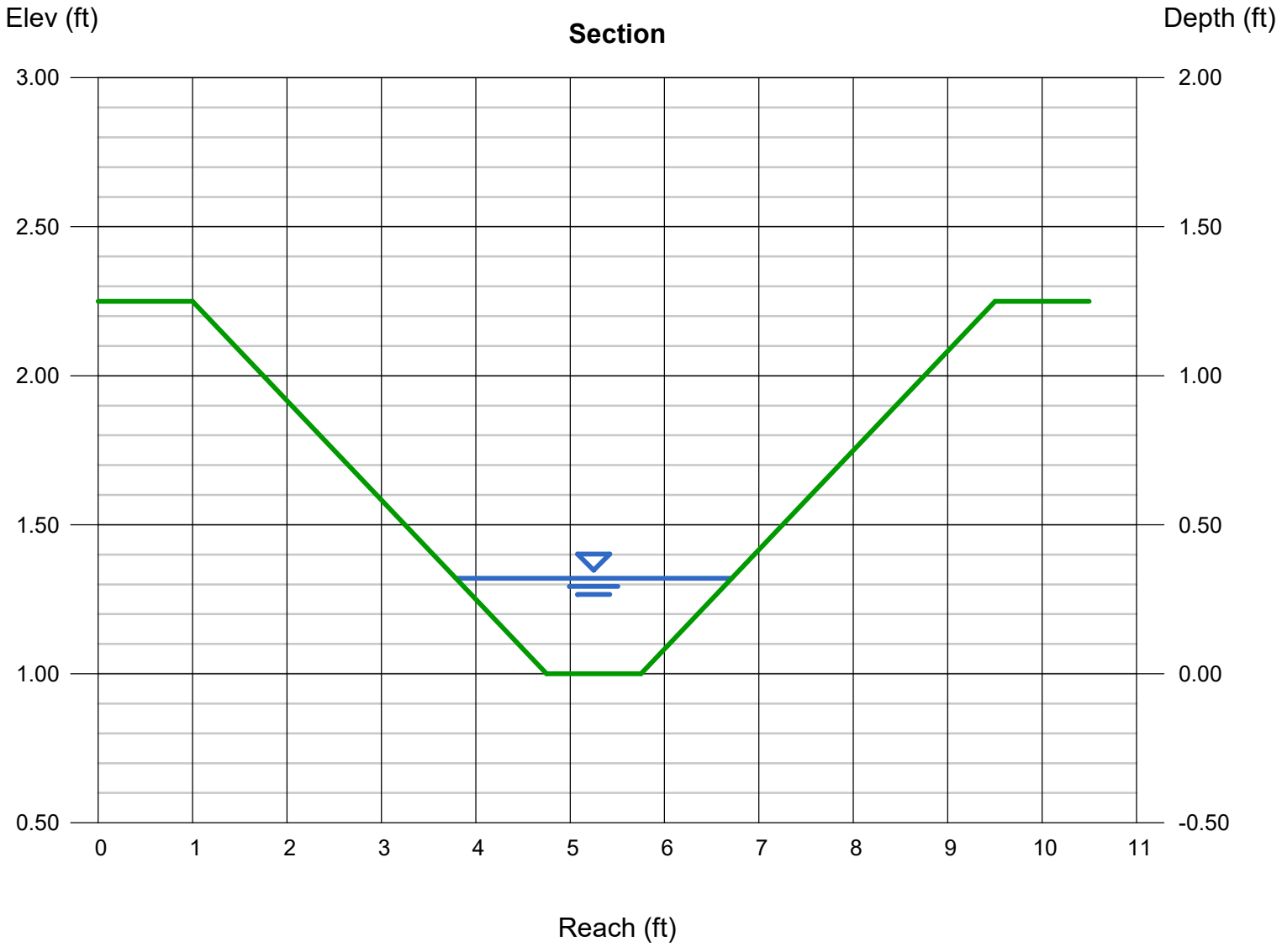
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.25
Invert Elev (ft)	= 1.00
Slope (%)	= 2.00
N-Value	= 0.020

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.30

Highlighted

Depth (ft)	= 0.32
Q (cfs)	= 2.300
Area (sqft)	= 0.63
Velocity (ft/s)	= 3.67
Wetted Perim (ft)	= 3.02
Crit Depth, Yc (ft)	= 0.39
Top Width (ft)	= 2.92
EGL (ft)	= 0.53



Inlets-Proposed Design

MHFD-Inlet, Version 5.01 (April 2021)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Basin A-1 (DP 4)	Basin A-3 (DP 5)	Ex Inlet BGM Drive(DP 8)
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	14.4	2.2	11.6
Major Q_{Known} (cfs)	29.9	4.5	21.6

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	User-Defined
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	2.8
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	13.1

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

Overland Slope (ft/ft)			
Overland Length (ft)			
Channel Slope (ft/ft)			
Channel Length (ft)			

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**14.4**	**2.2**	**14.4**
Major Total Design Peak Flow, Q (cfs)	**29.9**	**4.5**	**34.7**
Minor Flow Bypassed Downstream, Q_b (cfs)	2.8	0.0	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	12.9	0.2	N/A

MHFD-Inlet, Version 5.01 (April 2021)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Ex Inlet BasinC-1e(DP12)	ExInletBasinD-4c(DP 17c)
Site Type (Urban or Rural)	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	4.1	5.4
Major Q_{Known} (cfs)	7.8	11.2

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)		
Percent Impervious		
NRCS Soil Type		

Watershed Profile

Overland Slope (ft/ft)		
Overland Length (ft)		
Channel Slope (ft/ft)		
Channel Length (ft)		

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)		
One-Hour Precipitation, P_1 (inches)		

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)		
One-Hour Precipitation, P_1 (inches)		

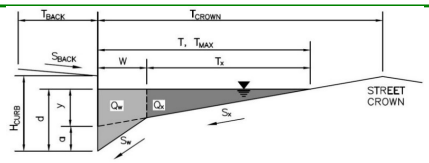
CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**4.1**	**5.4**
Major Total Design Peak Flow, Q (cfs)	**7.8**	**11.2**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	0.1	N/A

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass Filing No. 4**
Inlet ID: **Basin A-1 (DP 4)**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.025	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

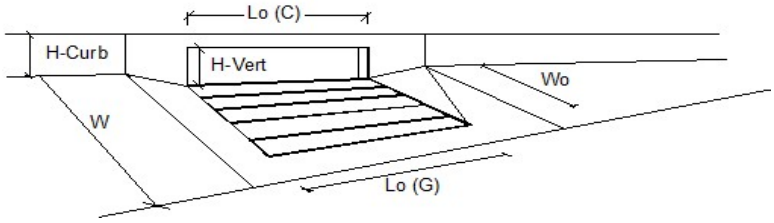
MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**17.2**	**38.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)

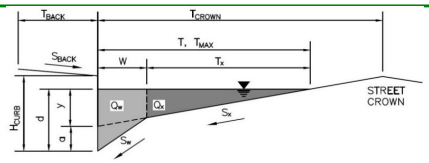


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**11.6**	**17.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**2.8**	**12.9**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**81**	**57**	**%**

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass Filing No. 4**
Inlet ID: **Basin A-3 (DP 5)**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.025	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	8.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☑	

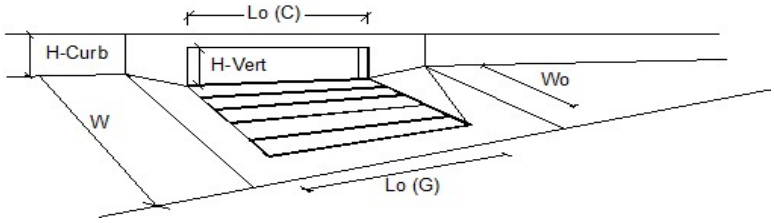
MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**17.2**	**38.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)



CDOT Type R Curb Opening

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.2**	**4.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.2**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**97**	**%**

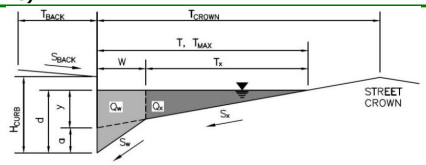
Inlets – Existing Analysis

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass Filing No. 4**

Inlet ID: **Ex Inlet BGM Drive(DP 8)**



Gutter Geometry:

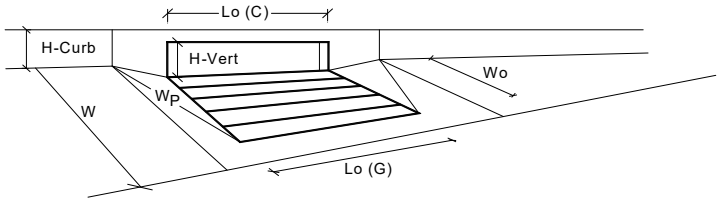
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	26.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)

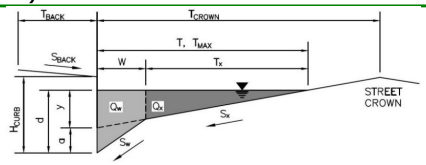


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**14.4**	**52.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	14.4	34.7	cfs

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass Filing No. 4**
Inlet ID: **Ex Inlet BasinC-1e(DP12)**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.030	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

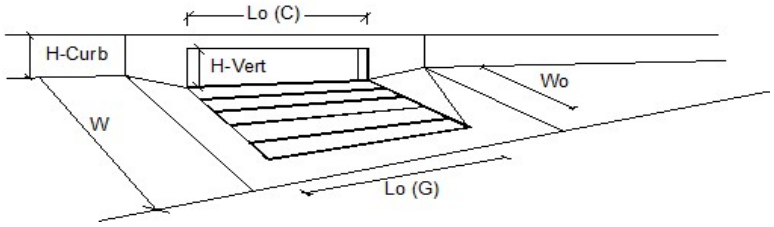
MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion

	Minor Storm	Major Storm	
Q_{allow} =	**17.7**	**18.8**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.01 (April 2021)

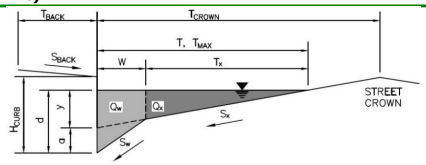


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**4.1**	**7.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**98**	**%**

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass Filing No. 4**
Inlet ID: **ExInletBasinD-4c(DP 17c)**



Gutter Geometry:

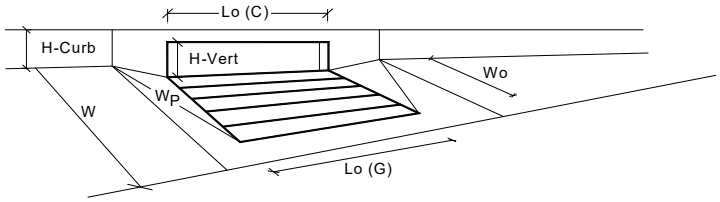
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

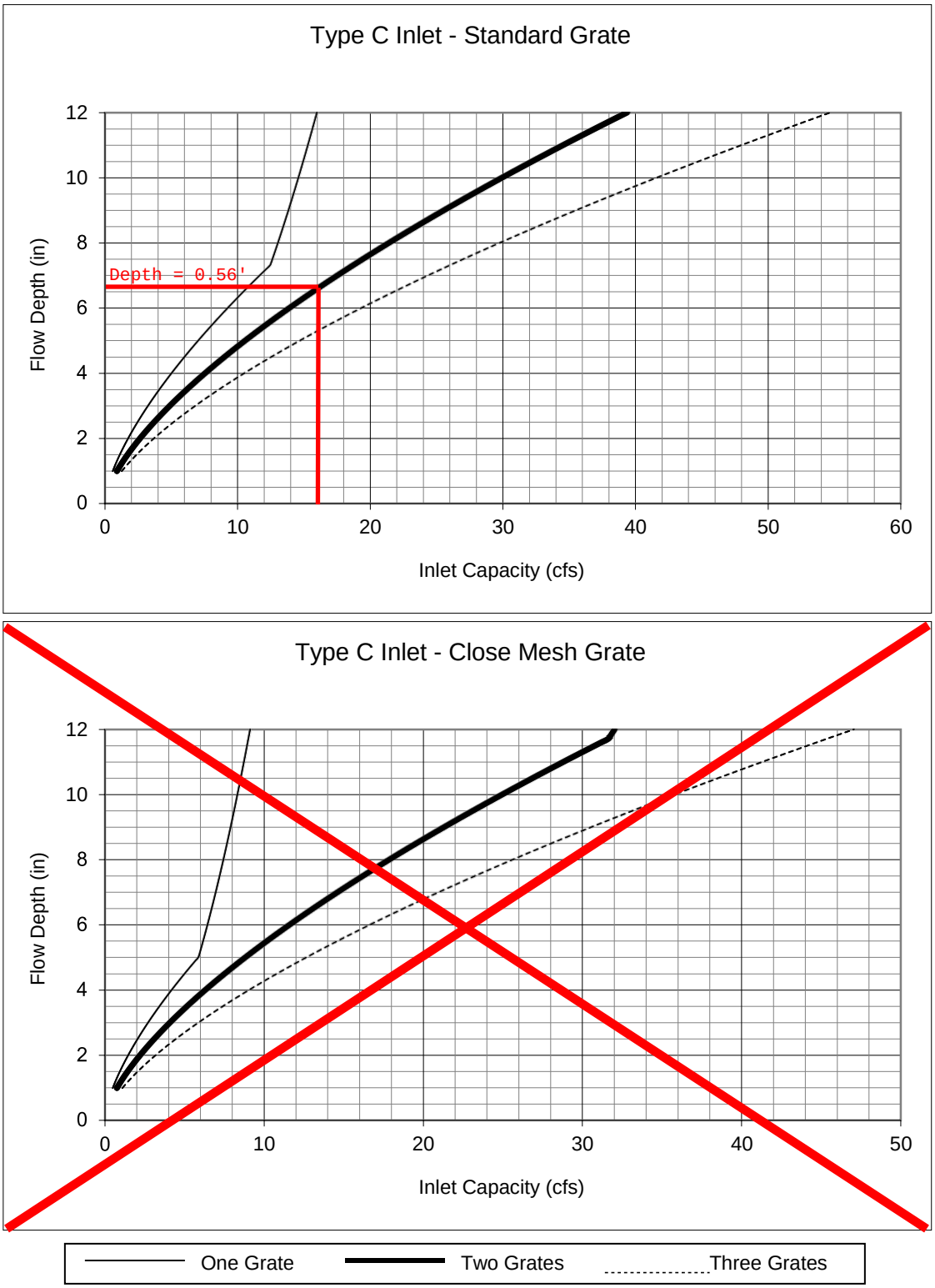
INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.01 (April 2021)



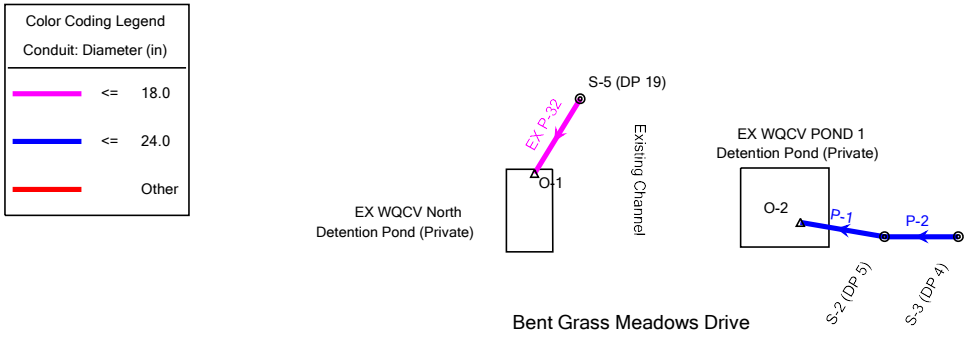
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.53	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.76	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**8.0**	**39.1**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	5.4	11.2	cfs

Figure 8-10. Inlet Capacity Chart Sump Conditions, Area (Type C) Inlet



Notes:
1. The standard inlet parameters must apply to use these charts.

Falcon Meadows at Bent Grass Filing No. 4
StormCAD Schematic



Falcon Meadows at Bent Grass Filing No. 4

FlexTable: Conduit Table

Active Scenario: 5 YR

Label	Diameter (in)	Material	Manning's n	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Flow / Capacity (Design) (%)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Velocity (ft/s)
EX P-32	18.0	Concrete	0.013	S-5 (DP 19)	6,943.93	O-1	6,942.30	0.042	7.9	6,945.14	6,945.13	7.28
P-1	24.0	<None>	0.013	S-2 (DP 5)	6,942.26	O-2	6,941.07	0.020	51.8	6,943.73	6,942.14	10.29
P-2	24.0	<None>	0.013	S-3 (DP 4)	6,943.16	S-2 (DP 5)	6,942.46	0.020	45.0	6,944.53	6,943.48	9.92

Falcon Meadows at Bent Grass Filing No. 4

FlexTable: Manhole Table

Active Scenario: 5 YR

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Headloss Coefficient (Standard)	Flow (Known) (cfs)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)
S-2 (DP 5)	6,947.47	6,942.26	0.100	16.60	6,943.73	6,943.80
S-3 (DP 4)	6,947.57	6,943.16	0.050	14.40	6,944.53	6,944.56
S-5 (DP 19)	6,950.38	6,943.93	0.640	1.70	6,945.14	6,945.15

Falcon Meadows at Bent Grass Filing No. 4
FlexTable: Outfall Table
Active Scenario: 5 YR

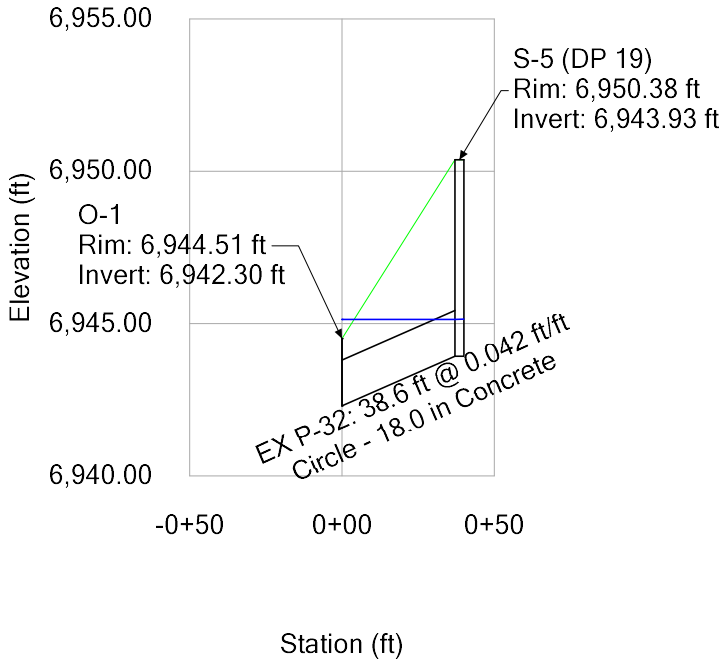
Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)
O-1	6,944.51	6,942.30	User Defined Tailwater	6,945.13	6,945.13	1.70
O-2	6,943.82	6,941.07	User Defined Tailwater	6,942.00	6,942.14	16.60

Falcon Meadows at Bent Grass Filing No. 4

Profile Report

Engineering Profile - DP 19 - O-1 (FM Filing 4 System.stsw)

Active Scenario: 5 YR

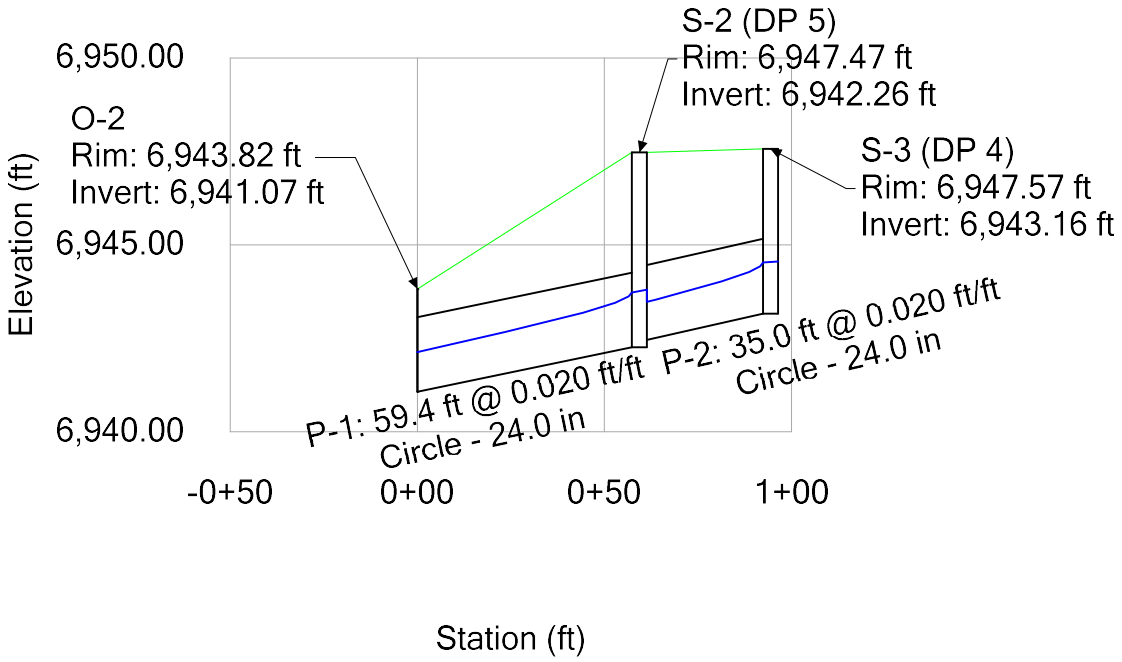


Falcon Meadows at Bent Grass Filing No. 4

Profile Report

Engineering Profile - DP 4 - O-2 (FM Filing 4 System.stsw)

Active Scenario: 5 YR



Falcon Meadows at Bent Grass Filing No. 4

FlexTable: Conduit Table

Active Scenario: 100 YR

Label	Diameter (in)	Material	Manning's n	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Flow / Capacity (Design) (%)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Velocity (ft/s)
EX P-32	18.0	Concrete	0.013	S-5 (DP 19)	6,943.93	O-1	6,942.30	0.042	18.5	6,945.56	6,945.50	2.26
P-1	24.0	Concrete	0.013	S-2 (DP 5)	6,942.26	O-2	6,941.07	0.020	107.4	6,944.11	6,942.92	11.35
P-2	24.0	Concrete	0.013	S-3 (DP 4)	6,943.16	S-2 (DP 5)	6,942.46	0.020	93.5	6,945.02	6,944.09	11.57

Falcon Meadows at Bent Grass Filing No. 4

FlexTable: Manhole Table

Active Scenario: 100 YR

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Headloss Coefficient (Standard)	Flow (Known) (cfs)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)
S-2 (DP 5)	6,947.47	6,942.26	0.100	34.40	6,944.11	6,944.31
S-3 (DP 4)	6,947.57	6,943.16	0.050	29.90	6,945.02	6,945.10
S-5 (DP 19)	6,950.38	6,943.93	0.640	4.00	6,945.56	6,945.61

Falcon Meadows at Bent Grass Filing No. 4

FlexTable: Outfall Table

Active Scenario: 100 YR

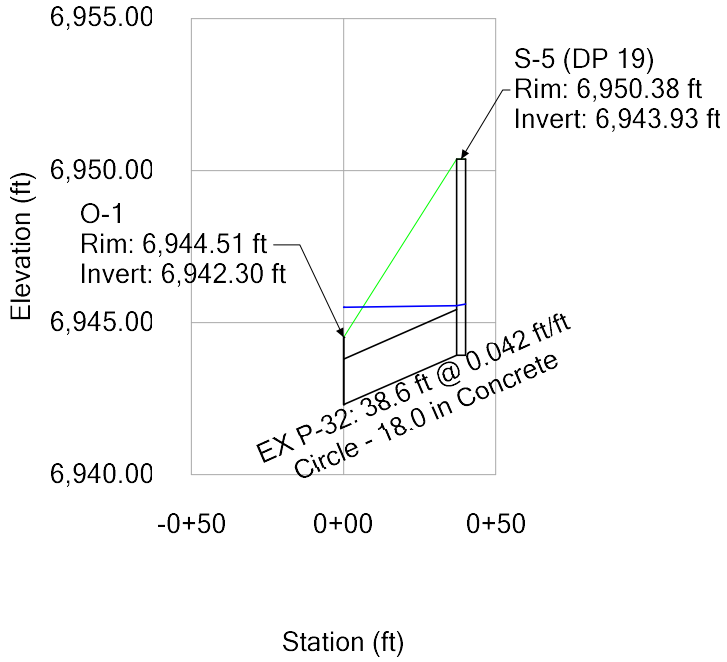
Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)
O-1	6,944.51	6,942.30	User Defined Tailwater	6,945.50	6,945.50	4.00
O-2	6,943.82	6,941.07	User Defined Tailwater	6,942.00	6,942.92	34.40

Falcon Meadows at Bent Grass Filing No. 4

Profile Report

Engineering Profile - DP 19 - O-1 (FM Filing 4 System.stsw)

Active Scenario: 100 YR

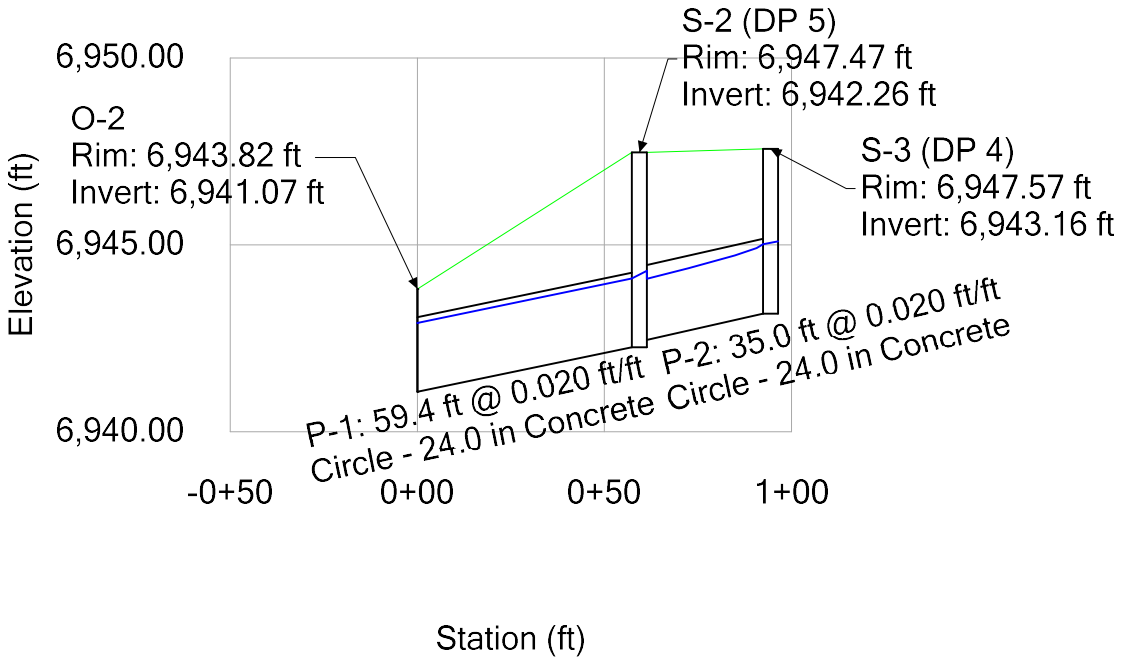


Falcon Meadows at Bent Grass Filing No. 4

Profile Report

Engineering Profile - DP 4 - O-2 (FM Filing 4 System.stsw)

Active Scenario: 100 YR

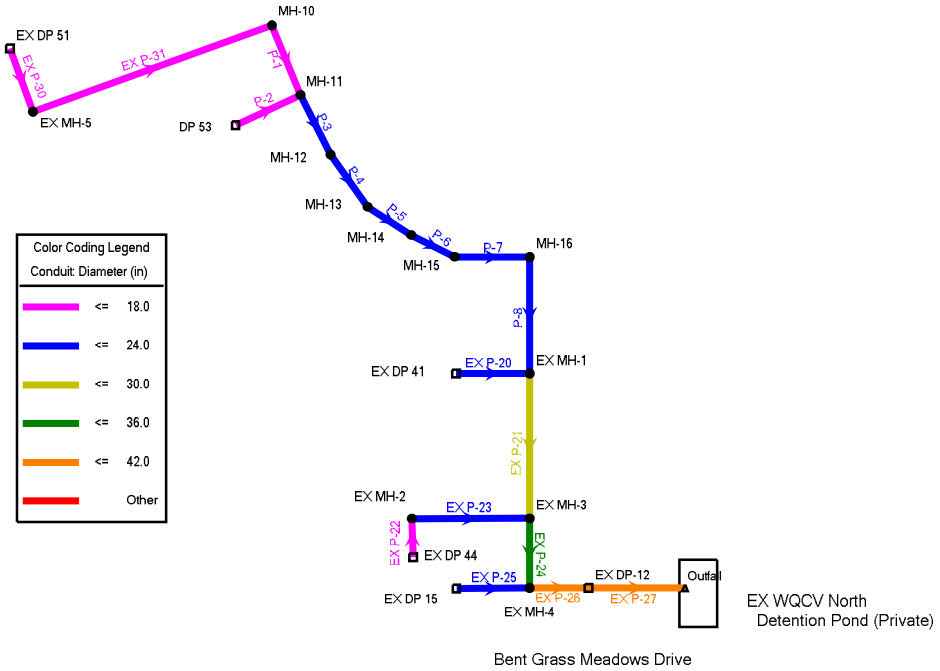


StormCAD

BG Filing No. 3 Storm

Scenario: 100 YR

Active Scenario: 100 YR



Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666

BG Filing No. 3 Storm
FlexTable: Conduit Table
Active Scenario: 100 YR

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Section Type	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
EX P-27	EX DP-12	Outfall	6,942.20	6,941.87	32.8	0.010	Circle	42.0	0.013	71.02	11.37	100.96	6,945.67	6,945.51	6,946.52	6,946.36
EX P-26	EX MH-4	EX DP-12	6,942.58	6,942.30	27.5	0.010	Circle	42.0	0.013	68.48	7.12	101.51	6,946.48	6,946.35	6,947.26	6,947.14
EX P-20	EX DP 41	EX MH-1	6,946.36	6,946.32	6.4	0.006	Circle	24.0	0.013	12.60	4.01	17.84	6,949.00	6,948.98	6,949.25	6,949.23
EX P-25	EX DP 15	EX MH-4	6,944.16	6,944.08	7.5	0.011	Circle	24.0	0.013	31.59	10.05	23.36	6,947.25	6,947.11	6,948.82	6,948.68
EX P-22	EX DP 44	EX MH-2	6,945.66	6,945.58	7.5	0.011	Circle	18.0	0.013	9.60	5.43	10.85	6,947.97	6,947.91	6,948.43	6,948.36
EX P-21	EX MH-1	EX MH-3	6,945.82	6,944.12	136.7	0.012	Circle	30.0	0.013	30.80	6.27	45.73	6,948.50	6,947.72	6,949.11	6,948.34
EX P-24	EX MH-3	EX MH-4	6,943.62	6,943.08	43.8	0.012	Circle	36.0	0.013	40.40	5.72	74.10	6,947.27	6,947.11	6,947.77	6,947.61
EX P-23	EX MH-2	EX MH-3	6,945.08	6,944.62	36.8	0.013	Circle	24.0	0.013	9.60	3.06	25.30	6,947.79	6,947.72	6,947.94	6,947.87
P-8	MH-16	EX MH-1	6,948.26	6,946.32	136.5	0.014	Circle	24.0	0.013	18.30	9.23	26.97	6,949.80	6,948.98	6,950.57	6,949.51
P-7	MH-15	MH-16	6,949.50	6,948.56	70.5	0.013	Circle	24.0	0.013	18.30	9.00	26.13	6,951.04	6,950.42	6,951.81	6,950.98
P-6	MH-14	MH-15	6,950.20	6,949.80	72.2	0.006	Circle	24.0	0.013	18.30	5.83	16.84	6,951.96	6,951.43	6,952.57	6,952.12
P-5	MH-13	MH-14	6,950.90	6,950.50	65.1	0.006	Circle	24.0	0.013	18.30	6.42	17.73	6,952.63	6,952.26	6,953.25	6,952.87
P-4	MH-12	MH-13	6,951.84	6,951.20	57.2	0.011	Circle	24.0	0.013	18.30	8.39	23.93	6,953.38	6,952.94	6,954.15	6,953.56
P-3	MH-11	MH-12	6,954.07	6,952.14	46.9	0.041	Circle	24.0	0.013	18.30	13.79	45.91	6,955.61	6,953.77	6,956.38	6,954.46
P-1	MH-10	MH-11	6,955.90	6,954.57	55.1	0.024	Circle	18.0	0.013	10.20	9.74	16.32	6,957.13	6,956.00	6,957.80	6,956.53
EX P-31	EX MH-5	MH-10	6,958.81	6,956.20	224.8	0.012	Circle	18.0	0.013	10.20	7.25	11.32	6,960.04	6,957.67	6,960.71	6,958.19
EX P-30	EX DP 51	EX MH-5	6,959.19	6,959.11	7.5	0.011	Circle	18.0	0.013	10.20	6.98	10.85	6,960.55	6,960.51	6,961.12	6,961.06
P-2	DP 53	MH-11	6,954.69	6,954.57	7.9	0.015	Circle	18.0	0.013	9.00	7.93	12.98	6,955.99	6,956.00	6,956.47	6,956.41

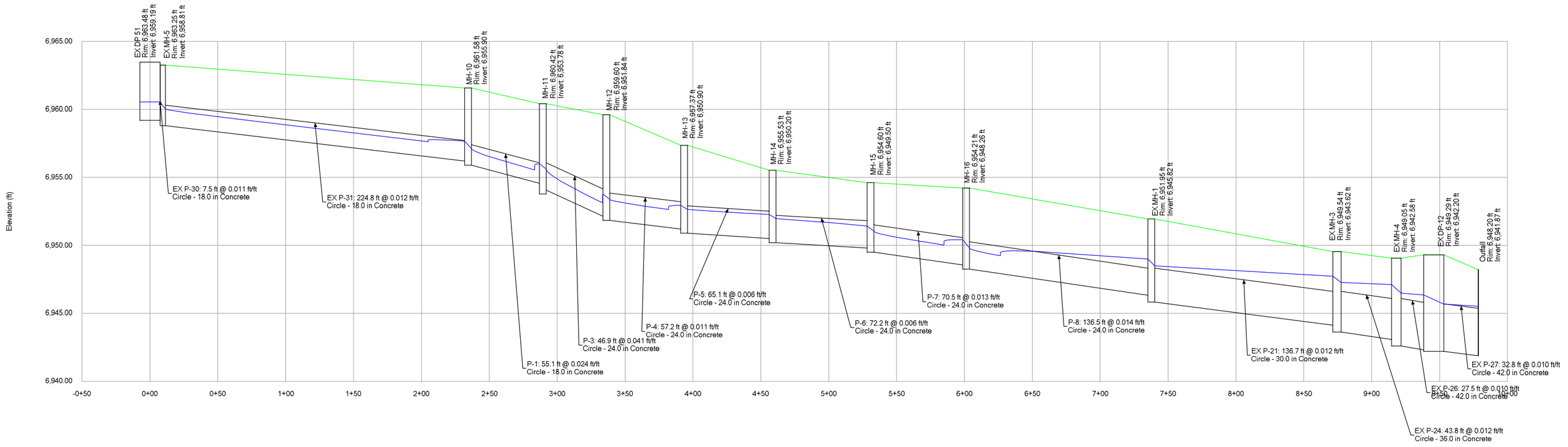
BG Filing No. 3 Storm
FlexTable: Manhole Table
Active Scenario: 100 YR

Label	Elevation (Rim) (ft)	Flow (Total Out) (cfs)	Headloss Method	Headloss Coefficient (Standard)	Headloss (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
EX MH-1	6,951.95	30.80	Standard	0.800	0.49	6,948.98	6,948.50	6,949.51	6,949.11
EX MH-4	6,949.05	68.48	Standard	0.800	0.63	6,947.11	6,946.48	6,947.61	6,947.26
EX MH-2	6,949.58	9.60	Standard	0.800	0.12	6,947.91	6,947.79	6,948.36	6,947.94
EX MH-3	6,949.54	40.40	Standard	0.900	0.46	6,947.72	6,947.27	6,947.87	6,947.77
MH-16	6,954.21	18.30	Standard	0.800	0.62	6,950.42	6,949.80	6,950.98	6,950.57
MH-15	6,954.60	18.30	Standard	0.500	0.39	6,951.43	6,951.04	6,952.12	6,951.81
MH-14	6,955.53	18.30	Standard	0.500	0.30	6,952.26	6,951.96	6,952.87	6,952.57
MH-13	6,957.37	18.30	Standard	0.500	0.31	6,952.94	6,952.63	6,953.56	6,953.25
MH-12	6,959.60	18.30	Standard	0.500	0.39	6,953.77	6,953.38	6,954.46	6,954.15
MH-11	6,960.42	18.30	Standard	0.500	0.39	6,956.00	6,955.61	6,956.41	6,956.38
MH-10	6,961.58	10.20	Standard	0.800	0.54	6,957.67	6,957.13	6,958.19	6,957.80
EX MH-5	6,963.25	10.20	Standard	0.700	0.47	6,960.51	6,960.04	6,961.06	6,960.71

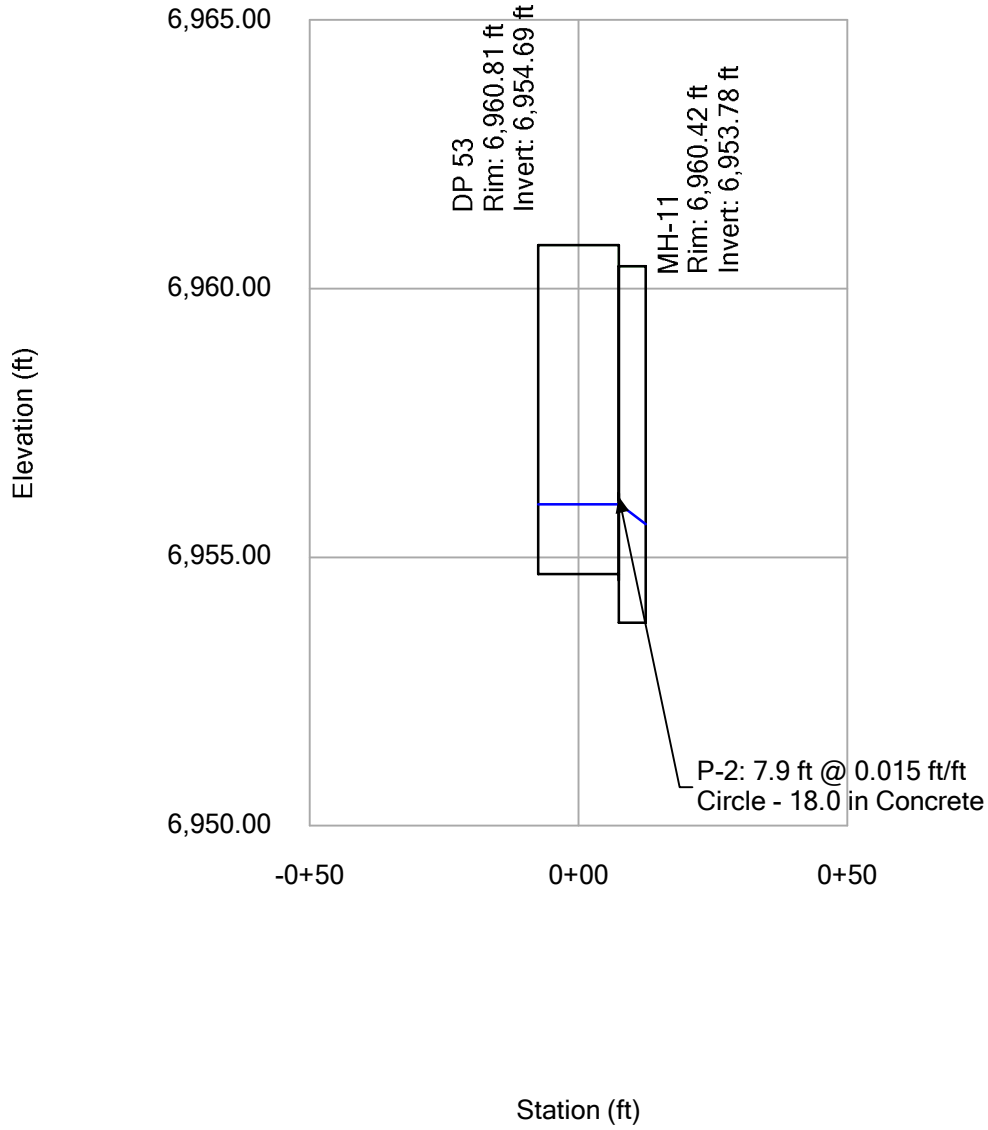
BG Filing No. 3 Storm
FlexTable: Outfall Table
Active Scenario: 100 YR

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Energy Grade Line (ft)	Flow (Total Out) (cfs)
Outfall	6,948.20	6,941.87	User Defined Tailwater	6,945.51	6,945.51	6,945.51	70.98

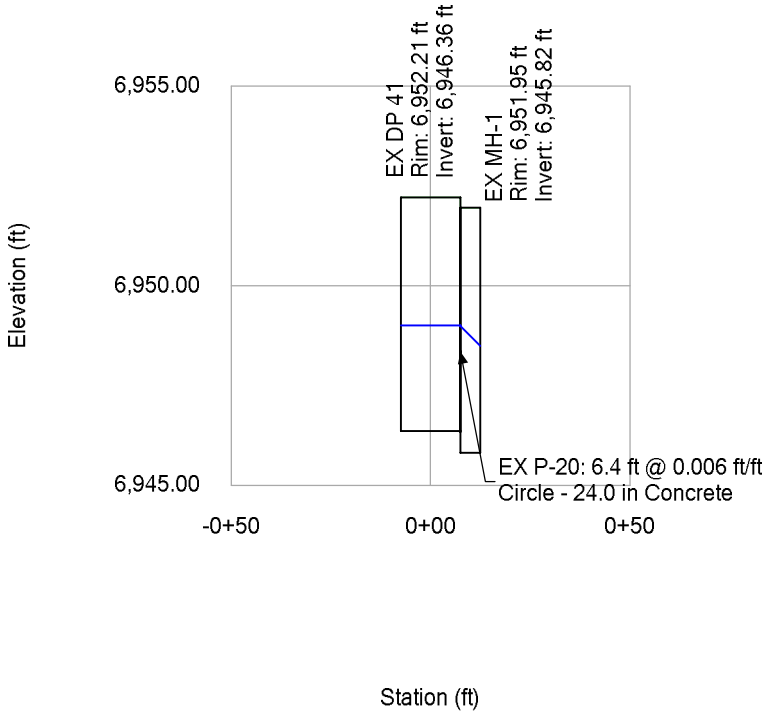
BG Filing No. 3 Storm
Profile Report
Engineering Profile - Mainline (FM Filing 3 System B.stsw)
Active Scenario: 100 YR



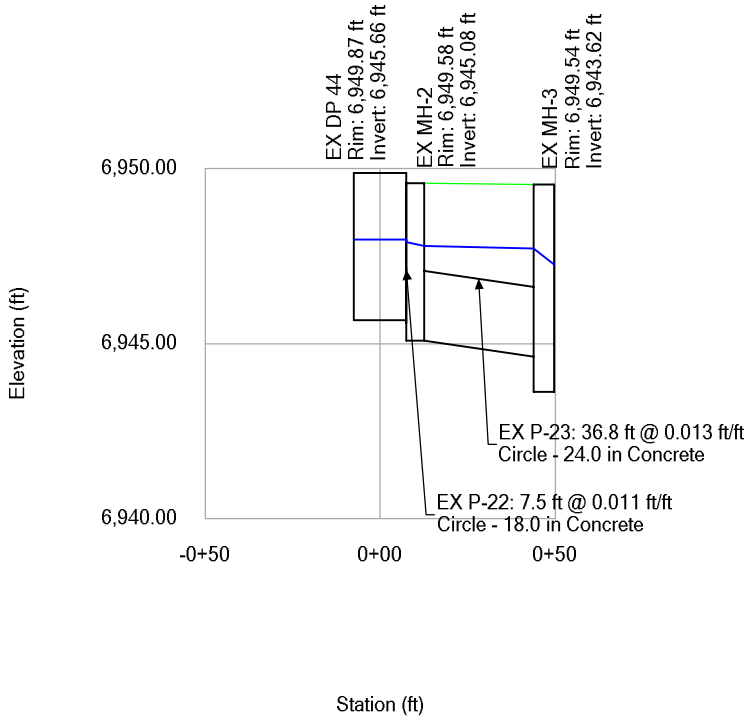
BG Filing No. 3 Storm
Profile Report
Engineering Profile - Lateral-DP 53 (FM Filing 3 System B.stsw)
Active Scenario: 100 YR



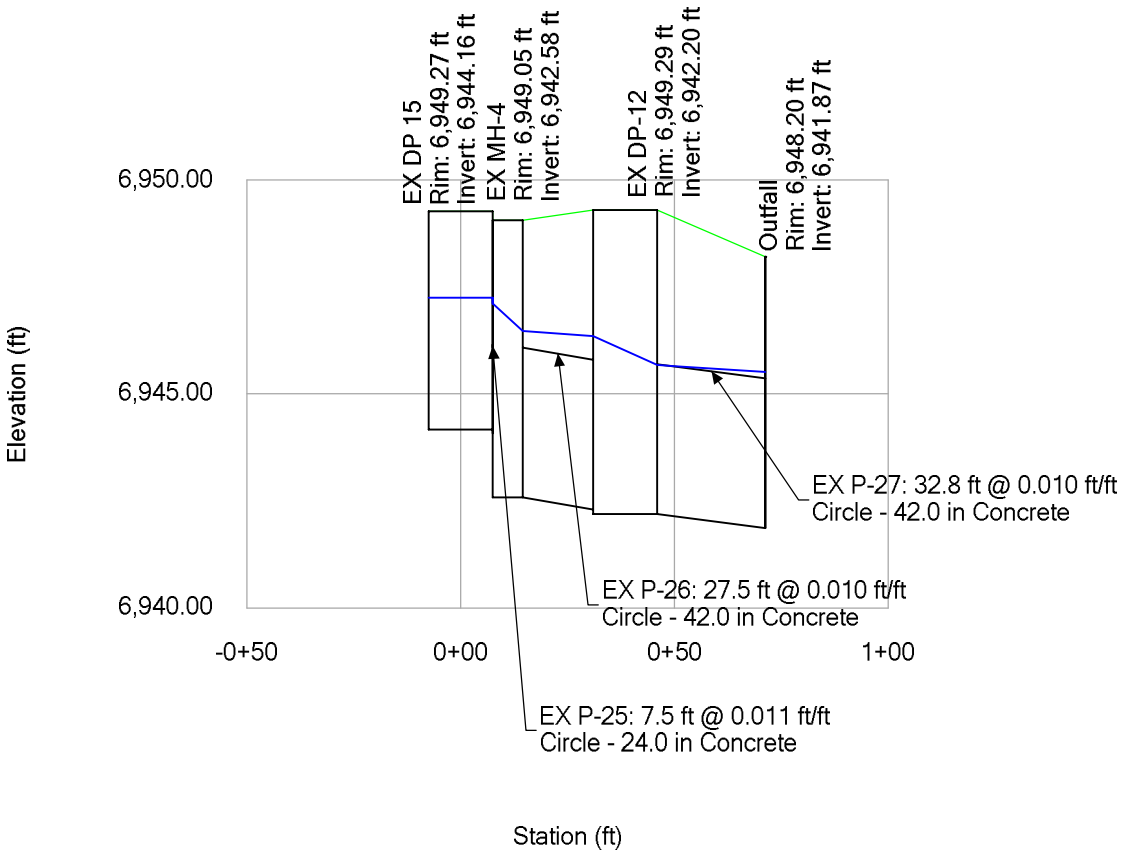
BG Filing No. 3 Storm
Profile Report
Engineering Profile - Lateral-DP 41 (Existing) (FM Filing 3 System B.stsw)
Active Scenario: 100 YR



BG Filing No. 3 Storm
Profile Report
Engineering Profile - Laterals-DP 44 (Existing) (FM Filing 3 System B.stsw)
Active Scenario: 100 YR



BG Filing No. 3 Storm
Profile Report
Engineering Profile - Laterals and Outfall to Pond (FM Filing 3 System B.stsw)
Active Scenario: 100 YR



BG Filing No. 3 Storm
FlexTable: Conduit Table
Active Scenario: 5 YR

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Section Type	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
EX P-27	EX DP-12	Outfall	6,942.20	6,941.87	32.8	0.010	Circle	42.0	0.013	25.00	8.70	100.96	6,944.91	6,944.92	6,945.06	6,945.04
EX P-26	EX MH-4	EX DP-12	6,942.58	6,942.30	27.5	0.010	Circle	42.0	0.013	23.50	8.59	101.51	6,945.02	6,945.03	6,945.18	6,945.17
EX P-20	EX DP 41	EX MH-1	6,946.36	6,946.32	6.4	0.006	Circle	24.0	0.013	8.20	5.56	17.84	6,947.52	6,947.53	6,947.81	6,947.79
EX P-25	EX DP 15	EX MH-4	6,944.16	6,944.08	7.5	0.011	Circle	24.0	0.013	4.70	5.82	23.36	6,945.13	6,945.15	6,945.28	6,945.27
EX P-22	EX DP 44	EX MH-2	6,945.66	6,945.58	7.5	0.011	Circle	18.0	0.013	4.70	5.92	10.85	6,946.49	6,946.32	6,946.83	6,946.77
EX P-21	EX MH-1	EX MH-3	6,945.82	6,944.12	136.7	0.012	Circle	30.0	0.013	14.80	8.31	45.73	6,947.12	6,945.53	6,947.63	6,945.95
EX P-24	EX MH-3	EX MH-4	6,943.62	6,943.08	43.8	0.012	Circle	36.0	0.013	19.50	8.84	74.10	6,945.04	6,945.15	6,945.58	6,945.37
EX P-23	EX MH-2	EX MH-3	6,945.08	6,944.62	36.8	0.013	Circle	24.0	0.013	4.70	6.16	25.30	6,945.84	6,945.53	6,946.13	6,945.71
P-8	MH-16	EX MH-1	6,948.26	6,946.32	136.5	0.014	Circle	24.0	0.013	7.90	7.45	26.97	6,949.26	6,947.53	6,949.65	6,947.77
P-7	MH-15	MH-16	6,949.50	6,948.56	70.5	0.013	Circle	24.0	0.013	7.90	7.29	26.13	6,950.50	6,949.57	6,950.89	6,949.95
P-6	MH-14	MH-15	6,950.20	6,949.80	72.2	0.006	Circle	24.0	0.013	7.90	5.27	16.84	6,951.20	6,950.76	6,951.59	6,951.20
P-5	MH-13	MH-14	6,950.90	6,950.50	65.1	0.006	Circle	24.0	0.013	7.90	5.48	17.73	6,951.90	6,951.44	6,952.29	6,951.90
P-4	MH-12	MH-13	6,951.84	6,951.20	57.2	0.011	Circle	24.0	0.013	7.90	6.83	23.93	6,952.84	6,952.00	6,953.23	6,952.71
P-3	MH-11	MH-12	6,954.07	6,952.14	46.9	0.041	Circle	24.0	0.013	7.90	10.94	45.91	6,955.07	6,952.73	6,955.46	6,954.36
P-1	MH-10	MH-11	6,955.90	6,954.57	55.1	0.024	Circle	18.0	0.013	5.00	8.12	16.32	6,956.76	6,955.15	6,957.11	6,956.14
EX P-31	EX MH-5	MH-10	6,958.81	6,956.20	224.8	0.012	Circle	18.0	0.013	5.00	6.21	11.32	6,959.67	6,956.90	6,960.02	6,957.50
EX P-30	EX DP 51	EX MH-5	6,959.19	6,959.11	7.5	0.011	Circle	18.0	0.013	5.00	6.02	10.85	6,960.05	6,959.88	6,960.40	6,960.35
P-2	DP 53	MH-11	6,954.69	6,954.57	7.9	0.015	Circle	18.0	0.013	3.20	6.08	12.98	6,955.37	6,955.27	6,955.63	6,955.51

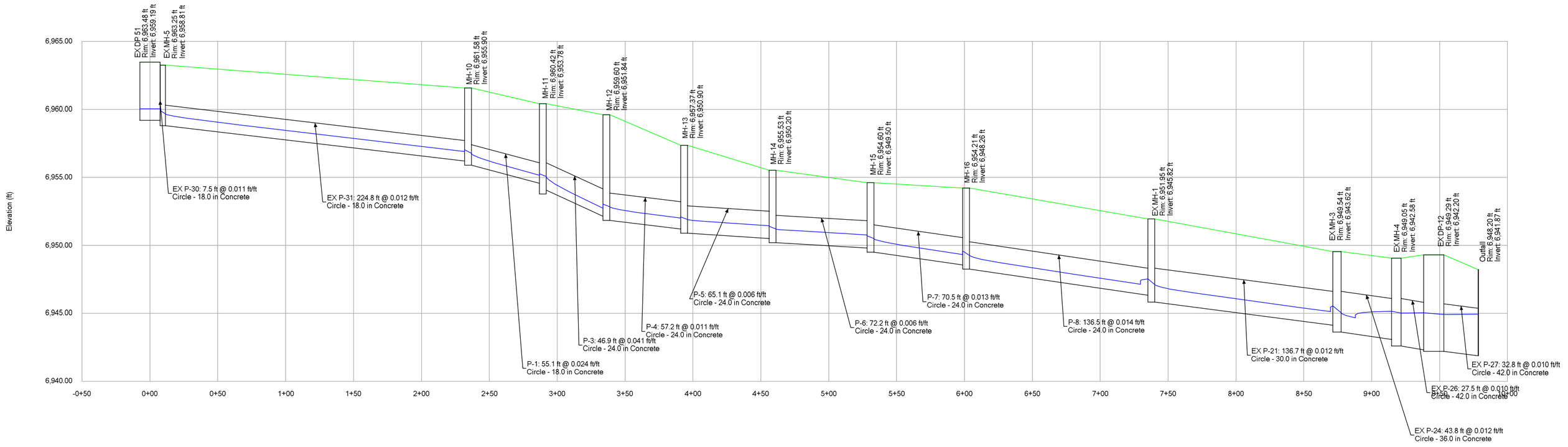
BG Filing No. 3 Storm
FlexTable: Manhole Table
Active Scenario: 5 YR

Label	Elevation (Rim) (ft)	Flow (Total Out) (cfs)	Headloss Method	Headloss Coefficient (Standard)	Headloss (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
EX MH-1	6,951.95	14.80	Standard	0.800	0.41	6,947.53	6,947.12	6,947.77	6,947.63
EX MH-4	6,949.05	23.50	Standard	0.800	0.13	6,945.15	6,945.02	6,945.37	6,945.18
EX MH-2	6,949.58	4.70	Standard	0.800	0.23	6,946.07	6,945.84	6,946.52	6,946.13
EX MH-3	6,949.54	19.50	Standard	0.900	0.49	6,945.53	6,945.04	6,945.71	6,945.58
MH-16	6,954.21	7.90	Standard	0.800	0.31	6,949.57	6,949.26	6,949.95	6,949.65
MH-15	6,954.60	7.90	Standard	0.500	0.20	6,950.70	6,950.50	6,951.13	6,950.89
MH-14	6,955.53	7.90	Standard	0.500	0.20	6,951.40	6,951.20	6,951.86	6,951.59
MH-13	6,957.37	7.90	Standard	0.500	0.20	6,952.10	6,951.90	6,952.80	6,952.29
MH-12	6,959.60	7.90	Standard	0.500	0.20	6,953.04	6,952.84	6,954.67	6,953.23
MH-11	6,960.42	7.90	Standard	0.500	0.20	6,955.27	6,955.07	6,956.26	6,955.46
MH-10	6,961.58	5.00	Standard	0.800	0.28	6,957.04	6,956.76	6,957.64	6,957.11
EX MH-5	6,963.25	5.00	Standard	0.700	0.25	6,959.92	6,959.67	6,960.39	6,960.02

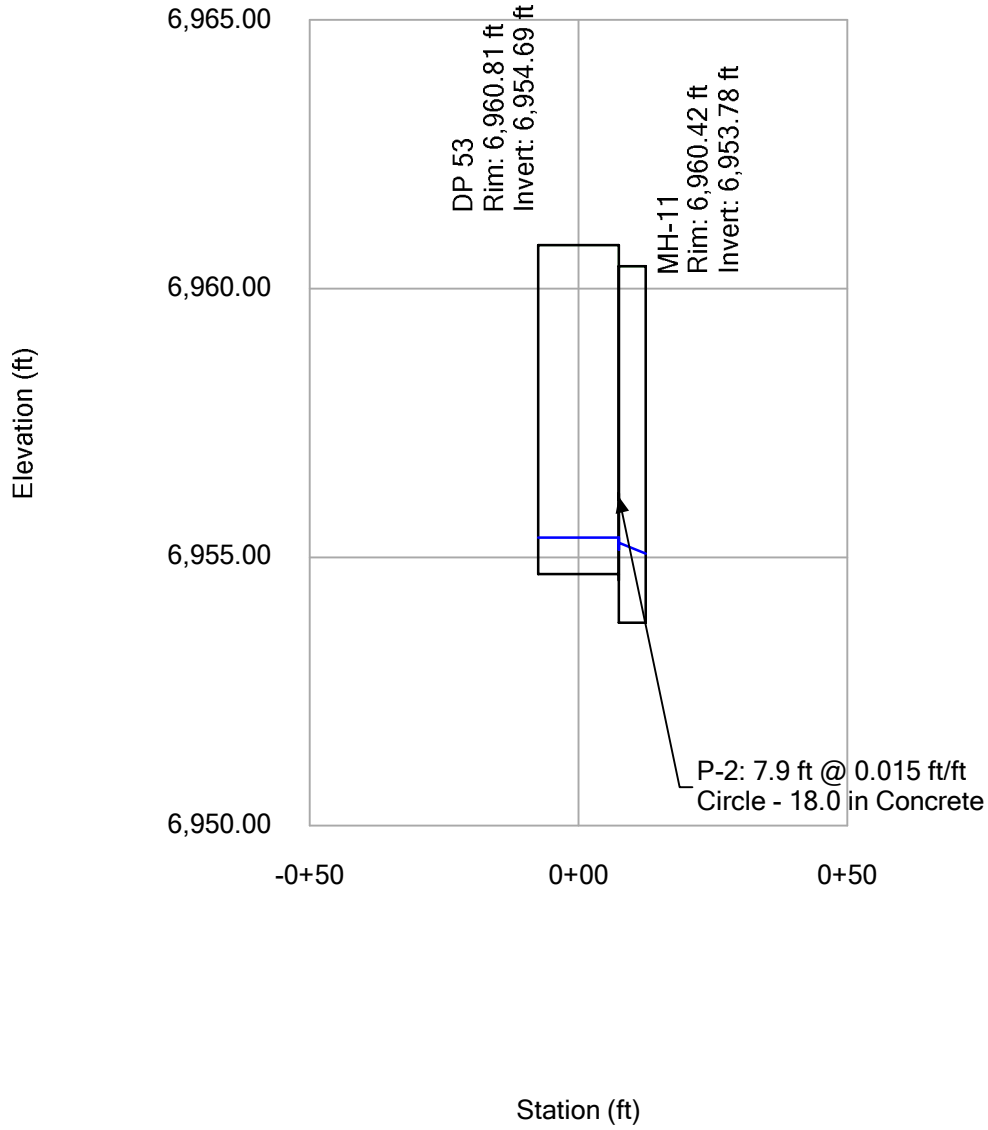
BG Filing No. 3 Storm
FlexTable: Outfall Table
Active Scenario: 5 YR

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Energy Grade Line (ft)	Flow (Total Out) (cfs)
Outfall	6,948.20	6,941.87	User Defined Tailwater	6,944.92	6,944.92	6,944.92	25.00

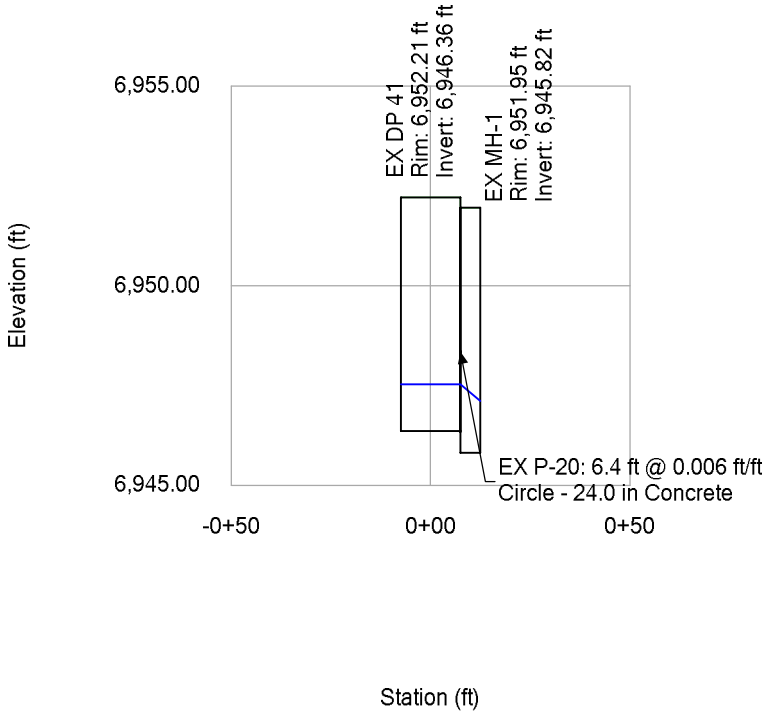
BG Filing No. 3 Storm
Profile Report
Engineering Profile - Mainline (FM Filing 3 System B.stsw)
Active Scenario: 5 YR



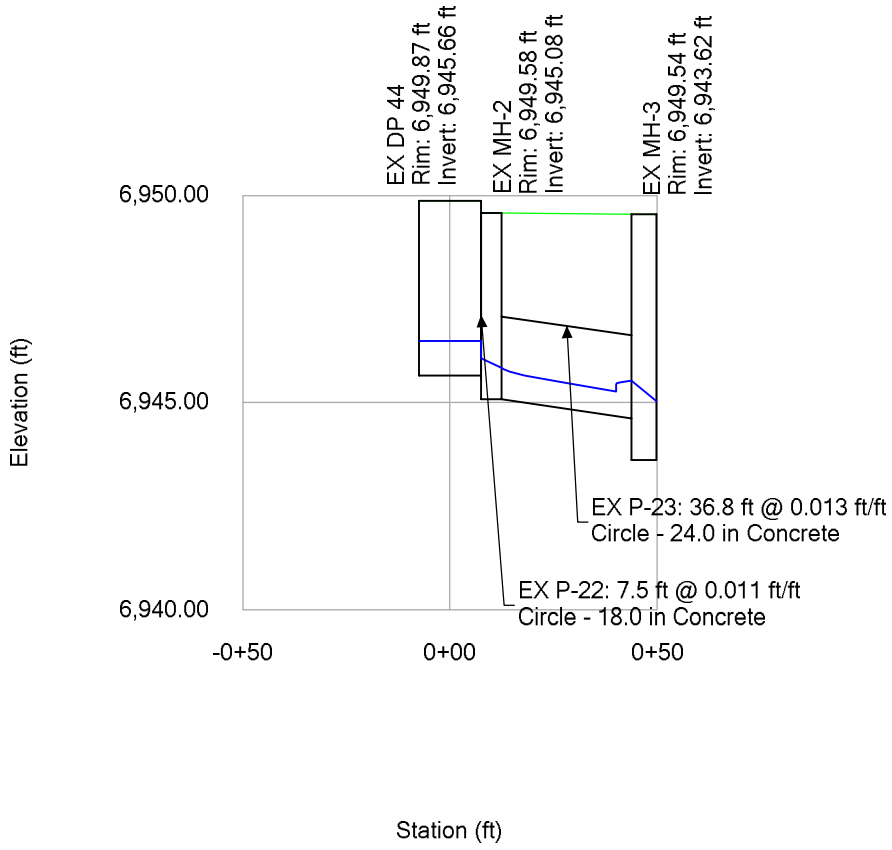
BG Filing No. 3 Storm
Profile Report
Engineering Profile - Lateral-DP 53 (FM Filing 3 System B.stsw)
Active Scenario: 5 YR



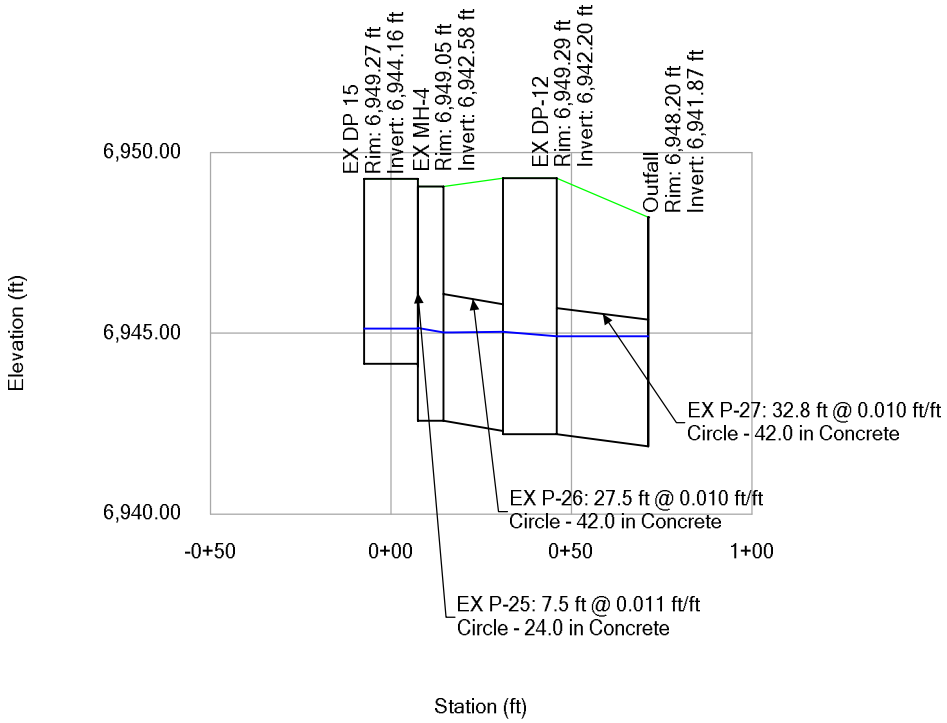
BG Filing No. 3 Storm
Profile Report
Engineering Profile - Lateral-DP 41 (Existing) (FM Filing 3 System B.stsw)
Active Scenario: 5 YR



BG Filing No. 3 Storm
Profile Report
Engineering Profile - Laterals-DP 44 (Existing) (FM Filing 3 System B.stsw)
Active Scenario: 5 YR



BG Filing No. 3 Storm
Profile Report
Engineering Profile - Laterals and Outfall to Pond (FM Filing 3 System B.stsw)
Active Scenario: 5 YR



APPENDIX D

Pond Calculations – **Existing Analysis**

DETENTION POND TRIBUTARY AREAS

Subdivision: Falcon Meadows
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass Filing No. 4
Project No.: CLH021
Calculated By: TJE
Checked By: BAS
Date: 6/29/22

Pond North (Existing)

Basin	Area	% Imp	
C-1a	0.27	84.5	(Obtained from Falcon Meadows Filing No. 3)
C-1b	1.77	61.3	(Obtained from Falcon Meadows Filing No. 3)
C-1c	1.19	68.2	(Obtained from Falcon Meadows Filing No. 3)
C-1d	1.97	72.1	(Obtained from Falcon Meadows Filing No. 3)
C-1e	0.49	100	(Obtained from Falcon Meadows Filing No. 3)
C-1f	0.14	87.5	(Obtained from Falcon Meadows Filing No. 3)
C-1g	0.87	65	
C-1h	1.12	49.3	
C-2	1	72	(Obtained from Falcon Meadows Filing No. 3)
C-3	0.18	85.7	(Obtained from Falcon Meadows Filing No. 3)
C-4	2.67	50.3	(Obtained from Falcon Meadows Filing No. 3)
C-5	0.6	2	(Obtained from Falcon Meadows Filing No. 3)
D-1f	0.67	73.4	(Obtained from Falcon Meadows Filing No. 3)
D-1g	0.78	45.5	(Obtained from Falcon Meadows Filing No. 3)
D-1h	1.57	48.8	(Obtained from Falcon Meadows Filing No. 3)
D-1j	0.95	60.6	(Obtained from Falcon Meadows Filing No. 3)
D-1k	0.8	50.6	(Obtained from Falcon Meadows Filing No. 3)
Total	**17.04**	**59.3**	

Pond South (Existing)

Basin	Area	% Imp	
D-1a	1.83	56.8	(Obtained from Falcon Meadows Filing No. 3)
D-1b	1.19	61.8	(Obtained from Falcon Meadows Filing No. 3)
D-1c	3.95	61.9	(Obtained from Falcon Meadows Filing No. 3)
D-2a	0.5	88.7	(Obtained from Falcon Meadows Filing No. 3)
D-2b	0.74	61.8	(Obtained from Falcon Meadows Filing No. 3)
D-2c	0.31	83.5	(Obtained from Falcon Meadows Filing No. 3)
D-2d	0.24	81.3	(Obtained from Falcon Meadows Filing No. 3)
D-2e	1.41	75.4	(Obtained from Falcon Meadows Filing No. 3)
D-2f	2.43	73.6	(Obtained from Falcon Meadows Filing No. 3)
D-2g	1.81	54.4	(Obtained from Falcon Meadows Filing No. 3)
D-2h	0.23	65	(Obtained from Falcon Meadows Filing No. 3)
D-3	2.26	54	(Obtained from Falcon Meadows Filing No. 3)
D-4a	0.98	72.5	(Obtained from Falcon Meadows Filing No. 3)
D-4b	0.95	80.9	(Obtained from Falcon Meadows Filing No. 3)
D-4c	3	65	
D-5	1.08	65.7	(Obtained from Falcon Meadows Filing No. 3)
D-6a	1.33	76.6	(Obtained from Falcon Meadows Filing No. 3)
D-6b	2.69	72.6	(Obtained from Falcon Meadows Filing No. 3)
D-7	8.01	13.2	
D-8	1.46	19.7	
D-9	0.72	24.8	(Obtained from Falcon Meadows Filing No. 3)
E-4	0.91	80.6	(Obtained from Falcon Meadows Filing No. 3)
E-5	0.89	89	(Obtained from Falcon Meadows Filing No. 3)
OS-2	20.07	8	(Obtained from Falcon Meadows Filing No. 3)
OS-3	10.61	8	(Obtained from Falcon Meadows Filing No. 3)
Total	**69.6**	**33.6**	

Galloway

DETENTION POND TRIBUTARY AREAS

Subdivision: Falcon Meadows
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass Filing No. 4
Project No.: CLH021
Calculated By: TJE
Checked By: BAS
Date: 6/29/22

Existing Pond - Bent Grass Residential Filing No. 1

Basin	Area	% Imp	
E-1	1.71	62.3	(Obtained from Bent Grass Residential Subdivision Filing 2)
E-2	0.68	82.8	(Obtained from Bent Grass Residential Subdivision Filing 2)
E-3	0.78	88.7	(Obtained from Bent Grass Residential Subdivision Filing 2)
A-1 Thru A-4	7.7	46	(Obtained from Bent Grass Residential Subdivision Filing 2)
OS-4	4.46	65	
OS-5	0.46	65	
OS-6	1.17	65	
A-1	2.19	65	
A-3	1.08	65	
A-4	0.81	2	
Total	**21.04**	**56.9**	

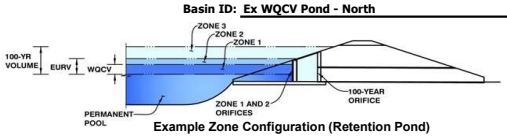
Galloway

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

Project: Bent Grass Residential Filing No. 2

Basin ID: Ex WQCV Pond - North



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	21.04	acres
Watershed Length =	1,700	ft
Watershed Length to Centroid =	1,000	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	59.30%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.410	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.509	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.123	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.481	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.767	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	2.162	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	2.551	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	3.031	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	5.036	acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	0.978	acre-feet		
Approximate 5-yr Detention Volume =	1.281	acre-feet		
Approximate 10-yr Detention Volume =	1.551	acre-feet		
Approximate 25-yr Detention Volume =	1.877	acre-feet		
Approximate 50-yr Detention Volume =	2.077	acre-feet		
Approximate 100-yr Detention Volume =	2.297	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.410	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.410	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

Total detention volume is less than 100-year volume.

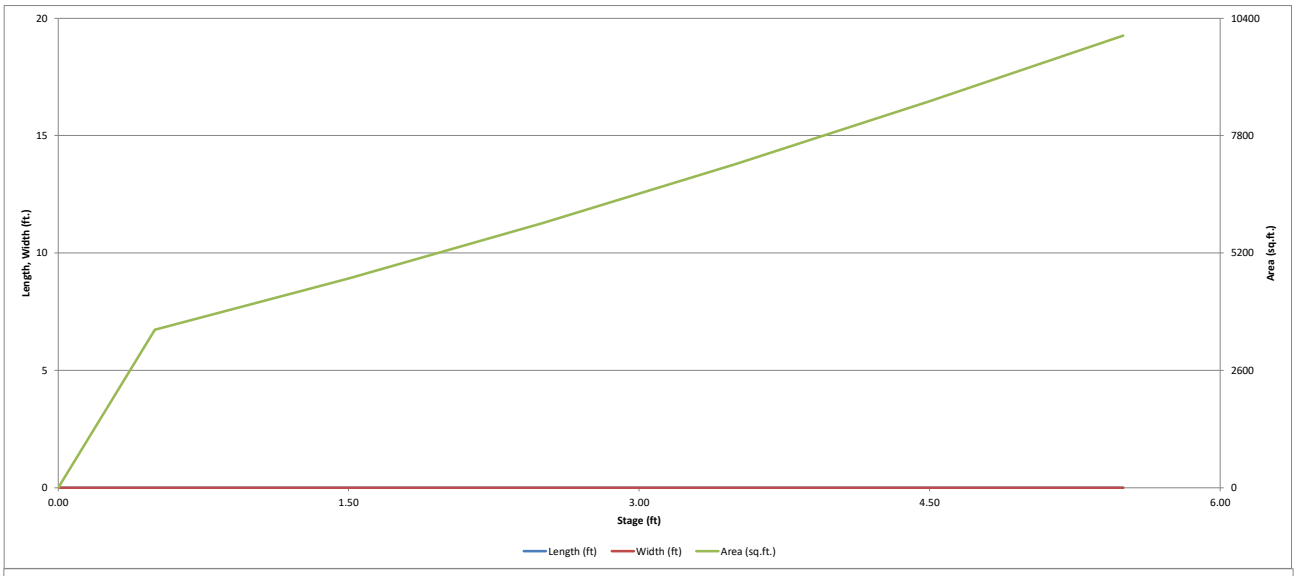
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

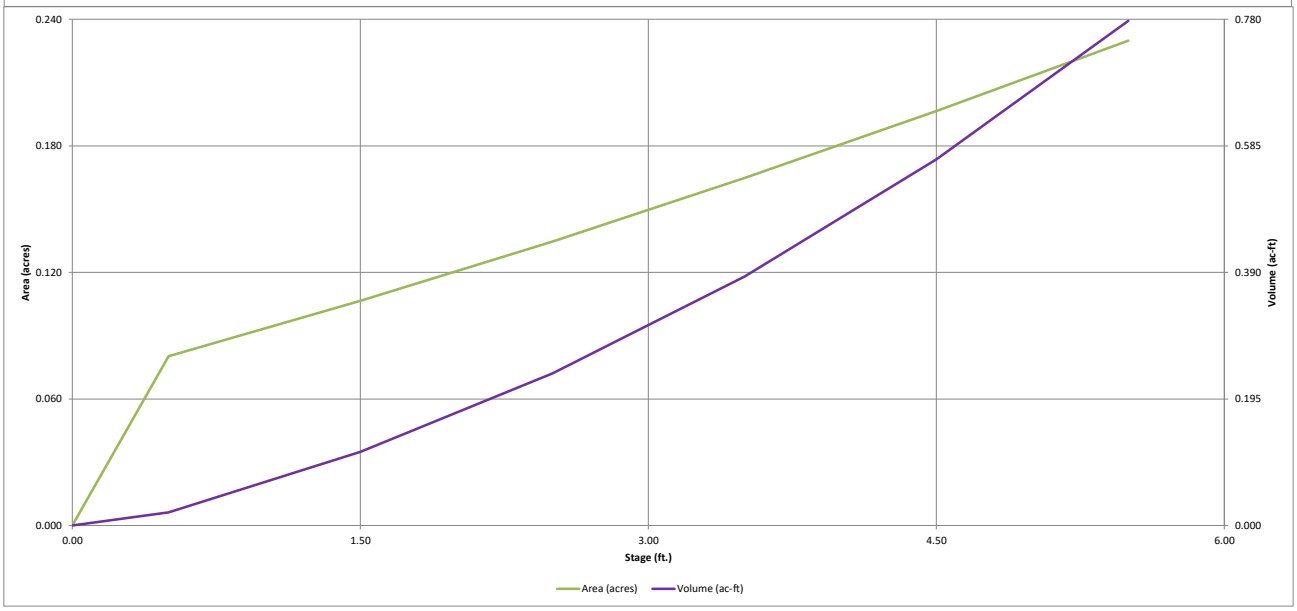
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
6939.25	--	0.50	--	--	--	3,500	0.080	875	0.020
6940.25	--	1.50	--	--	--	4,637	0.106	4,943	0.113
6941.25	--	2.50	--	--	--	5,865	0.135	10,194	0.234
6942.25	--	3.50	--	--	--	7,177	0.165	16,715	0.384
6943.25	--	4.50	--	--	--	8,559	0.196	24,583	0.564
6944.25	--	5.50	--	--	--	10,013	0.230	33,869	0.778

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)



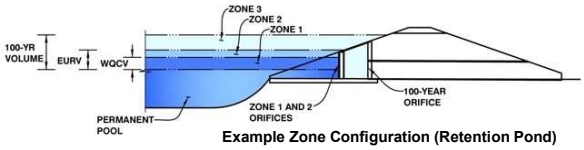


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Project: **Bent Grass Residential Filing No. 2**

Basin ID: **Ex WQCV Pond - North**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.66	0.410	Orifice Plate
Zone 2			
Zone 3			
Total (all zones)		0.410	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =		ft (distance below the filtration media surface)	Underdrain Orifice Area =		ft²
Underdrain Orifice Diameter =		inches	Underdrain Orifice Centroid =		feet

Calculated Parameters for Underdrain

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	1.153E-02	ft²
Depth at top of Zone using Orifice Plate =	3.10	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	12.00	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	1.66	sq. inches (diameter = 1-7/16 inches)	Elliptical Slot Area =	N/A	ft²

Calculated Parameters for Plate

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.00	2.00	3.00				
Orifice Area (sq. inches)	1.66	1.66	1.66					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected				
Invert of Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =		ft²
Depth at top of Zone using Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =		feet
Vertical Orifice Diameter =			inches			

Calculated Parameters for Vertical Orifice

Not Selected	Not Selected

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)

	Not Selected	Not Selected					
Overflow Weir Front Edge Height, Ho =			ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =			feet
Overflow Weir Front Edge Length =			feet	Overflow Weir Slope Length =			feet
Overflow Weir Grate Slope =			H:V	Grate Open Area / 100-yr Orifice Area =			
Horiz. Length of Weir Sides =			feet	Overflow Grate Open Area w/o Debris =			ft²
Overflow Grate Open Area % =			%, grate open area/total area	Overflow Grate Open Area w/ Debris =			ft²
Debris Clogging % =			%				

Calculated Parameters for Overflow Weir

Not Selected	Not Selected

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Not Selected	Not Selected					
Depth to Invert of Outlet Pipe =			ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =			ft²
Circular Orifice Diameter =			inches	Outlet Orifice Centroid =			feet
				Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Not Selected	Not Selected

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	3.25	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.45	feet
Spillway Crest Length =	40.00	feet	Stage at Top of Freeboard =	4.70	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.20	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	0.60	acre-ft

Calculated Parameters for Spillway

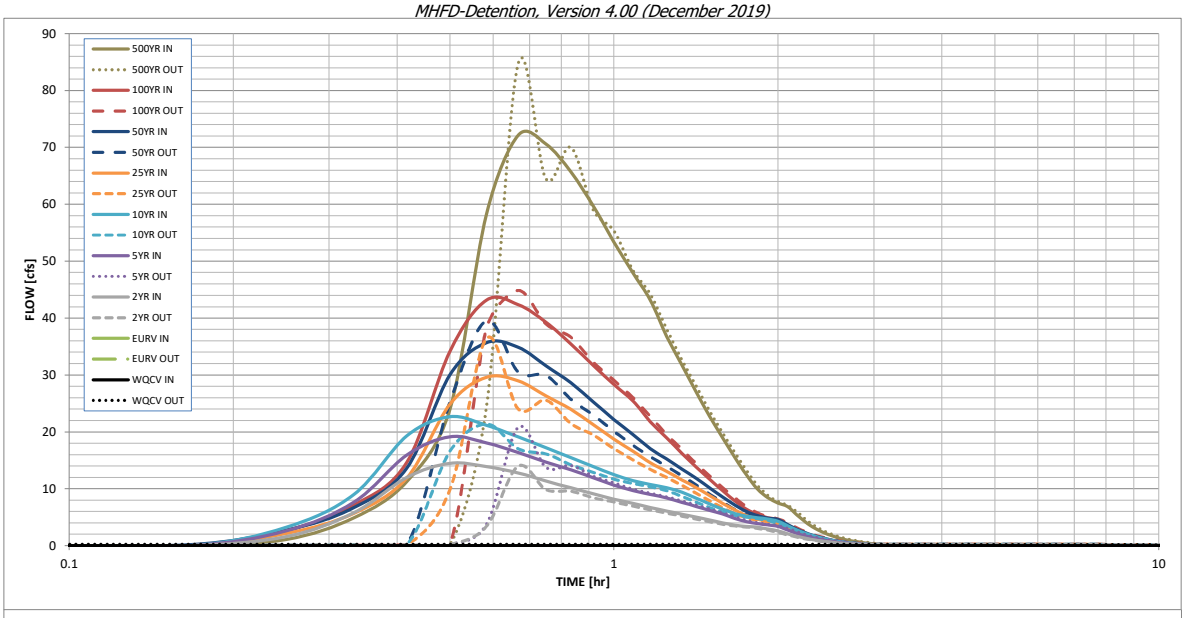
Routed Hydrograph Results

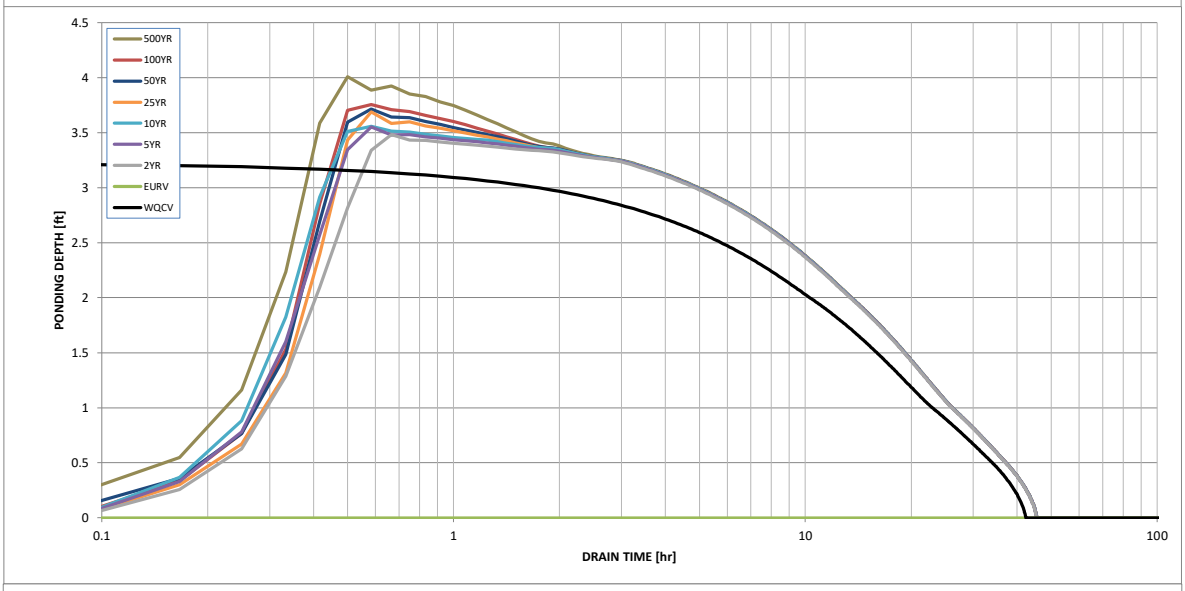
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

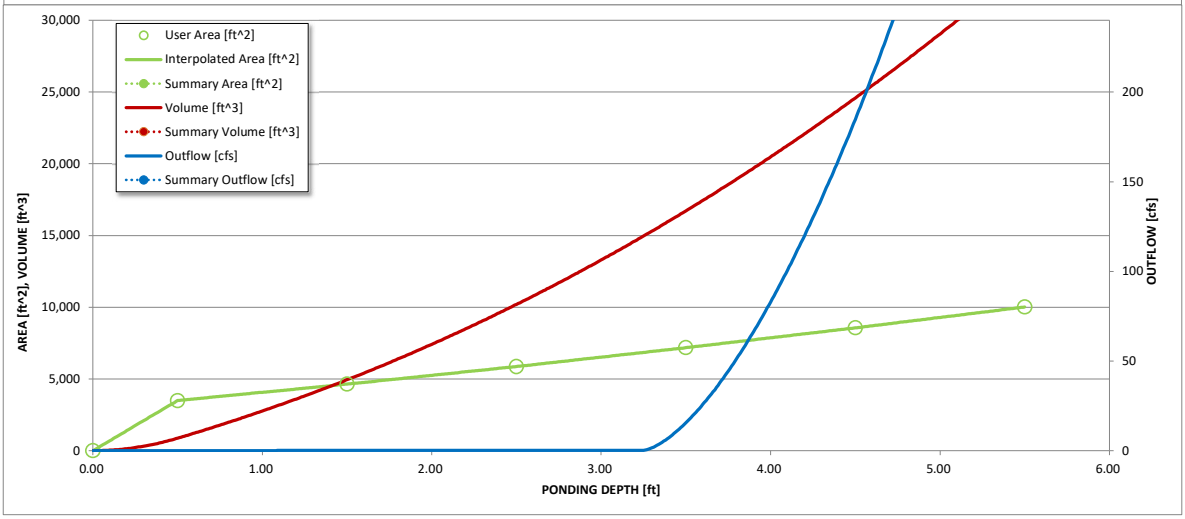
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.68
CUHP Runoff Volume (acre-ft) =	0.410	1.509	1.123	1.481	1.767	2.162	2.551	3.031	5.036
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.123	1.481	1.767	2.162	2.551	3.031	5.036
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.1	0.2	0.3	2.9	5.8	9.7	25.4
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.01	0.02	0.14	0.28	0.46	1.21
Peak Inflow Q (cfs) =	N/A	N/A	14.5	19.1	22.7	29.6	35.7	43.1	72.1
Peak Outflow Q (cfs) =	10.4	257.5	14.0	20.8	21.4	36.4	39.5	44.9	84.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	90.7	66.7	12.5	6.8	4.6	3.3
Structure Controlling Flow =	Spillway	Plate	Spillway	Spillway	Spillway	Spillway	Spillway	Spillway	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	37	>120	33	31	29	26	24	22	15
Time to Drain 99% of Inflow Volume (hours) =	**40**	>120	40	39	38	37	36	34	29
Maximum Ponding Depth (ft) =	3.66	0.00	3.48	3.55	3.56	3.69	3.71	3.75	4.01
Area at Maximum Ponding Depth (acres) =	0.17	0.00	0.16	0.17	0.17	0.17	0.17	0.17	0.18
Maximum Volume Stored (acre-ft) =	0.410	0.000	0.380	0.392	0.392	0.414	0.419	0.426	0.470

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.00 (December 2019)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.02	1.07
	0:15:00	0.00	0.00	1.59	2.58	3.20	2.16	2.71	2.64	4.89
	0:20:00	0.00	0.00	5.79	7.64	9.00	5.70	6.67	7.12	11.25
	0:25:00	0.00	0.00	11.99	15.90	19.26	11.89	13.60	14.62	23.96
	0:30:00	0.00	0.00	14.48	19.14	22.66	24.84	30.02	34.16	58.20
	0:35:00	0.00	0.00	13.87	18.05	21.15	29.59	35.68	43.15	72.13
	0:40:00	0.00	0.00	12.78	16.35	19.11	28.97	34.88	42.37	70.59
	0:45:00	0.00	0.00	11.37	14.69	17.22	26.34	31.61	39.27	65.71
	0:50:00	0.00	0.00	10.16	13.33	15.48	23.96	28.62	35.45	59.67
	0:55:00	0.00	0.00	9.10	11.93	13.89	21.24	25.27	31.64	53.40
	1:00:00	0.00	0.00	8.16	10.65	12.48	18.74	22.18	28.33	47.91
	1:05:00	0.00	0.00	7.45	9.67	11.42	16.59	19.53	25.43	43.13
	1:10:00	0.00	0.00	6.71	9.03	10.75	14.54	17.04	21.79	36.78
	1:15:00	0.00	0.00	6.08	8.36	10.20	13.04	15.23	18.93	31.73
	1:20:00	0.00	0.00	5.52	7.60	9.38	11.56	13.45	16.22	26.96
	1:25:00	0.00	0.00	5.00	6.88	8.32	10.20	11.82	13.79	22.69
	1:30:00	0.00	0.00	4.49	6.19	7.30	8.77	10.13	11.63	18.95
	1:35:00	0.00	0.00	4.00	5.55	6.39	7.45	8.56	9.65	15.53
	1:40:00	0.00	0.00	3.60	4.79	5.65	6.27	7.16	7.88	12.47
	1:45:00	0.00	0.00	3.36	4.22	5.18	5.30	5.99	6.40	9.93
	1:50:00	0.00	0.00	3.23	3.88	4.91	4.68	5.27	5.47	8.42
	1:55:00	0.00	0.00	2.90	3.64	4.65	4.31	4.85	4.92	7.50
	2:00:00	0.00	0.00	2.60	3.39	4.30	4.08	4.59	4.56	6.86
	2:05:00	0.00	0.00	2.10	2.74	3.48	3.28	3.69	3.62	5.40
	2:10:00	0.00	0.00	1.65	2.15	2.74	2.56	2.87	2.77	4.10
	2:15:00	0.00	0.00	1.30	1.69	2.14	2.00	2.24	2.12	3.11
	2:20:00	0.00	0.00	1.01	1.32	1.66	1.54	1.73	1.62	2.34
	2:25:00	0.00	0.00	0.78	1.02	1.28	1.19	1.33	1.24	1.80
	2:30:00	0.00	0.00	0.60	0.77	0.97	0.90	1.01	0.95	1.37
	2:35:00	0.00	0.00	0.46	0.58	0.73	0.68	0.76	0.72	1.03
	2:40:00	0.00	0.00	0.34	0.43	0.55	0.51	0.57	0.55	0.78
	2:45:00	0.00	0.00	0.25	0.32	0.41	0.39	0.43	0.41	0.59
	2:50:00	0.00	0.00	0.18	0.23	0.30	0.28	0.31	0.30	0.42
	2:55:00	0.00	0.00	0.11	0.15	0.20	0.19	0.21	0.20	0.29
	3:00:00	0.00	0.00	0.07	0.10	0.12	0.12	0.13	0.12	0.17
	3:05:00	0.00	0.00	0.03	0.05	0.06	0.06	0.07	0.07	0.09
	3:10:00	0.00	0.00	0.01	0.02	0.02	0.03	0.03	0.03	0.03
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft ^{2}]	Area [acres]	Volume [ft ^{3}]	Volume [ac-ft]	Total Outflow [cfs]

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

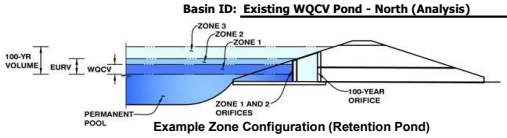
Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

Project: Falcon Meadows at Bent Grass Filing No. 2

Basin ID: Existing WQCV Pond - North (Analysis)



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	17.04	acres
Watershed Length =	1,275	ft
Watershed Length to Centroid =	750	ft
Watershed Slope =	0.030	ft/ft
Watershed Imperviousness =	59.30%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

		Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.332 acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.222 acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.900 acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.186 acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.414 acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	1.730 acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	2.041 acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.425 acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	4.027 acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	0.792 acre-feet		
Approximate 5-yr Detention Volume =	1.038 acre-feet		
Approximate 10-yr Detention Volume =	1.256 acre-feet		
Approximate 25-yr Detention Volume =	1.520 acre-feet		
Approximate 50-yr Detention Volume =	1.682 acre-feet		
Approximate 100-yr Detention Volume =	1.860 acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.332	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.332	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

Total detention volume is less than 100-year volume.

Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

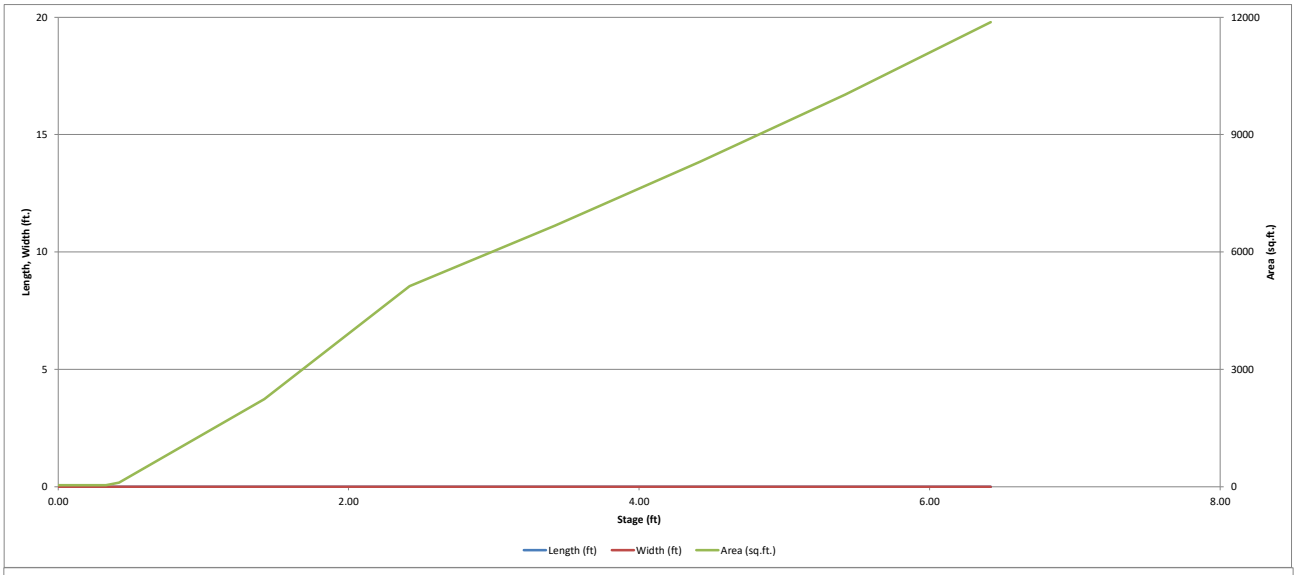
Depth Increment = ft

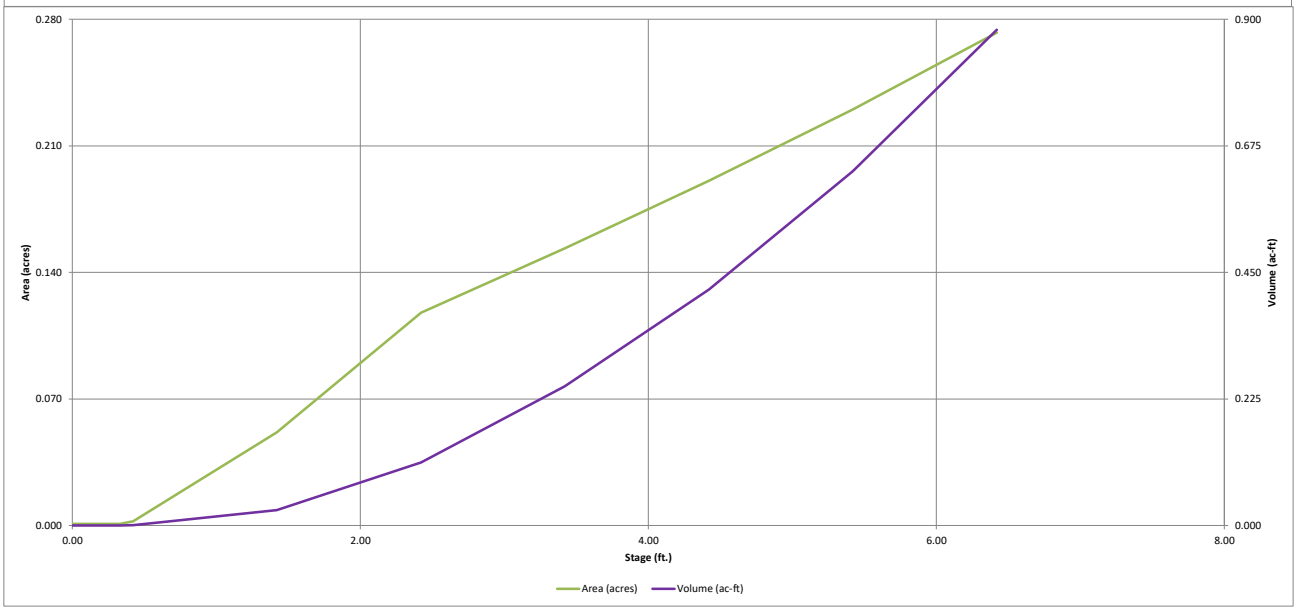
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	40	0.001		
Trickle Channel Inv	--	0.33	--	--	--	40	0.001	13	0.000
6941	--	0.42	--	--	--	102	0.002	20	0.000
6942	--	1.42	--	--	--	2,246	0.052	1,194	0.027
6943	--	2.42	--	--	--	5,126	0.118	4,880	0.112
6944	--	3.42	--	--	--	6,678	0.153	10,782	0.248
6945	--	4.42	--	--	--	8,308	0.191	18,275	0.420
6946	--	5.42	--	--	--	10,025	0.230	27,441	0.630
Top of Bank	--	6.42	--	--	--	11,873	0.273	38,390	0.881

6940.58
6940.91
6947.00

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)



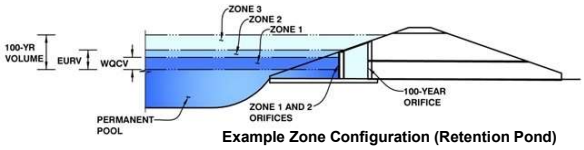


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Project: **Falcon Meadows at Bent Grass Filing No. 2**

Basin ID: **Existing WQCV Pond - North (Analysis)**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.94	0.332	Orifice Plate
Zone 2			
Zone 3			
Total (all zones)		0.332	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =		ft (distance below the filtration media surface)	Underdrain Orifice Area =		ft^2
Underdrain Orifice Diameter =		inches	Underdrain Orifice Centroid =		feet

Calculated Parameters for Underdrain

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	7.014E-03	ft^2
Depth at top of Zone using Orifice Plate =	4.07	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	1.01	sq. inches (diameter = 1-1/8 inches)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.10	2.20					
Orifice Area (sq. inches)	1.01	1.01	1.01					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected				
Invert of Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =		ft^2
Depth at top of Zone using Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =		feet
Vertical Orifice Diameter =			inches			

Calculated Parameters for Vertical Orifice

Not Selected	Not Selected

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)

	Not Selected	Not Selected					
Overflow Weir Front Edge Height, Ho =	4.08		ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	4.08		feet
Overflow Weir Front Edge Length =	6.00		feet	Overflow Weir Slope Length =	3.00		feet
Overflow Weir Grate Slope =	0.00		H:V	Grate Open Area / 100-yr Orifice Area =	4.01		
Horiz. Length of Weir Sides =	3.00		feet	Overflow Grate Open Area w/o Debris =	12.60		ft^2
Overflow Grate Open Area % =	70%		%, grate open area/total area	Overflow Grate Open Area w/ Debris =	6.30		ft^2
Debris Clogging % =	50%		%				

Calculated Parameters for Overflow Weir

Not Selected	Not Selected

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Not Selected	Not Selected					
Depth to Invert of Outlet Pipe =	0.25		ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	3.14		ft^2
Circular Orifice Diameter =	24.00		inches	Outlet Orifice Centroid =	1.00		feet
				Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Not Selected	Not Selected

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	4.92	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.66	feet
Spillway Crest Length =	25.00	feet	Stage at Top of Freeboard =	5.58	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.24	acres
Freeboard above Max Water Surface =	0.00	feet	Basin Volume at Top of Freeboard =	0.67	acre-ft

Calculated Parameters for Spillway

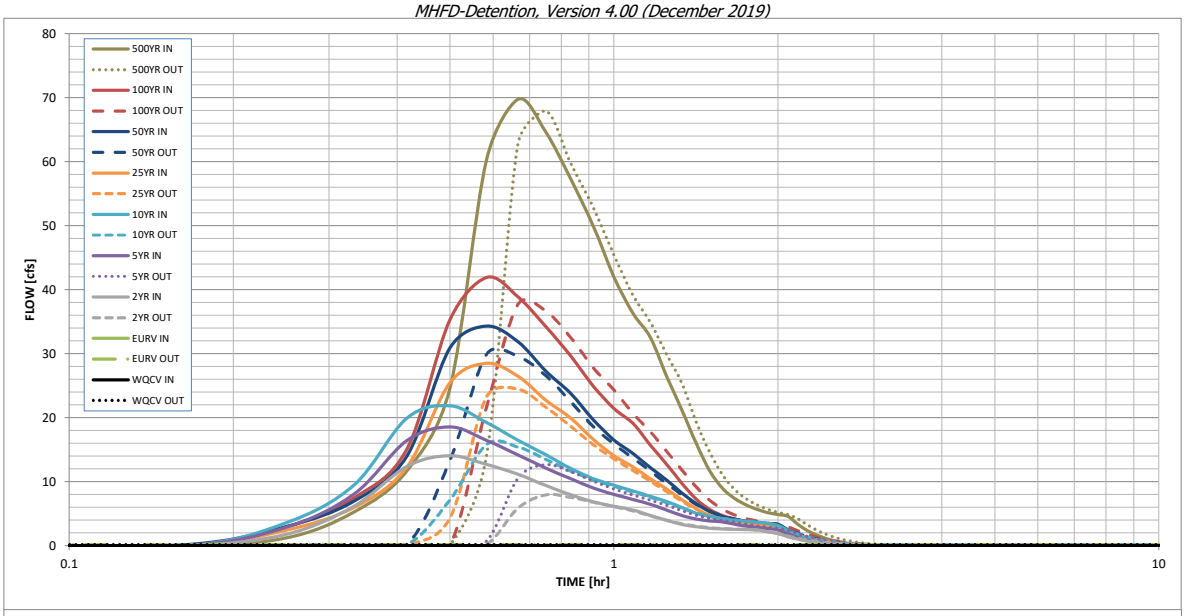
Routed Hydrograph Results

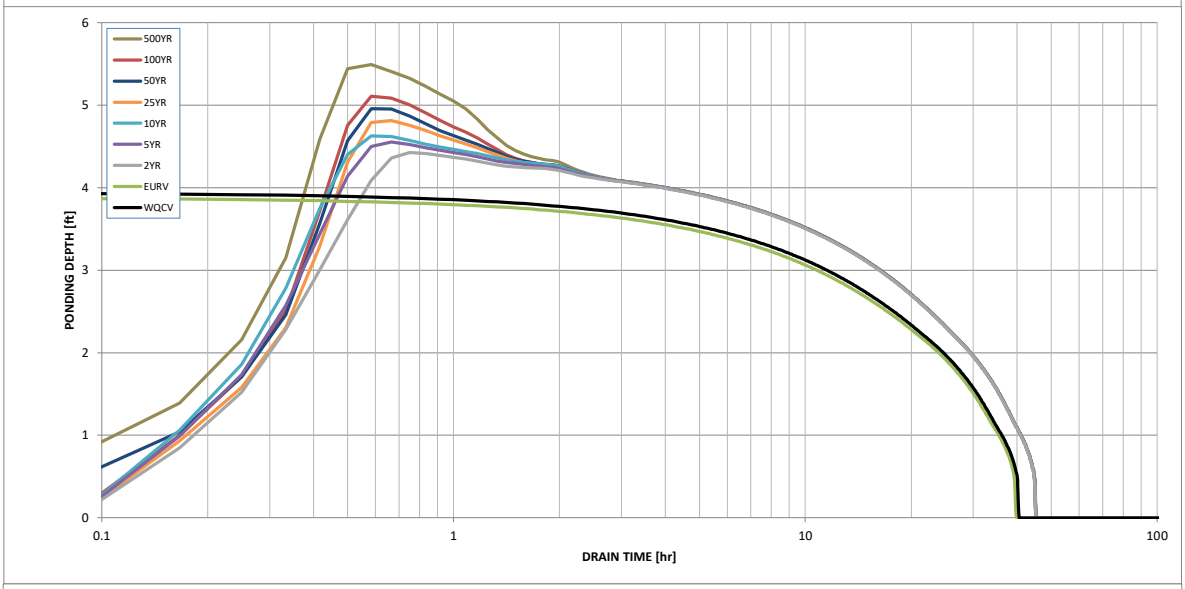
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

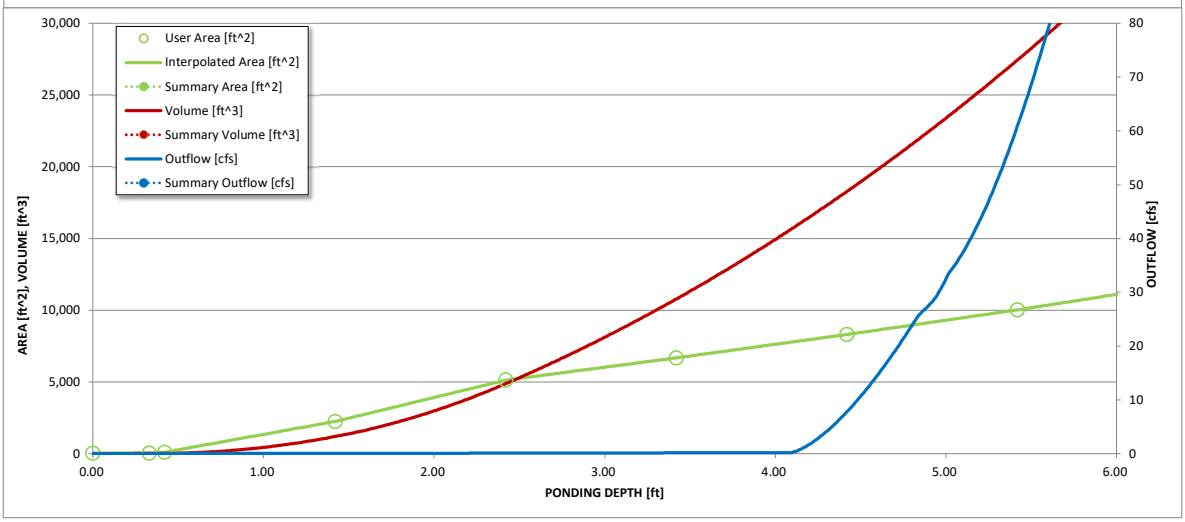
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.68
CUHP Runoff Volume (acre-ft) =	0.332	1.222	0.900	1.186	1.414	1.730	2.041	2.425	4.027
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.900	1.186	1.414	1.730	2.041	2.425	4.027
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.1	0.2	0.3	3.1	6.1	10.0	25.6
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.01	0.02	0.18	0.36	0.59	1.50
Peak Inflow Q (cfs) =	N/A	N/A	14.0	18.5	21.8	28.5	34.3	41.9	69.7
Peak Outflow Q (cfs) =	0.2	130.9	7.9	12.6	15.8	24.5	29.8	37.7	67.9
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	53.3	47.4	8.0	4.9	3.8	2.7
Structure Controlling Flow =	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Spillway	Spillway	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	0.60	1.0	1.2	1.9	2.3	2.5	2.6
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	36	32	37	35	34	32	31	29	23
Time to Drain 99% of Inflow Volume (hours) =	**39**	36	41	40	40	39	38	37	34
Maximum Ponding Depth (ft) =	3.94	3.87	4.42	4.55	4.63	4.81	4.96	5.11	5.49
Area at Maximum Ponding Depth (acres) =	0.17	0.17	0.19	0.20	0.20	0.21	0.21	0.22	0.23
Maximum Volume Stored (acre-ft) =	0.332	0.319	0.420	0.445	0.458	0.497	0.526	0.558	0.646

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.00 (December 2019)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.02	1.19
	0:15:00	0.00	0.00	1.76	2.86	3.55	2.39	2.97	2.91	5.24
	0:20:00	0.00	0.00	6.17	8.06	9.47	5.97	6.95	7.46	11.66
	0:25:00	0.00	0.00	12.37	16.41	19.89	12.25	13.97	15.03	24.62
	0:30:00	0.00	0.00	14.04	18.53	21.84	25.47	30.88	35.29	60.20
	0:35:00	0.00	0.00	12.69	16.46	19.23	28.47	34.31	41.88	69.73
	0:40:00	0.00	0.00	11.15	14.15	16.47	26.45	31.84	38.85	64.58
	0:45:00	0.00	0.00	9.39	12.11	14.18	22.72	27.24	34.22	57.27
	0:50:00	0.00	0.00	7.93	10.45	12.05	19.91	23.76	29.59	49.88
	0:55:00	0.00	0.00	6.87	9.01	10.46	16.59	19.65	24.92	42.01
	1:00:00	0.00	0.00	6.16	8.02	9.43	14.04	16.52	21.43	36.28
	1:05:00	0.00	0.00	5.57	7.22	8.56	12.29	14.38	19.10	32.54
	1:10:00	0.00	0.00	4.72	6.46	7.70	10.46	12.18	15.69	26.45
	1:15:00	0.00	0.00	3.94	5.55	6.89	8.84	10.23	12.72	21.15
	1:20:00	0.00	0.00	3.32	4.70	5.94	7.15	8.22	9.72	15.93
	1:25:00	0.00	0.00	2.93	4.15	5.07	5.77	6.56	7.25	11.64
	1:30:00	0.00	0.00	2.72	3.87	4.55	4.70	5.31	5.63	8.94
	1:35:00	0.00	0.00	2.61	3.70	4.21	4.06	4.57	4.71	7.36
	1:40:00	0.00	0.00	2.55	3.33	3.97	3.65	4.11	4.13	6.34
	1:45:00	0.00	0.00	2.51	3.04	3.79	3.38	3.80	3.74	5.65
	1:50:00	0.00	0.00	2.47	2.83	3.67	3.20	3.59	3.48	5.17
	1:55:00	0.00	0.00	2.16	2.67	3.49	3.07	3.45	3.29	4.83
	2:00:00	0.00	0.00	1.90	2.47	3.17	2.98	3.35	3.16	4.62
	2:05:00	0.00	0.00	1.42	1.85	2.36	2.23	2.50	2.36	3.43
	2:10:00	0.00	0.00	1.03	1.34	1.70	1.61	1.81	1.70	2.48
	2:15:00	0.00	0.00	0.75	0.97	1.23	1.16	1.31	1.24	1.80
	2:20:00	0.00	0.00	0.53	0.69	0.88	0.83	0.93	0.89	1.29
	2:25:00	0.00	0.00	0.37	0.47	0.61	0.58	0.65	0.62	0.90
	2:30:00	0.00	0.00	0.25	0.32	0.42	0.41	0.45	0.43	0.62
	2:35:00	0.00	0.00	0.16	0.22	0.28	0.28	0.31	0.29	0.42
	2:40:00	0.00	0.00	0.10	0.14	0.17	0.17	0.19	0.18	0.26
	2:45:00	0.00	0.00	0.05	0.07	0.09	0.09	0.10	0.10	0.14
	2:50:00	0.00	0.00	0.02	0.03	0.04	0.04	0.04	0.04	0.05
	2:55:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	**Stage** [ft]	**Area** [ft^2]	**Area** [acres]	**Volume** [ft^3]	**Volume** [ac-ft]	**Total Outflow** [cfs]

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

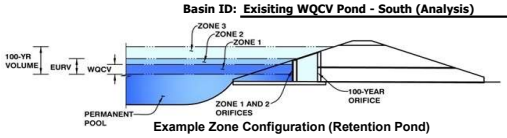
Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

Project: Falcon Meadows at Bent Grass Filing No. 2

Basin ID: Exisiting WQCV Pond - South (Analysis)



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	69.60	acres
Watershed Length =	3,600	ft
Watershed Length to Centroid =	1,500	ft
Watershed Slope =	0.030	ft/ft
Watershed Imperviousness =	33.60%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

		Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.941 acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	2.412 acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.746 acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	2.380 acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	2.898 acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	4.083 acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	5.199 acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	6.686 acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	12.916 acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	1.524 acre-feet		
Approximate 5-yr Detention Volume =	2.028 acre-feet		
Approximate 10-yr Detention Volume =	2.521 acre-feet		
Approximate 25-yr Detention Volume =	3.162 acre-feet		
Approximate 50-yr Detention Volume =	3.622 acre-feet		
Approximate 100-yr Detention Volume =	4.324 acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.941	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.941	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

Total detention volume is less than 100-year volume.

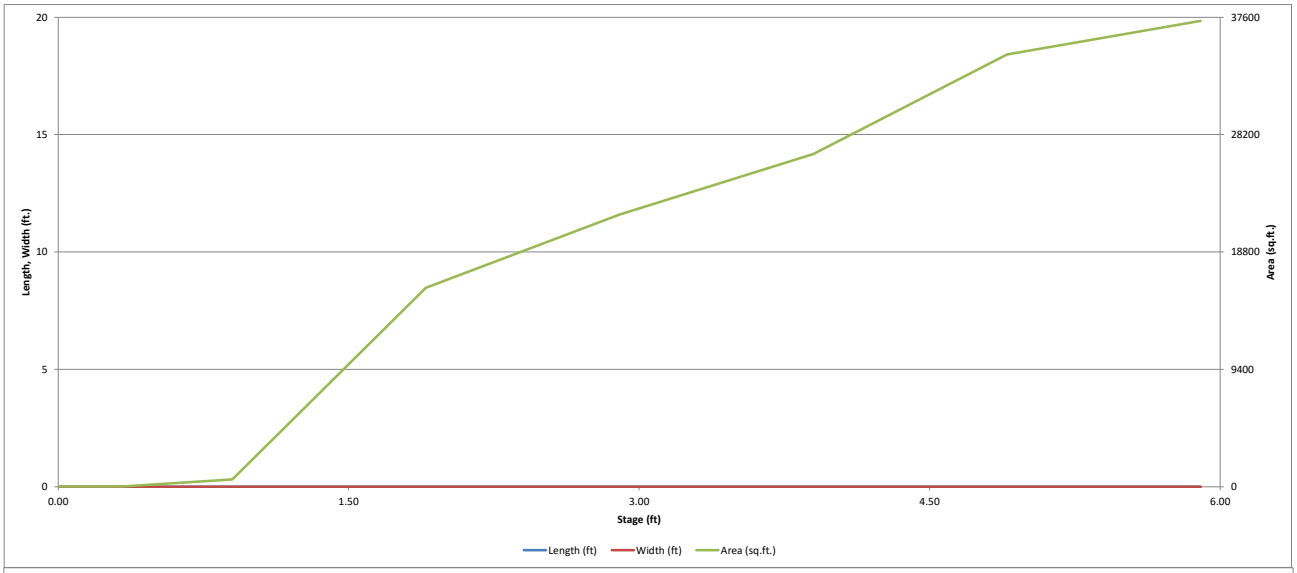
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

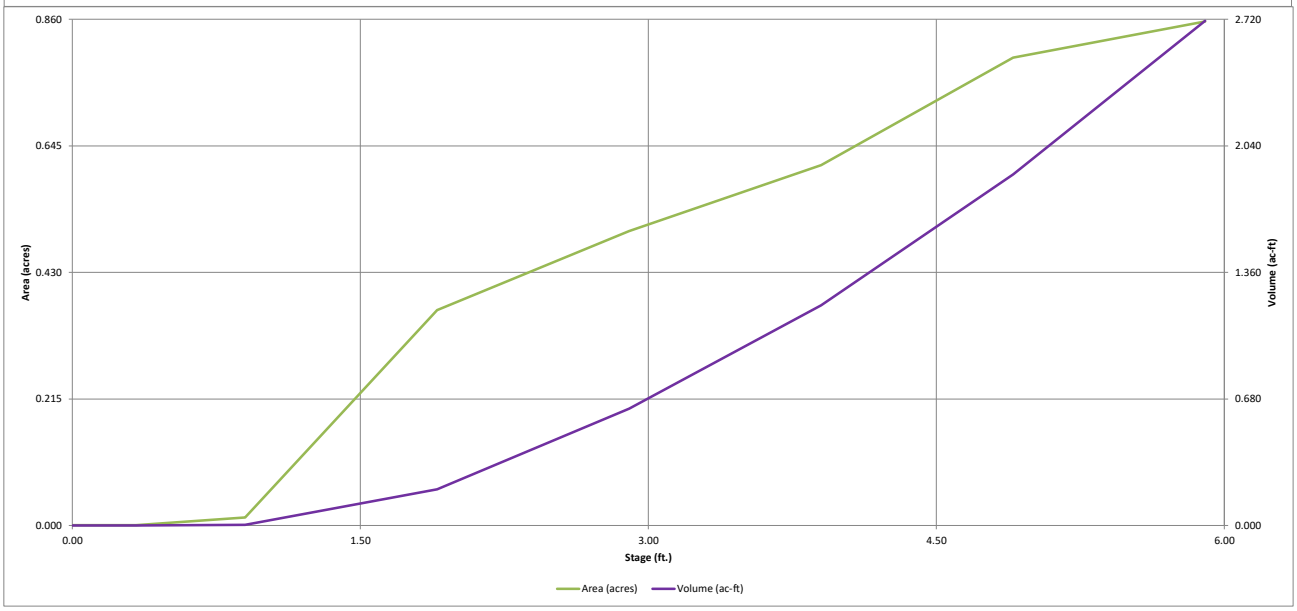
Depth Increment = 1.00 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
6923.1 Top of Micropool	--	0.00	--	--	--	35	0.001		
(Trickle Channel Inv) 6923.43	--	0.33	--	--	--	35	0.001	12	0.000
6924	--	0.90	--	--	--	593	0.014	191	0.004
6925	--	1.90	--	--	--	15,946	0.366	8,460	0.194
6926	--	2.90	--	--	--	21,804	0.501	27,335	0.628
6927	--	3.90	--	--	--	26,657	0.612	51,565	1.184
(Spillway Invert) 6928	--	4.90	--	--	--	34,630	0.795	82,209	1.887
(Top of Bank) 6929	--	5.90	--	--	--	37,309	0.856	118,178	2.713

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)



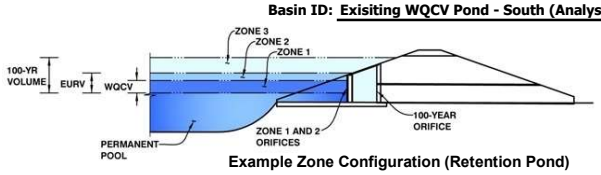


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Project: **Falcon Meadows at Bent Grass Filing No. 2**

Basin ID: **Exisiting WQCV Pond - South (Analysis)**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.49	0.941	Orifice Plate
Zone 2			
Zone 3			
Total (all zones)		0.941	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =		ft (distance below the filtration media surface)
Underdrain Orifice Diameter =		inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =		ft^2
Underdrain Orifice Centroid =		feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	3.41	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	2.41	sq. inches (diameter = 1-3/4 inches)

Calculated Parameters for Plate

WQ Orifice Area per Row =	1.670E-02	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.14	2.27					
Orifice Area (sq. inches)	2.41	2.41	2.41					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =			inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =			ft^2
Vertical Orifice Centroid =			feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)

	Not Selected	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.50		ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	6.00		feet
Overflow Weir Grate Slope =	0.00		H:V
Horiz. Length of Weir Sides =	6.00		feet
Overflow Grate Open Area % =	80%		%, grate open area/total area
Debris Clogging % =	50%		%

Calculated Parameters for Overflow Weir

	Not Selected	Not Selected	
Height of Grate Upper Edge, H_t =	3.50		feet
Overflow Weir Slope Length =	6.00		feet
Grate Open Area / 100-yr Orifice Area =	5.87		
Overflow Grate Open Area w/o Debris =	28.80		ft^2
Overflow Grate Open Area w/ Debris =	14.40		ft^2

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Not Selected	Not Selected	
Depth to Invert of Outlet Pipe =	2.50		ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter =	30.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Not Selected	Not Selected	
Outlet Orifice Area =	4.91		ft^2
Outlet Orifice Centroid =	1.25		feet
Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	4.90	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	24.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	0.00	feet

Calculated Parameters for Spillway

Spillway Design Flow Depth=	0.93	feet
Stage at Top of Freeboard =	5.83	feet
Basin Area at Top of Freeboard =	0.85	acres
Basin Volume at Top of Freeboard =	2.65	acre-ft

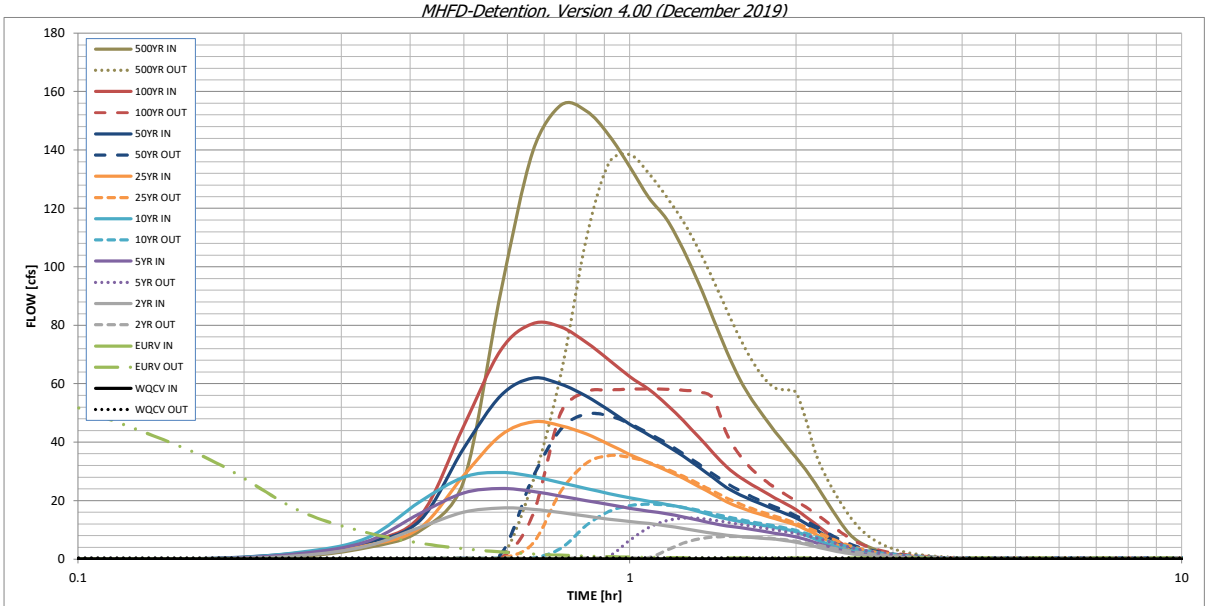
Routed Hydrograph Results

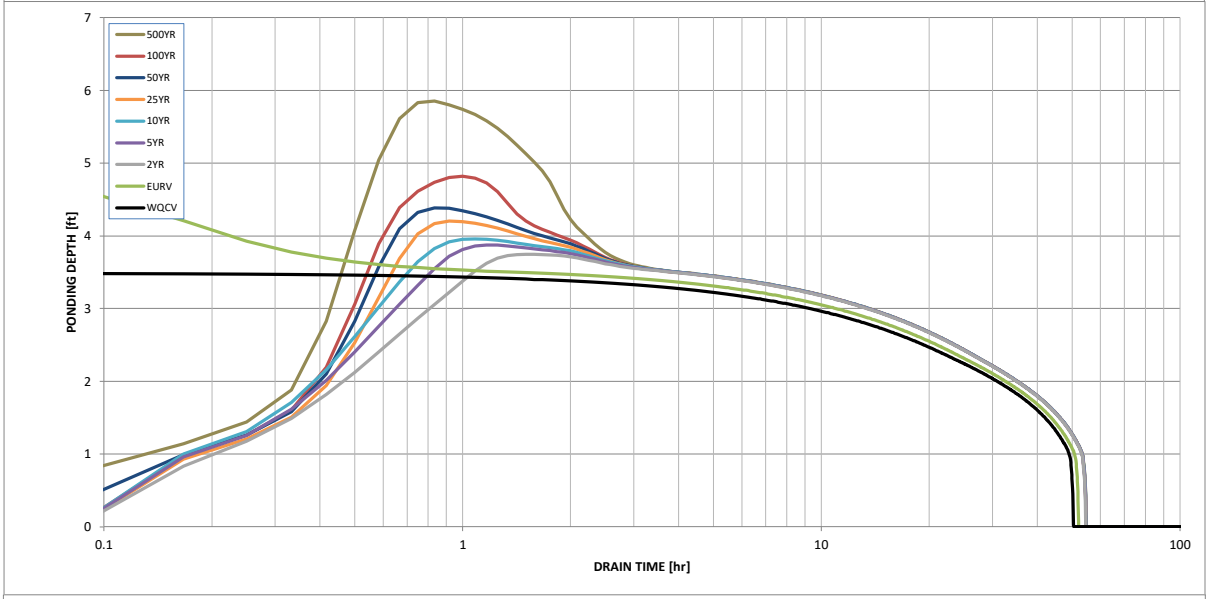
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

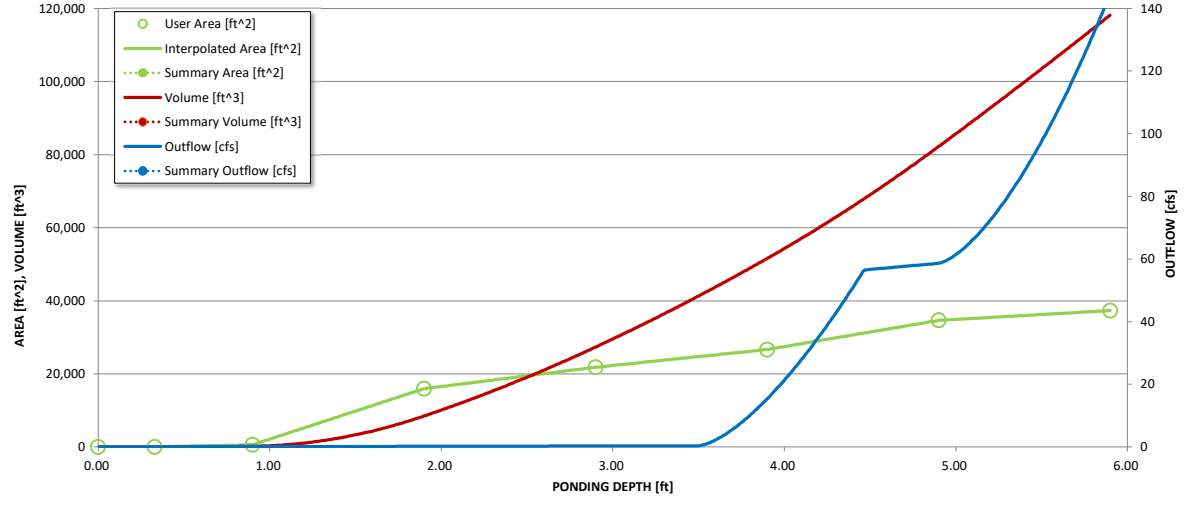
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.68
CUHP Runoff Volume (acre-ft) =	0.941	2.412	1.746	2.380	2.898	4.083	5.199	6.686	12.916
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.746	2.380	2.898	4.083	5.199	6.686	12.916
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.4	0.8	1.1	10.5	21.0	35.0	91.0
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.01	0.02	0.15	0.30	0.50	1.31
Peak Inflow Q (cfs) =	N/A	N/A	17.5	24.1	29.6	47.0	61.9	80.6	155.3
Peak Outflow Q (cfs) =	0.4	74.6	7.7	14.0	18.8	35.4	49.6	58.2	138.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	17.2	16.5	3.4	2.4	1.7	1.5
Structure Controlling Flow =	Plate	Spillway	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	2.12	0.26	0.5	0.6	1.2	1.7	2.0	2.2
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	46	45	48	47	45	43	40	37	26
Time to Drain 99% of Inflow Volume (hours) =	**49**	49	52	51	51	49	48	47	42
Maximum Ponding Depth (ft) =	3.49	5.55	3.75	3.88	3.96	4.20	4.38	4.82	5.85
Area at Maximum Ponding Depth (acres) =	0.57	0.83	0.59	0.61	0.62	0.67	0.70	0.78	0.85
Maximum Volume Stored (acre-ft) =	0.942	2.417	1.087	1.165	1.215	1.376	1.499	1.816	2.670

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.00 (December 2019)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.01	0.79
	0:15:00	0.00	0.00	1.10	1.78	2.24	1.53	1.98	1.90	3.87
	0:20:00	0.00	0.00	4.41	5.94	7.13	4.60	5.49	5.81	9.65
	0:25:00	0.00	0.00	10.85	15.61	19.66	10.61	13.20	14.60	26.52
	0:30:00	0.00	0.00	16.03	22.62	28.01	28.50	37.86	45.41	91.19
	0:35:00	0.00	0.00	17.45	24.13	29.62	42.31	55.85	71.47	139.37
	0:40:00	0.00	0.00	17.06	23.18	28.26	46.96	61.90	80.57	155.33
	0:45:00	0.00	0.00	15.88	21.50	26.13	45.64	59.83	79.44	153.41
	0:50:00	0.00	0.00	14.69	20.01	24.16	42.82	55.75	74.22	145.10
	0:55:00	0.00	0.00	13.67	18.61	22.38	39.29	50.94	68.18	134.29
	1:00:00	0.00	0.00	12.82	17.39	20.95	35.78	46.19	62.46	123.69
	1:05:00	0.00	0.00	12.15	16.40	19.79	32.95	42.45	58.03	116.21
	1:10:00	0.00	0.00	11.34	15.47	18.69	30.24	38.78	52.87	105.87
	1:15:00	0.00	0.00	10.44	14.41	17.59	27.59	35.17	47.37	94.37
	1:20:00	0.00	0.00	9.56	13.24	16.28	24.82	31.43	41.72	82.34
	1:25:00	0.00	0.00	8.77	12.14	14.83	22.13	27.81	36.28	70.90
	1:30:00	0.00	0.00	8.16	11.30	13.70	19.55	24.40	31.46	61.34
	1:35:00	0.00	0.00	7.73	10.73	12.86	17.64	21.98	27.98	54.33
	1:40:00	0.00	0.00	7.40	10.11	12.13	16.19	20.10	25.35	48.70
	1:45:00	0.00	0.00	7.08	9.45	11.45	14.94	18.47	23.02	43.67
	1:50:00	0.00	0.00	6.78	8.82	10.81	13.78	16.94	20.89	39.06
	1:55:00	0.00	0.00	6.29	8.21	10.13	12.70	15.50	18.86	34.70
	2:00:00	0.00	0.00	5.74	7.59	9.33	11.64	14.10	16.90	30.54
	2:05:00	0.00	0.00	5.02	6.67	8.14	10.16	12.21	14.52	25.86
	2:10:00	0.00	0.00	4.26	5.66	6.85	8.55	10.19	12.05	21.10
	2:15:00	0.00	0.00	3.54	4.68	5.61	6.98	8.23	9.64	16.49
	2:20:00	0.00	0.00	2.88	3.79	4.51	5.53	6.41	7.39	12.19
	2:25:00	0.00	0.00	2.30	3.02	3.58	4.23	4.78	5.35	8.56
	2:30:00	0.00	0.00	1.85	2.41	2.93	3.15	3.54	3.87	6.31
	2:35:00	0.00	0.00	1.52	2.00	2.46	2.46	2.76	2.94	4.79
	2:40:00	0.00	0.00	1.27	1.68	2.06	1.97	2.21	2.29	3.64
	2:45:00	0.00	0.00	1.06	1.40	1.72	1.60	1.78	1.79	2.75
	2:50:00	0.00	0.00	0.88	1.17	1.42	1.29	1.43	1.39	2.07
	2:55:00	0.00	0.00	0.73	0.96	1.17	1.05	1.15	1.08	1.54
	3:00:00	0.00	0.00	0.61	0.79	0.96	0.84	0.93	0.85	1.17
	3:05:00	0.00	0.00	0.50	0.65	0.79	0.69	0.76	0.69	0.95
	3:10:00	0.00	0.00	0.42	0.53	0.64	0.56	0.61	0.56	0.76
	3:15:00	0.00	0.00	0.34	0.43	0.51	0.45	0.49	0.45	0.61
	3:20:00	0.00	0.00	0.27	0.34	0.40	0.35	0.38	0.35	0.47
	3:25:00	0.00	0.00	0.21	0.26	0.31	0.27	0.29	0.27	0.35
	3:30:00	0.00	0.00	0.15	0.19	0.23	0.20	0.21	0.20	0.25
	3:35:00	0.00	0.00	0.11	0.14	0.16	0.14	0.15	0.13	0.16
	3:40:00	0.00	0.00	0.07	0.09	0.11	0.09	0.10	0.08	0.10
	3:45:00	0.00	0.00	0.04	0.06	0.06	0.05	0.05	0.05	0.05
	3:50:00	0.00	0.00	0.02	0.03	0.03	0.03	0.02	0.02	0.01
	3:55:00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.
The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer: TJE
Company: Galloway & Company
Date: June 29, 2022
Project: Falcon Meadows at Bent Grass Filing No. 4
Location: Falcon, CO

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	**A-2**													
Receiving Pervious Area Soil Type	Loamy Sand													
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	0.710													
Directly Connected Impervious Area (DCIA, acres)	0.000													
Unconnected Impervious Area (UIA, acres)	0.090													
Receiving Pervious Area (RPA, acres)	0.620													
Separate Pervious Area (SPA, acres)	0.000													
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C													

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	0.710													
Directly Connected Impervious Area (DCIA, %)	0.0%													
Unconnected Impervious Area (UIA, %)	12.7%													
Receiving Pervious Area (RPA, %)	87.3%													
Separate Pervious Area (SPA, %)	0.0%													
A_R (RPA / UIA)	6.889													
I_a Check	0.130													
f / I for WQCV Event:	3.2													
f / I for 5-Year Event:	0.5													
f / I for 100-Year Event:	0.4													
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	0.28													
IRF for 5-Year Event:	0.54													
IRF for 100-Year Event:	0.56													
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	12.7%													
Effective Imperviousness for WQCV Event:	3.6%													
Effective Imperviousness for 5-Year Event:	6.9%													
Effective Imperviousness for 100-Year Event:	7.1%													
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	67.8%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	51.7%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	**12.7%**
Total Site Effective Imperviousness for WQCV Event:	**3.6%**
Total Site Effective Imperviousness for 5-Year Event:	**6.9%**
Total Site Effective Imperviousness for 100-Year Event:	**7.1%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

APPENDIX E

Drainage Maps

Move this appendix to the very end of the report

MOVED TO APPENDIX F

Provide the existing drainage plan

THE EXISTING DRAINAGE MAP IS THE PROPOSED DRAINAGE MAP OF FILING 3. ADDED NOTE HERE TO REFERENCE APPENDIX B (EXCERPTS FROM PREIVOUS REPORTS)

Provide maintenance access

PROVIDED A MAINTENANCE ACCESS ROAD AND EASEMENT

LOT 13, THE MEADOWS FILING NO. 3
ZONE: RR-5
PLAT NO.: 10713
PARCEL NO.: 5301005043

EXISTING SWALE

EXISTING DROP STRUCTURE

EXISTING RIPRAP BANK PROTECTION

PROVIDED A TRACT FOR MAINTENANCE RESPONSIBILITY

Provide a separate tract to include Swale A for ownership and maintenance by district

ADDED LABEL

Label material and if it is to be removed

FALCON MEADOWS AT BENT GRASS FILING NO. 3

SWALE A

LEMON GRASS ROAD (60' PUBLIC-LOCAL-ROW)

THEDFORD COURT (50' LOCAL)

SILKY THREAD ROAD (50' LOCAL)

BENT GRASS RESIDENTIAL FILING NO. 2

HENZLEE PLACE (PUBLIC-LOCAL-50' ROW)

EXISTING CHANNEL

WILLMORE DRIVE (60' LOCAL)

BENT GRASS MEADOWS DRIVE (60' COLLECTOR)

EX. POND T
WQCV DETENTION POND
(BENT GRASS RESIDENTIAL FILING 2)

EX. POND NORTH
WQCV DETENTION POND
(FILING 2)

EX MAINTENANCE ACCESS TO POND

EX POND OVERFLOW

PR. TRICKLE CHANNEL

PR. FOREBAY

PR. 24" RCP (PRIVATE)

PR. 24" RCP (PUBLIC)

EX 18" RCP SD

EX 24" RCP SD

EX 30" RCP SD

EX 42" RCP SD

EX 7' STM MANHOLE

EX 5' STM MANHOLE

PR 5' STM MANHOLE

EX 15' CDOT TYPE R INLET

EX 20' CDOT TYPE R INLET

PR 24" RCP STM PIPE

EX 24" RCP SD

EX 18" RCP SD

EXISTING DROP STRUCTURE

S-5
CDOT-TYPE C INLET (35" X 35")
(PRIVATE)

S-3
CDOT-TYPE R INLET (15')
(PUBLIC)

S-2
CDOT-TYPE R INLET (10')
(PUBLIC)

A-1 4.4 / 2.19 / 9.1

A-2 1.8 / 0.71 / 3.8

A-3 2.2 / 1.08 / 4.5

A-4 0.0 / 0.81 / 0.9

B-1 0.1 / 4.32 / 2.8

C-1e 2.2 / 0.49 / 3.8

C-1f 1.7 / 1.12 / 4.0

C-1g 2.1 / 0.87 / 4.3

C-5 0.0 / 0.61 / 0.6

OS-4 7.7 / 4.46 / 16.1

OS-5 1.2 / 0.46 / 2.5

OS-6 2.2 / 1.17 / 4.6

MATCHLINE - SEE SHEET DR2.2

Show DP 13

ADDED DP13

Provide flows at DP AA

PROVIDED DESIGN POINT TABLE

Show DP 6

ADDED DP6

Provide a DP for gutter flows entering BGM Drive

PROVIDED DP 4A AND 5A

Provide Swale A cross-section

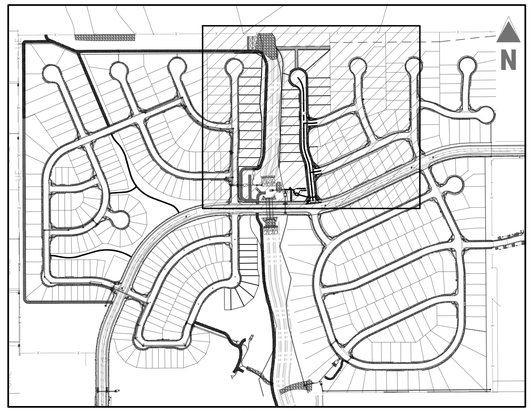
ADDED DETAILS FOR SWALE A AND C

PROVIDED A DP TABLE

Provide a DP summary table

N

0 10 20 50
SCALE: 1"=50'



KEY MAP
N.T.S.

DRAINAGE LEGEND

- PROPERTY LINE
- 6480 EXISTING MAJOR CONTOUR
- 6482 EXISTING MINOR CONTOUR
- 6480 PROPOSED MAJOR CONTOUR
- 6482 PROPOSED MINOR CONTOUR
- BASIN BOUNDARY LINE
- 100YR FEMA EFFECTIVE 100-YR FLOODPLAIN
- DBPS 100-YR FLOODPLAIN PER MATRIX DBPS
- CENTERLINE OF STREAM
- EXISTING RIPRAP
- EXISTING ACCESS
- PROPOSED RIPRAP
- PROPOSED ACCESS
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DESIGN POINT

(1 / 1.8 / 4.0 / 0.71)

BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
OS-4	4.46	0.50	0.62	15.61	7.7	16.1
OS-5	0.46	0.50	0.62	5.00	1.2	2.5
OS-6	1.17	0.50	0.62	12.86	2.2	4.6
A-1	2.19	0.50	0.62	10.95	4.4	9.1
A-2	0.71	0.50	0.62	5.00	1.8	3.8
A-3	1.08	0.50	0.62	10.63	2.2	4.5
A-4	0.81	0.01	0.13	5.00	0.0	0.9
B-1	4.32	0.01	0.13	21.61	0.1	2.8
C-1E	0.49	0.86	0.89	5.00	2.2	3.8
C-1G	0.87	0.50	0.62	6.75	2.1	4.3
C-5	0.51	0.01	0.13	5.00	0.0	0.6
C-1H	1.12	0.35	0.49	8.94	1.7	4.0
D-4C	3.00	0.50	0.62	14.22	5.4	11.2
D-7	8.01	0.06	0.21	14.81	1.7	10.0
D-8	1.46	0.11	0.26	14.03	0.6	2.3

Galloway
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

CHALLENGER HOMES

FINAL DRAINAGE REPORT
FALCON MEADOWS AT BENT GRASS FILING NO. 4
FOR
CHALLENGER COMMUNITIES, LLC

BENT GRASS MEADOWS DRIVE
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No: CLH021
Drawn By: TJE
Checked By: BAS
Date: JULY 1, 2022

PROPOSED DRAINAGE MAP

DR 2.1

MATCHLINE – SEE SHEET DR2.1

JOLIE COURT (PUBLIC–LOCAL–50' ROW)

BENT GRASS MEADOWS DRIVE (60' COLLECTOR)

ROWENA WAY (PUBLIC–LOCAL–50' ROW)

NICO WAY (PUBLIC–LOCAL–50' ROW)

LINLEE PLACE (PUBLIC–LOCAL–50' ROW)

LINLEY WAY (PUBLIC–LOCAL–50' ROW)

LOMA TRAIL (PUBLIC–LOCAL–50' ROW)

FALCON MEADOWS AT BENT GRASS FILING NO. 1

SWALE C

EXISTING CHANNEL

MAINTENANCE ACCESS

EX 15'X5' TWIN RCBC'S

EX 10' CDOT TYPE R INLET

EX RIPRAP OUTLET PROTECTION

EX 42" RCP SD

EX 48" RCP SD

EX 54" RCP SD

EX 24" RCP SD

EX 8' STM MANHOLE

EX 15' CDOT TYPE R INLET

EX FOREBAY

EX TRICKLE CHANNEL

EX POND SOUTH OVERFLOW

EX. POND SOUTH NOT TO BE MODIFIED WITH PHASE 1F

MAINTENANCE ACCESS TO POND

D-4C 3.00 5.4 11.2

D-8 1.46 0.8 2.3

D-7 8.01 1.7 10.0

N

0 15 30 50
SCALE: 1"=50'

KEY MAP
N.T.S.

Label maintenance access road

ADDED LINEWORK AND LABELED ROAD

Label lot numbers

ADDED LOT NUMBERS

Show floodplain boundary and elevations

PROVIDED PROPOSED CONDITION FLOODPLAIN AND BFE'S

Provide Swale C cross-section

PROVIDED DETAIL FOR SWALE C

PROVIDED DP'S DIRECTLY FROM FMBG F3 FDR

Provide a DP

Provide WQ pond summary tables on each plan

THERE IS NOT ENOUGH ROOM. PLEASE SEE APPENDIX E.

DRAINAGE LEGEND

- PROPERTY LINE
- EXISTING MAJOR CONTOUR (6480)
- EXISTING MINOR CONTOUR (6482)
- PROPOSED MAJOR CONTOUR (6480)
- PROPOSED MINOR CONTOUR (6482)
- BASIN BOUNDARY LINE
- FEMA EFFECTIVE 100–YR FLOODPLAIN (100YR)
- 100–YR FLOODPLAIN PER MATRIX DBPS (DBPS)
- CENTERLINE OF STREAM
- EXISTING RIPRAP
- EXISTING ACCESS
- PROPOSED RIPRAP
- PROPOSED ACCESS
- BASIN DESIGNATION (1 / 0.71 / 1.6 / 4.4)
  - 5–YEAR RUNOFF IN CUBIC FEET PER SECOND
  - 100–YEAR RUNOFF IN CUBIC FEET PER SECOND
  - BASIN AREA IN ACRES
- DESIGN POINT (1)

BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
OS-4	4.46	0.50	0.62	15.61	7.7	16.1
OS-5	0.46	0.50	0.62	5.00	1.2	2.5
OS-6	1.17	0.50	0.62	12.86	2.2	4.6
A-1	2.19	0.50	0.62	10.95	4.4	9.1
A-2	0.71	0.50	0.62	5.00	1.8	3.8
A-3	1.08	0.50	0.62	10.63	2.2	4.5
A-4	0.81	0.01	0.13	5.00	0.0	0.9
B-1	4.32	0.01	0.13	21.61	0.1	2.8
C-1E	0.49	0.86	0.89	5.00	2.2	3.8
C-1G	0.87	0.50	0.62	6.75	2.1	4.3
C-5	0.51	0.01	0.13	5.00	0.0	0.6
C-1H	1.12	0.35	0.49	8.94	1.7	4.0
D-4C	3.00	0.50	0.62	14.22	5.4	11.2
D-7	8.01	0.06	0.21	14.81	1.7	10.0
D-8	1.46	0.11	0.26	14.03	0.6	2.3

Galloway
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

CHALLENGER HOMES

FINAL DRAINAGE REPORT
FALCON MEADOWS AT BENT GRASS FILING NO. 4
FOR
CHALLENGER COMMUNITIES, LLC

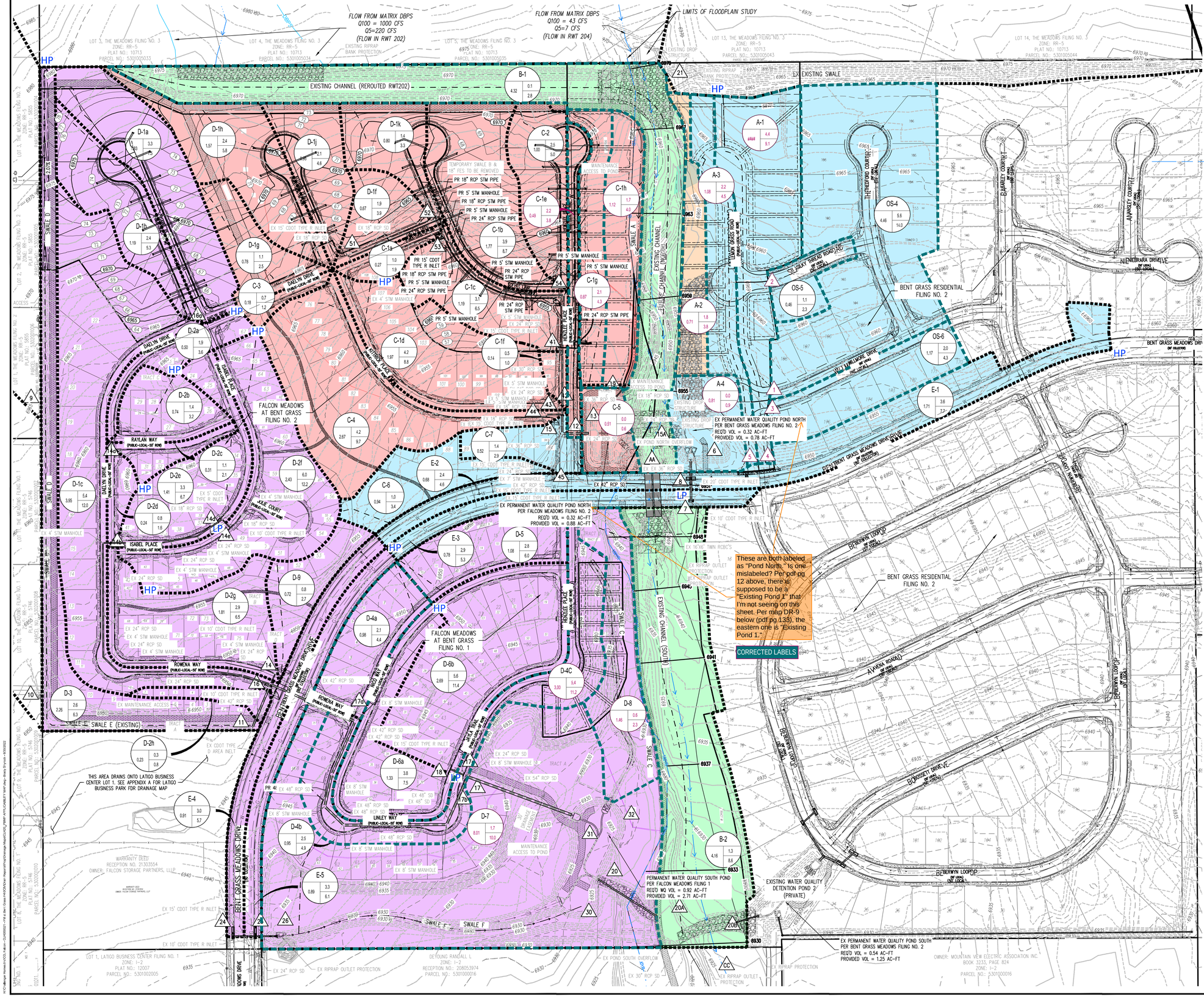
BENT GRASS MEADOWS DRIVE
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No: CLH021
Drawn By: TJE
Checked By: BAS
Date: JULY 1, 2022

PROPOSED DRAINAGE MAP

DR 2.2



EX PERMANENT WATER QUALITY POND NORTH
PER BENT GRASS MEADOWS FILING NO. 2
REQ'D VOL = 0.32 AC–FT
PROVIDED VOL = 0.78 AC–FT

EX PERMANENT WATER QUALITY POND NORTH
PER FALCON MEADOWS FILING NO. 2
REQ'D VOL = 0.32 AC–FT
PROVIDED VOL = 0.88 AC–FT

PERMANENT WATER QUALITY SOUTH POND
PER FALCON MEADOWS FILING 1
REQ'D WQ VOL = 0.92 AC–FT
PROVIDED VOL = 2.71 AC–FT

EXISTING WATER QUALITY
DETENTION POND 2
(PRIVATE)

EX PERMANENT WATER QUALITY POND SOUTH
PER BENT GRASS MEADOWS FILING NO. 2
REQ'D VOL = 0.54 AC–FT
PROVIDED VOL = 1.25 AC–FT

These are both labeled as "Pond North." Is one mislabeled? Per pdf pg 12 above, there is supposed to be a "Existing Pond 1" that I'm not seeing on this sheet. Per map DR-9 below (pdf pg 133), the eastern one is "Existing Pond 1."

CORRECTED LABELS

0 25 50 100
SCALE: 1"=100'

DRAINAGE LEGEND

▬	PROPERTY LINE
— — 6485 — —	EXISTING MAJOR CONTOUR
- - 6483 - -	EXISTING MINOR CONTOUR
—6485—	PROPOSED MAJOR CONTOUR
—6483—	PROPOSED MINOR CONTOUR
■ ■ ■ ■	BASIN BOUNDARY LINE
—100YR—	FEMA EFFECTIVE 100–YR FLOODPLAIN
→ · · ·	CENTERLINE OF STREAM
HP	HIGH POINT
LP	LOW POINT
➡	DIRECTION OF RUNOFF
🟥	AREA TO BE DETAINED IN PBMP (NORTH POND)
🟪	AREA TO BE DETAINED IN PBMP (SOUTH POND)
🟦	AREA TO BE DETAINED IN EXISTING PBMP
🟧	AREA NOT DETAINED IN PBMP PER SECTION I.7.1.C.1 (20% UP TO 1 AC. OF DEVELOPMENT SITE CAN BE EXCLLUDED, DUE TO TOPOGRAPHY)
🟩	AREA NOT DETAINED IN PBMP PER SECTION I.7.1.B.7 (LAND DISTURBANCE TO UNDEV. LAND THAT WILL REMAIN UNDEV)

1 — BASIN DESIGNATION
1.8 — 5–YEAR RUNOFF IN CUBIC FEET PER SECOND
4.8 — 100–YEAR RUNOFF IN CUBIC FEET PER SECOND
0.71 — BASIN AREA IN ACRES

▨	EXISTING RIPRAP
▨	PROPOSED RIPRAP
▨	PROPOSED ACCESS

Is this whole light blue area tributary to Existing Pond 1 or is there other existing PBMPs? Just clarify with parenthesis here like you did for the North and South ponds above.

ADDED DESCRIPTIONS TO LEGEND

Galloway

1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

CHALLENGER HOMES

FINAL DRAINAGE REPORT
FALCON MEADOWS AT BENT GRASS FILING NO. 3
FOR
CHALLENGER COMMUNTIES, LLC

BENT GRASS MEADOWS DRIVE
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.
-			
-			
-			
-			
-			
-			

Project No:	CLH000021
Drawn By:	BAS
Checked By:	RGD
Date:	07/01/2022

WQ PLAN

DR 2.3

APPENDIX F

Excerpts from Previous Studies

Historic Computations

COMPOSITE % IMPERVIOUS CALCULATIONS (EXISTING/HISTORIC CONDITIONS)

Subdivision: Falcon Meadows — Falcon Meadows at Bent Grass Filing No. 3
Location: CO, Colorado Springs — CLH020.20
TJE
CMD
12/2/20

Basin ID	Total Area (ac)	Paved Roads			Lawns			Roofs			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
OFFSITE BASINS											
WT200	192.00										10.0
OS-25	14.13	100	0.17	1.2	2	13.71	1.9	90	0.22	1.4	4.5
OS-26	5.81	100	0.00	0.0	2	5.81	2.0	90	0.00	0.0	2.0
OS-1	13.06	100	0.84	6.4	2	11.65	1.8	90	0.57	3.9	12.1
OS-2	17.81	100	2.00	11.2	2	15.18	1.7	90	0.63	3.2	16.1
OS-4	30.69	100	1.42	4.6	2	28.41	1.9	90	0.86	2.5	9.0
BENT GRASS FILING NO. 2 & BENT GRASS WEST BASINS											
A-1	5.42	100	0.16	3.0	2	5.26	1.9	90	0.00	0.0	4.9
A-2	18.00	100	0.00	0.0	2	18.00	2.0	90	0.00	0.0	2.0
A-3	19.59	100	0.00	0.0	2	19.59	2.0	90	0.00	0.0	2.0
A-4	23.81	100	0.57	2.4	2	23.12	1.9	90	0.12	0.5	4.8
B-1	32.53	100	0.00	0.0	2	32.53	2.0	90	0.00	0.0	2.0
B-2	4.51	100	0.00	0.0	2	4.51	2.0	90	0.00	0.0	2.0
B-3	16.18	100	1.00	6.2	2	15.18	1.9	90	0.00	0.0	8.1

COMPOSITE RUNOFF COEFFICIENT CALCULATIONS (EXISTING/HISTORIC CONDITIONS)

Subdivision: Falcon Meadows — Falcon Meadows at Bent Grass Filing No. 3
Location: CO, Colorado Springs — CLH020.20
TJE
CMD
12/2/20

Basin ID	Total Area (ac)	Hydrologic Soils Group	Paved Roads			Lawns			Roofs			Composite C_5	Composite C_{100}
			C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)		
OFFSITE BASINS													
WT200	192.00											0.20	0.44
OS-25	14.13	A	0.90	0.96	0.17	0.09	0.36	13.71	0.73	0.81	0.22	0.11	0.37
OS-26	5.81	A	0.90	0.96	0.00	0.09	0.36	5.81	0.73	0.81	0.00	0.09	0.36
OS-1	13.06	A	0.90	0.96	0.84	0.09	0.36	11.65	0.73	0.81	0.57	0.17	0.42
OS-2	17.81	A	0.90	0.96	2.00	0.09	0.36	15.18	0.73	0.81	0.63	0.20	0.44
OS-4	30.69	A	0.90	0.96	1.42	0.09	0.36	28.41	0.73	0.81	0.86	0.15	0.40
BENT GRASS FILING NO. 2 & BENT GRASS WEST BASINS													
A-1	5.42	A	0.90	0.96	0.16	0.09	0.36	5.26	0.73	0.81	0.00	0.11	0.38
A-2	18.00	A	0.90	0.96	0.00	0.09	0.36	18.00	0.73	0.81	0.00	0.09	0.36
A-3	19.59	A	0.90	0.96	0.00	0.09	0.36	19.59	0.73	0.81	0.00	0.09	0.36
A-4	23.81	A	0.90	0.96	0.57	0.09	0.36	23.12	0.73	0.81	0.12	0.11	0.38
B-1	32.53	A	0.90	0.96	0.00	0.09	0.36	32.53	0.73	0.81	0.00	0.09	0.36
B-2	4.51	A	0.90	0.96	0.00	0.09	0.36	4.51	0.73	0.81	0.00	0.09	0.36
B-3	16.18	A	0.90	0.96	1.00	0.09	0.36	15.18	0.73	0.81	0.00	0.14	0.40

STANDARD FORM SF-2
TIME OF CONCENTRATION
EXISTING/HISTORIC CONDITIONS

Subdivision: Falcon Meadows
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass Filing No. 3
Project No.: CLH020.20
Calculated By: TJE
Checked By: CMD
Date: 12/2/20

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					Tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C5	C_{100}	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH (FT)	Urbanized T_c (MIN)	T_c (MIN)
OFFSITE BASINS																	
WT200	192.00	A	10.00	0.20	0.44	300	2.0	22.7	2060	2.0	15.0	2.1	16.2	38.8	2360.0	23.1	23.1
OS-25	14.13	A	4.50	0.11	0.37	300	2.5	23.1	1400	3.0	15.0	2.6	9.0	32.1	1700.0	19.4	19.4
OS-26	5.81	A	2.00	0.09	0.36	300	2.0	25.4	400	2.0	15.0	2.1	3.1	28.6	700.0	13.9	13.9
OS-1	13.06	A	12.10	0.17	0.42	300	2.5	21.7	1420	2.5	15.0	2.4	10.0	31.7	1720.0	19.6	19.6
OS-2	17.81	A	16.10	0.20	0.44	300	2.3	21.6	1370	2.3	15.0	2.3	10.0	31.7	1670.0	19.3	19.3
OS-4	30.69	A	9.00	0.15	0.40	300	2.3	22.8	2600	2.3	15.0	2.3	19.0	41.9	2900.0	26.1	26.1
BENT GRASS FILING NO. 2 & BENT GRASS WEST BASINS																	
A-1	5.42	A	4.90	0.11	0.38	300	2.5	23.0	466	2.5	15.0	2.4	3.3	26.3	766.0	14.3	14.3
A-2	18.00	A	2.00	0.09	0.36	300	2.4	23.9	1130	2.0	15.0	2.1	8.9	32.8	1430.0	17.9	17.9
A-3	19.59	A	2.00	0.09	0.36	300	2.7	23.0	760	2.7	15.0	2.5	5.1	28.1	1060.0	15.9	15.9
A-4	23.81	A	4.80	0.11	0.38	300	2.0	24.9	1500	2.0	15.0	2.1	11.8	36.7	1800.0	20.0	20.0
B-1	32.53	A	2.00	0.09	0.36	300	2.6	23.3	1100	2.6	15.0	2.4	7.6	30.9	1400.0	17.8	17.8
B-2	4.51	A	2.00	0.09	0.36	300	3.0	22.2	323	5.0	15.0	3.4	1.6	23.8	623.0	13.5	13.5
B-3	16.18	A	8.10	0.14	0.40	300	2.9	21.4	780	2.9	15.0	2.6	5.1	26.4	1080.0	16.0	16.0

NOTES:

$T_i = (0.395*(1.1 - C_5)*(L)^0.5)/((S)^0.33)$, S in ft/ft

T_t=L/60V

Velocity V=Cv*S^0.5, S in ft/ft

Tc Check = 10+L/180

For Urbanized basins a minimum T_c of 5.0 minutes is required.

For non-urbanized basins a minimum T_c of 10.0 minutes is required

Type of Land Surface	Cv
Heavy Meadow	2.5
Tillage/field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN (EXISTING/HISTORIC CONDITIONS)

(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass Filing No. 3
Project No.: CLH020.20
Calculated By: TJE
Checked By: CMD
Date: 12/2/20

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
		RWT202	1574.40						46.6	7.69	1.82	14.0									From Falcon DBPS by Matrix (Existing Flows)
		RWT204	38.40						11.4	1.78	3.94	7.0									From Falcon DBPS by Matrix (Existing Flows)
		WT200	192.00						37.8	11.74	2.13	25.0									From Falcon DBPS by Matrix (Existing Flows)
		OS-25	14.13	0.11	19.4	1.55	3.13	4.9													
		OS-26	5.81	0.09	13.9	0.52	3.64	1.9													
		OS-1	13.06	0.17	19.6	2.22	3.12	6.9													
		OS-2	17.81	0.20	19.3	3.56	3.14	11.2													
		OS-4	30.69	0.15	26.1	4.60	2.69	12.4													
BENT GRASS FILING NO. 2 & BENT GRASS WEST BASINS																					
		A-1	5.42	0.11	14.3	0.60	3.60	2.2													
		A-2	18.00	0.09	17.9	1.62	3.25	5.3													
		A-3	19.59	0.09	15.9	1.76	3.43	6.0													
		A-4	23.81	0.11	20.0	2.62	3.09	8.1													
		B-1	32.53	0.09	17.8	2.93	3.27	9.6													
		B-2	4.51	0.09	13.5	0.41	3.68	1.5													
		B-3	16.18	0.14	16.0	2.27	3.42	7.8													

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass Filing No. 3
Project No.: CLH020.20
Calculated By: TJE
Checked By: CMD
Date: 12/2/20

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
		RWT202	1574.40						46.6	252.46	3.05	770.0									From Falcon DBPS by Matrix (Existing Flows)
		RWT204	38.40						11.4	6.51	6.61	43.0									From Falcon DBPS by Matrix (Existing Flows)
		WT200	192.00						37.8	30.73	3.58	110.0									From Falcon DBPS by Matrix (Existing Flows)
		OS-25	14.13	0.37	19.4	5.23	5.26	27.5													
		OS-26	5.81	0.36	13.9	2.09	6.10	12.7													
		OS-1	13.06	0.42	19.6	5.49	5.24	28.8													
		OS-2	17.81	0.44	19.3	7.84	5.28	41.4													
		OS-4	30.69	0.40	26.1	12.28	4.51	55.4													
BENT GRASS FILING NO. 2 & BENT GRASS WEST BASINS																					
		A-1	5.42	0.38	14.3	2.06	6.04	12.4													
		A-2	18.00	0.36	17.9	6.48	5.46	35.4													
		A-3	19.59	0.36	15.9	7.05	5.77	40.7													
		A-4	23.81	0.38	20.0	9.05	5.19	47.0													
		B-1	32.53	0.36	17.8	11.71	5.48	64.2													
		B-2	4.51	0.36	13.5	1.62	6.18	10.0													
		B-3	16.18	0.40	16.0	6.47	5.75	37.2													

Proposed Computations

COMPOSITE % IMPERVIOUS CALCULATIONS: PROPOSED

Subdivision: Falcon Meadows
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass Filing No. 3
Project No.: CLH000020
Calculated By: CMV
Checked By: SMB
Date: 12/6/21

Basin ID	Total Area (ac)	Paved/Gravel Roads			Lawns/Undeveloped			Residential - 1/8 Acre			Residential - 1/4 Acre			Residential - 1/3 Acre			Residential - 1/2 Acre			Residential - 1 Acre			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
OFFSITE																							
OS-1	32.28	100	2.15	6.7	2	29.25	1.8	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	11.0
OS-2	20.07	80	0.90	3.6	2	18.62	1.9	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	8.0
OS-3	10.61	80	0.48	3.6	2	9.84	1.9	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	8.0
BENT GRASS FILING NO. 2 & FALCON MEADOWS AT BENT GRASS FILING NO. 1																							
EX-1	1.19	100	0.00	0.0	2	1.19	2.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
EX-2	1.60	100	0.00	0.0	2	1.60	2.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
EX-3	0.66	100	0.00	0.0	2	0.66	2.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
B-1	6.59	100	0.00	0.0	2	6.59	2.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
B-2	4.16	100	0.00	0.0	2	4.16	2.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
D-4a	0.98	100	0.21	21.4	2	0.00	0.0	65.0	0.77	51.1	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	72.5
D-4b	0.95	100	0.43	45.3	2	0.00	0.0	65.0	0.52	35.6	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	80.9
D-4c	1.22	100	0.43	35.2	2	0.24	0.4	65.0	0.55	29.3	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	64.9
D-5	1.08	100	0.22	20.4	2	0.11	0.2	65.0	0.75	45.1	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.7
D-6a	1.33	100	0.44	33.1	2	0.00	0.0	65.0	0.89	43.5	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	76.6
D-6b	2.69	100	0.59	21.9	2	0.00	0.0	65.0	2.10	50.7	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	72.6
D-7	7.65	100	0.00	0.0	2	6.22	1.6	65.0	1.43	12.2	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	13.8
D-8	1.69	100	0.00	0.0	2	0.11	0.1	65.0	1.58	60.8	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	60.9
E-1	1.71	100	0.78	45.6	2	0.23	0.3	65.0	0.00	0.0	40	0.70	16.4	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	62.3
E-2	0.68	100	0.56	82.4	2	0.12	0.4	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	82.8
E-3	0.78	100	0.69	88.5	2	0.09	0.2	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	88.7
E-4	0.91	100	0.73	80.2	2	0.18	0.4	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	80.6
E-5	0.89	100	0.79	88.8	2	0.10	0.2	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	89.0
OS-4	4.46	100	0.00	0.0	2	0.00	0.0	65.0	2.28	33.2	40	1.46	13.1	30	0.00	0.0	25	0.00	0.0	20	0.72	3.2	49.5
OS-5	0.46	100	0.00	0.0	2	0.00	0.0	65.0	0.46	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
OS-6	1.17	100	0.00	0.0	2	0.00	0.0	65.0	1.17	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
FALCON MEADOWS AT BENT GRASS FILING NO. 2																							
C-1a	0.27	100	0.15	55.6	2	0.00	0.0	65.0	0.12	28.9	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	84.5
C-1d	1.97	100	0.40	20.3	2	0.00	0.0	65.0	1.57	51.8	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	72.1
C-1e	0.49	100	0.49	100.0	2	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	100.0
C-3	0.18	100	0.14	77.8	2	0.02	0.3	65.0	0.02	7.6	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	85.7
C-4	2.67	100	0.41	15.4	2	0.84	0.6	65.0	1.41	34.3	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	50.3
C-5	0.60	100	0.00	0.0	2	0.60	2.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
C-6	0.94	100	0.00	0.0	2	0.65	1.4	65.0	0.29	20.1	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	21.5
C-7	0.52	100	0.15	29.4	2	0.00	0.0	65.0	0.37	46.3	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	75.7
D-9	0.72	100	0.00	0.0	2	0.46	1.3	65.0	0.26	23.5	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	24.8
D-1c	3.95	100	0.33	8.4	2	0.00	0.0	65.0	2.67	43.9	40	0.95	9.6	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	61.9
D-2a	0.50	100	0.33	66.0	2	0.00	0.0	65.0	0.17	22.7	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	88.7
D-2b	0.74	100	0.18	24.3	2	0.14	0.4	65.0	0.42	37.1	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	61.8
D-2c	0.31	100	0.15	50.0	2	0.00	0.0	65.0	0.16	33.5	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	83.5
D-2d	0.24	100	0.10	43.4	2	0.00	0.0	65.0	0.14	37.9	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	81.3
D-2e	1.41	100	0.41	29.3	2	0.00	0.0	65.0	1.00	46.1	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	75.4
D-2f	2.43	100	0.70	28.8	2	0.07	0.1	65.0	1.67	44.7	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	73.6
D-2g	1.81	100	0.48	26.5	2	0.57	0.6	65.0	0.76	27.3	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	54.4
D-2h	0.23	100	0.00	0.0	2	0.00	0.0	65.0	0.23	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
D-3	2.26	100	0.00	0.0	2	0.28	0.2	65.0	1.74	50.0	40	0.13	2.3	30	0.11	1.5	25	0.00	0.0	20	0.00	0.0	54.0
FALCON MEADOWS AT BENT GRASS FILING NO. 3																							
C-1b	1.77	100	0.38	21.5	2	0.10	0.1	65.0	0.75	27.5	40	0.54	12.2	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	61.3
C-1c	1.19	100	0.26	21.8	2	0.00	0.0	65.0	0.72	39.3	40	0.21	7.1	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	68.2
C-1f	0.14	100	0.09	64.3	2	0.00	0.0	65.0	0.05	23.2	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	87.5
C-2	1.00	100	0.27	27.0	2	0.04	0.1	65.0	0.69	44.9	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	72.0
D-1a	1.83	100	0.35	19.1	2	0.15	0.2	65.0	0.75	26.6	40	0.25	5.5	30	0.33	5.4	25	0.00	0.0	20	0.00	0.0	56.8
D-1b	1.19	100	0.29	24.4	2	0.00	0.0	65.0	0.39	21.3	40	0.39	13.1	30	0.12	3.0	25	0.00	0.0	20	0.00	0.0	61.8
D-1f	0.67	100	0.16	23.9	2	0.00	0.0	65.0	0.51	49.5	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	73.4
D-1g	0.78	100	0.13	16.7	2	0.20	0.5	65.0	0.34	28.3	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	45.5
D-1h	1.57	100	0.23	14.6	2	0.31	0.4	65.0	0.58	24.0	40	0.19	4.8	30	0.26	5.0	25	0.00	0.0	20	0.00	0.0	48.8
D-1j	0.95	100	0.23	24.2	2	0.09	0.2	65.0	0.38	26.0	40	0.22	9.3	30	0.03	0.9	25	0.00	0.0	20	0.00	0.0	60.6
D-1k	0.80	100	0.18	22.5	2	0.10	0.3	65.0	0.19	15.4	40	0.00	0.0	30	0.33	12.4	25	0.00	0.0	20	0.00	0.0	50.6
FUTURE FILINGS																							
C-1g	1.02	100	0.00	0.0	2	0.00	0.0	65.0	1.02	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0

Lot Type Identification:	
Lot Size (SF)	*Lot Size (Acre)*
0 - 8,167	1/8 Acre
8,168 - 12,704	1/4 Acre
12,705 - 18,149	1/3 Acre
18,150 - 32,670	1/2 Acre
32,671 - 43,560	1 Acre

NOTES:
% Impervious values are taken directly from Table 6-6 in the Colorado Springs DCM Vol. 1, Ch. 6 (Referencing UDFCD 2001)

COMPOSITE RUNOFF COEFFICIENT CALCULATIONS: PROPOSED

Subdivision: Falcon Meadows
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass Filing No. 3
Project No.: CLH000020
Calculated By: CMV
Checked By: SMB
Date: 12/6/21

Basin ID	Total Area (ac)	Paved/Gravel Roads			Lawns/Undeveloped			Residential - 1/8 Acre			Residential - 1/4 Acre			Residential - 1/3 Acre			Residential - 1/2 Acre			Residential - 1 Acre			Composite	Composite
		C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}
OFFSITE																								
OS-1	32.28	0.90	0.96	2.15	0.09	0.36	29.25	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.16	0.41
OS-2	20.07	0.90	0.96	0.90	0.09	0.36	18.62	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.14	0.40
OS-3	10.61	0.90	0.96	0.48	0.09	0.36	9.84	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.14	0.40
BENT GRASS FILING NO. 2 & FALCON MEADOWS AT BENT GRASS FILING NO. 1																								
EX-1	1.19	0.90	0.96	0.00	0.09	0.36	1.19	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
EX-2	1.60	0.90	0.96	0.00	0.09	0.36	1.60	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
EX-3	0.66	0.90	0.96	0.00	0.09	0.36	0.66	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
B-1	6.59	0.90	0.96	0.00	0.09	0.36	6.59	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
B-2	4.16	0.90	0.96	0.00	0.09	0.36	4.16	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
D-4a	0.98	0.90	0.96	0.21	0.09	0.36	0.00	0.45	0.59	0.77	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.55	0.67
D-4b	0.95	0.90	0.96	0.43	0.09	0.36	0.00	0.45	0.59	0.52	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.65	0.76
D-4c	1.22	0.90	0.96	0.43	0.09	0.36	0.24	0.45	0.59	0.55	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.54	0.68
D-5	1.08	0.90	0.96	0.22	0.09	0.36	0.11	0.45	0.59	0.75	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.51	0.64
D-6a	1.33	0.90	0.96	0.44	0.09	0.36	0.00	0.45	0.59	0.89	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.60	0.71
D-6b	2.69	0.90	0.96	0.59	0.09	0.36	0.00	0.45	0.59	2.10	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.55	0.67
D-7	7.65	0.90	0.96	0.00	0.09	0.36	6.22	0.45	0.59	1.43	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.16	0.40
D-8	1.69	0.90	0.96	0.00	0.09	0.36	0.11	0.45	0.59	1.58	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.43	0.58
E-1	1.71	0.90	0.96	0.78	0.09	0.36	0.23	0.45	0.59	0.00	0.30	0.50	0.70	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.55	0.69
E-2	0.68	0.90	0.96	0.56	0.09	0.36	0.12	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.76	0.85
E-3	0.78	0.90	0.96	0.69	0.09	0.36	0.09	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.81	0.89
E-4	0.91	0.90	0.96	0.73	0.09	0.36	0.18	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.74	0.84
E-5	0.89	0.90	0.96	0.79	0.09	0.36	0.10	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.81	0.89
OS-4	4.46	0.90	0.96	0.00	0.09	0.36	0.00	0.45	0.59	2.28	0.30	0.50	1.46	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.72	0.36	0.54
OS-5	0.46	0.90	0.96	0.00	0.09	0.36	0.00	0.45	0.59	0.46	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
OS-6	1.17	0.90	0.96	0.00	0.09	0.36	0.00	0.45	0.59	1.17	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
FALCON MEADOWS FILING NO. 2																								
C-1a	0.27	0.90	0.96	0.15	0.09	0.36	0.00	0.45	0.59	0.12	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.70	0.80
C-1d	1.97	0.90	0.96	0.40	0.09	0.36	0.00	0.45	0.59	1.57	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.54	0.67
C-1e	0.49	0.90	0.96	0.49	0.09	0.36	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.90	0.96
C-3	0.18	0.90	0.96	0.14	0.09	0.36	0.02	0.45	0.59	0.02	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.76	0.86
C-4	2.67	0.90	0.96	0.41	0.09	0.36	0.84	0.45	0.59	1.41	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.41	0.57
C-5	0.60	0.90	0.96	0.00	0.09	0.36	0.60	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
C-6	0.94	0.90	0.96	0.00	0.09	0.36	0.65	0.45	0.59	0.29	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.20	0.43
C-7	0.52	0.90	0.96	0.15	0.09	0.36	0.00	0.45	0.59	0.37	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.58	0.70
D-9	0.72	0.90	0.96	0.00	0.09	0.36	0.46	0.45	0.59	0.26	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.22	0.44
D-1c	3.95	0.90	0.96	0.33	0.09	0.36	0.00	0.45	0.59	2.67	0.30	0.50	0.95	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.60
D-2a	0.50	0.90	0.96	0.33	0.09	0.36	0.00	0.45	0.59	0.17	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.75	0.84
D-2b	0.74	0.90	0.96	0.18	0.09	0.36	0.14	0.45	0.59	0.42	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.49	0.64
D-2c	0.31	0.90	0.96	0.15	0.09	0.36	0.00	0.45	0.59	0.16	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.68	0.78
D-2d	0.24	0.90	0.96	0.10	0.09	0.36	0.00	0.45	0.59	0.14	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.65	0.76
D-2e	1.41	0.90	0.96	0.41	0.09	0.36	0.00	0.45	0.59	1.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.58	0.70
D-2f	2.43	0.90	0.96	0.70	0.09	0.36	0.07	0.45	0.59	1.67	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.57	0.69
D-2g	1.81	0.90	0.96	0.48	0.09	0.36	0.57	0.45	0.59	0.76	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.46	0.62
D-2h	0.23	0.90	0.96	0.00	0.09	0.36	0.00	0.45	0.59	0.23	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
D-3	2.26	0.90	0.96	0.00	0.09	0.36	0.28	0.45	0.59	1.74	0.30	0.50	0.13	0.25	0.47	0.11	0.22	0.46	0.00	0.20	0.44	0.00	0.39	0.55
FALCON MEADOWS FILING NO. 3																								
C-1b	1.77	0.90	0.96	0.38	0.09	0.36	0.10	0.45	0.59	0.75	0.30	0.50	0.54	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.48	0.63
C-1c	1.19	0.90	0.96	0.26	0.09	0.36	0.00	0.45	0.59	0.72	0.30	0.50	0.21	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.52	0.65
C-1f	0.14	0.90	0.96	0.09	0.09	0.36	0.00	0.45	0.59	0.05	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.74	0.83

Basin ID	Total Area (ac)	Paved/Gravel Roads			Lawns/Undeveloped			Residential - 1/8 Acre			Residential - 1/4 Acre			Residential - 1/3 Acre			Residential - 1/2 Acre			Residential - 1 Acre			Composite	Composite
		C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}	Area (ac)	C_5	C_{100}
C-2	1.00	0.90	0.96	0.27	0.09	0.36	0.04	0.45	0.59	0.69	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.56	0.68
D-1a	1.83	0.90	0.96	0.35	0.09	0.36	0.15	0.45	0.59	0.75	0.30	0.50	0.25	0.25	0.47	0.33	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.61
D-1b	1.19	0.90	0.96	0.29	0.09	0.36	0.00	0.45	0.59	0.39	0.30	0.50	0.39	0.25	0.47	0.12	0.22	0.46	0.00	0.20	0.44	0.00	0.49	0.64
D-1f	0.67	0.90	0.96	0.16	0.09	0.36	0.00	0.45	0.59	0.51	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.56	0.68
D-1g	0.78	0.90	0.96	0.13	0.09	0.36	0.20	0.45	0.59	0.34	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.37	0.51
D-1h	1.57	0.90	0.96	0.23	0.09	0.36	0.31	0.45	0.59	0.58	0.30	0.50	0.19	0.25	0.47	0.26	0.22	0.46	0.00	0.20	0.44	0.00	0.39	0.57
D-1j	0.95	0.90	0.96	0.23	0.09	0.36	0.09	0.45	0.59	0.38	0.30	0.50	0.22	0.25	0.47	0.03	0.22	0.46	0.00	0.20	0.44	0.00	0.48	0.63
D-1k	0.80	0.90	0.96	0.18	0.09	0.36	0.10	0.45	0.59	0.19	0.30	0.50	0.00	0.25	0.47	0.33	0.22	0.46	0.00	0.20	0.44	0.00	0.42	0.60
FUTURE FILINGS																								
C-1g	1.02	0.90	0.96	0.00	0.09	0.36	0.00	0.45	0.59	1.02	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59

Lot Type Identification:	
Lot Size (SF)	*Lot Size (Acre)*
0 - 8,167	</= 1/8 Acre
8,168 - 12,704	1/4 Acre
12,705 - 18,149	1/3 Acre
18,150 - 32,670	1/2 Acre
32,671 - 43,560	1 Acre

NOTES:

C values are taken directly from Table 6-6 in the Colorado Springs DCM Vol. 1. CH. 6 (Referencing UDFCD 2001)

Coeffficients use HSG A&B soils - Refer to "Appendix A: Exhibits and Figures" for soil map

STANDARD FORM SF-2: PROPOSED
TIME OF CONCENTRATION

Subdivision: Falcon Meadows
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass Filing No. 3
Project No.: CLH000020
Calculated By: CMV
Checked By: SMB
Date: 12/6/21

SUB-BASIN DATA					INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					Tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	Impervious (%)	C_5	C_{100}	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH(FT)	Urbanized T_c (MIN)	T_c (MIN)
OFFSITE																
OS-1	32.28	11.0	0.16	0.41	100	2.4	12.9	2100	2.2	15	2.2	15.7	28.6	2200.0	22.2	22.2
OS-2	20.07	8.0	0.14	0.40	100	2.3	13.3	1400	2.3	15	2.3	10.3	23.6	1500.0	18.3	18.3
OS-3	10.61	8.0	0.14	0.40	100	2.0	14.0	1500	2.0	15	2.1	11.8	25.7	1600.0	18.9	18.9
BENT GRASS FILING NO. 2 & FALCON MEADOWS AT BENT GRASS FILING NO. 1																
EX-1	1.19	2.0	0.09	0.36	300	2.7	23.0	690	2.7	15	2.5	4.7	27.7	990.0	15.5	15.5
EX-2	1.60	2.0	0.09	0.36	200	2.7	18.8	100	2.7	15	2.5	0.7	19.5	300.0	11.7	11.7
EX-3	0.66	2.0	0.09	0.36	100	5.0	10.8	30	2.7	15	2.5	0.2	11.0	130.0	10.7	10.7
B-1	6.59	2.0	0.09	0.36	90	6.4	9.5	2000	1.7	15	2.0	17.0	26.5	2090.0	21.6	21.6
B-2	4.16	2.0	0.09	0.36	160	11.0	10.5	920	1.6	15	1.9	8.1	18.6	1080.0	16.0	16.0
D-4a	0.98	72.5	0.55	0.67	100	2.3	7.6	420	1.0	20	2.0	3.5	11.1	520.0	12.9	11.1
D-4b	0.95	80.9	0.65	0.76	75	1.5	6.2	480	1.0	20	2.0	4.0	10.2	555.0	13.1	10.2
D-4c	1.22	64.9	0.54	0.68	70	0.5	10.8	690	1.0	20	2.0	5.8	16.6	760.0	14.2	14.2
D-5	1.08	65.7	0.51	0.64	10	2.0	2.7	300	1.1	20	2.1	2.4	5.1	310.0	11.7	5.1
D-6a	1.33	76.6	0.60	0.71	20	2.0	3.2	385	1.0	20	2.0	3.2	6.5	405.0	12.3	6.5
D-6b	2.69	72.6	0.55	0.67	45	2.0	5.4	870	1.0	20	2.0	7.3	12.6	915.0	15.1	12.6
D-7	7.65	13.8	0.16	0.40	200	7.5	12.4	665	1.0	15	1.5	7.4	19.8	865.0	14.8	14.8
D-8	1.69	60.9	0.43	0.58	125	3.7	8.9	600	1.0	15	1.5	6.7	15.5	725.0	14.0	14.0
E-1	1.71	62.3	0.55	0.69	25	2.0	4.0	940	1.0	20	2.0	7.8	11.8	965.0	15.4	11.8
E-2	0.68	82.8	0.76	0.85	25	2.0	2.5	665	1.6	20	2.5	4.4	6.9	690.0	13.8	6.9
E-3	0.78	88.7	0.81	0.89	25	2.0	2.1	632	1.0	20	2.0	5.3	7.4	657.0	13.7	7.4
E-4	0.91	80.6	0.74	0.84	25	2.0	2.6	913	2.0	20	2.8	5.4	8.0	938.0	15.2	8.0
E-5	0.89	89.0	0.81	0.89	25	2.0	2.1	903	2.1	20	2.9	5.2	7.3	928.0	15.2	7.3
OS-4	4.46	49.5	0.36	0.54	100	2.0	10.8	910	1.2	20	2.2	6.9	17.7	1010.0	15.6	15.6
OS-5	0.46	65.0	0.45	0.59	15	2.0	3.7	190	1.0	20	2.0	1.6	5.2	205.0	11.1	5.2
OS-6	1.17	65.0	0.45	0.59	85	0.2	18.7	430	0.9	20	1.9	3.8	22.5	515.0	12.9	12.9
FALCON MEADOWS FILING NO. 2																
C-1a	0.27	84.5	0.70	0.80	10	2.0	1.8	230	1.0	20	2.0	1.9	3.8	240.0	11.3	5.0
C-1d	1.97	72.1	0.54	0.67	100	3.8	6.6	505	0.8	20	1.8	4.6	11.2	605.0	13.4	11.2
C-1e	0.49	100.0	0.90	0.96	10	2.0	0.9	68	3.4	20	3.7	0.3	1.2	78.0	10.4	5.0
C-3	0.18	85.7	0.76	0.86	10	2.0	1.6	580	1.0	20	2.0	4.8	6.4	590.0	13.3	6.4
C-4	2.67	50.3	0.41	0.57	100	3.0	8.8	600	2.0	20	2.8	3.5	12.3	700.0	13.9	12.3
C-5	0.60	2.0	0.09	0.36	5	2.0	3.3		1.0	15	1.5	0.0	3.3	5.0	10.0	5.0
C-6	0.94	21.5	0.20	0.43	20	3.3	5.0	90	5.0	15	3.4	0.4	5.4	110.0	10.6	5.4
C-7	0.52	75.7	0.58	0.70	100	6.8	5.0	165	1.3	15	1.7	1.6	6.7	265.0	11.5	6.7

SUB-BASIN DATA					INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					Tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	Impervious (%)	C_5	C_{100}	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH(FT)	Urbanized T_c (MIN)	T_c (MIN)
D-9	0.72	24.8	0.22	0.44	10	2.0	4.0	250	3.6	15	2.8	1.5	5.5	260.0	11.4	5.5
D-1c	3.95	61.9	0.45	0.60	100	2.6	8.7	1900	1.3	20	2.3	13.9	22.5	2000.0	21.1	21.1
D-2a	0.50	88.7	0.75	0.84	10	2.0	1.6	495	1.3	20	2.3	3.6	5.2	505.0	12.8	5.2
D-2b	0.74	61.8	0.49	0.64	100	1.7	9.4	189	1.0	20	2.0	1.6	10.9	289.0	11.6	10.9
D-2c	0.31	83.5	0.68	0.78	5	2.0	1.4	275	1.0	20	2.0	2.3	3.7	280.0	11.6	5.0
D-2d	0.24	81.3	0.65	0.76	5	2.0	1.5	200	1.3	20	2.3	1.5	2.9	205.0	11.1	5.0
D-2e	1.41	75.4	0.58	0.70	100	1.9	7.7	340	0.8	20	1.8	3.2	10.9	440.0	12.4	10.9
D-2f	2.43	73.6	0.57	0.69	75	2.0	6.7	175	0.5	20	1.4	2.1	8.7	250.0	11.4	8.7
D-2g	1.81	54.4	0.46	0.62	35	2.0	5.5	1355	1.3	20	2.3	9.9	15.4	1390.0	17.7	15.4
D-2h	0.23	65.0	0.45	0.59	35	2.0	5.6	1355	1.3	20	2.3	9.9	15.5	1390.0	17.7	15.5
D-3	2.26	54.0	0.39	0.55	25	8.0	3.3	1960	1.0	15	1.5	21.8	25.0	1985.0	21.0	21.0
FALCON MEADOWS FILING NO. 3																
C-1b	1.77	61.3	0.48	0.63	50	12.0	3.5	570	1.7	20	2.6	3.7	7.2	620.0	13.4	7.2
C-1c	1.19	68.2	0.52	0.65	10	2.0	2.7	440	1.7	20	2.6	2.9	5.5	450.0	12.5	5.5
C-1f	0.14	87.5	0.74	0.83	60	7.0	2.7	90	1.8	20	2.7	0.6	3.2	150.0	10.8	5.0
C-2	1.00	72.0	0.56	0.68	80	2.4	6.6	360	3.4	20	3.7	1.6	8.2	440.0	12.4	8.2
D-1a	1.83	56.8	0.45	0.61	100	3.6	7.8	550	2.2	20	3.0	3.1	10.9	650.0	13.6	10.9
D-1b	1.19	61.8	0.49	0.64	100	3.9	7.1	520	2.2	20	3.0	2.9	10.0	620.0	13.4	10.0
D-1f	0.67	73.4	0.56	0.68	20	2.0	3.5	225	1.0	20	2.0	1.9	5.4	245.0	11.4	5.4
D-1g	0.78	45.5	0.37	0.51	100	2.3	10.1	395	1.0	20	2.0	3.3	13.4	495.0	12.8	12.8
D-1h	1.57	48.8	0.39	0.57	100	2.3	9.8	380	2.9	20	3.4	1.9	11.7	480.0	12.7	11.7
D-1j	0.95	60.6	0.48	0.63	75	4.4	6.0	320	2.9	20	3.4	1.6	7.6	395.0	12.2	7.6
D-1k	0.80	50.6	0.42	0.60	100	3.8	8.0	300	1.7	20	2.6	1.9	9.9	400.0	12.2	9.9
FUTURE FILINGS																
C-1g	1.02	65.0	0.45	0.59	100	6.1	6.5	375	2.4	20	3.1	2.0	8.5	475.0	12.6	8.5

NOTES:

$T_i = (0.395*(1.1 - C_5)*(L)^{0.5})/((S)^{0.33})$, S in ft/ft

T_t=L/60V (Velocity From Fig. 501)

Velocity V=Cv*S^0.5, S in ft/ft

Tc Check = 10+L/180

For Urbanized basins a minimum T_c of 5.0 minutes is required.

For non-urbanized basins a minimum T_c of 10.0 minutes is required

Type of Land Surface	Cv
Heavy Meadow	2.5
Tillage/field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swale	20

STANDARD FORM SF-3: PROPOSED
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass Filing No. 3
Project No.: CLH000020
Calculated By: CMV
Checked By: SMB
Date: 12/6/21

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
		RWT202	1574.40						46.6	120.88	1.82	220.0									From Falcon DBPS by Matrix
		RWT204	38.40						11.37	1.78	3.94	7.0									From Falcon DBPS by Matrix
		WT200	192.00						37.8	24.41	2.13	52.0									From Falcon DBPS by Matrix
	21	OS-1	32.28	0.16	22.2	5.16	2.93	15.1	46.6	152.23	1.82	277.1									Flows obtained from Bent Grass Filing No. 2 FDR. Q=65.1 CFS Cumulation of northern off-site flows entering Basin B-1
	1	OS-4	4.46	0.36	15.6	1.61	3.46	5.6					1.2	5.6				910	2.2	6.9	Flows from Basin B-1 of Bent Grass Filing No. 2 FDR into Basin EX-2
	2	OS-5	0.46	0.45	5.2	0.21	5.10	1.1					1	1.1				190	2.0	1.6	Flows from Basin B-2 of Bent Grass Filing No. 2 FDR into Basin EX-2
	3	OS-6	1.17	0.45	12.9	0.53	3.75	2.0					0.9	2.0				430	1.9	3.8	Flows from Basin B-3 of Bent Grass Filing No. 2 FDR into Basin EX-2
		EX-1	1.19	0.09	15.5	0.11	3.47	0.4													Flows to Basin EX-2
	5	EX-2	1.60	0.09	11.7	0.14	3.90	0.5	22.5	2.60	2.91	7.6									Flows to Basin EX-3
	7	E-3	0.78	0.81	7.4	0.63	4.59	2.9													
		C-6	0.94	0.20	5.4	0.19	5.05	1.0					1	1.0				216	2.0	1.8	
	45	C-7	0.52	0.58	6.7	0.30	4.74	1.4					1	1.4				216	2.0	1.8	
		E-2	0.68	0.76	6.9	0.52	4.70	2.4	8.5	1.01	4.38	4.4									Combination of C-6, C-7, E-2
	8	E-1	1.71	0.55	11.8	0.94	3.88	3.6	11.8	2.58	3.88	10.0									Ex Basin from Filing No. 2(East side of BGMD) Combination of C-7, E-1, E-2, E-3. Flows to Basin EX-3
	6 15a	EX-3	0.66	0.09	10.7	0.06	4.02	0.2	22.5	5.24	2.91	15.2									Flows to Basin B-1
		D-1g	0.78	0.37	12.8	0.29	3.76	1.1					1	1.1				57	2.0	0.5	
		D-1h	1.57	0.39	11.7	0.61	3.89	2.4													
	51	D-1j	0.95	0.48	7.6	0.46	4.55	2.1	13.2	1.36	3.71	5.0	0.9	0.0	5.0			225	1.9	2.0	Flows to existing on-grade inlet at DP51
		D-1f	0.67	0.56	5.4	0.38	5.06	1.9													
	52	D-1k	0.80	0.42	9.9	0.34	4.14	1.4	9.9	0.72	4.14	3.0									
	53	C-1a	0.27	0.70	5.0	0.19	5.17	1.0	15.2	0.92	3.50	3.2	1.1	0.0	3.2			430	2.1	3.4	Flows to proposed on-grade inlet at DP53
	53								15.1	2.26	3.51	7.9			7.9						Total pipe flow at DP 53
		C-1b	1.77	0.48	7.2	0.85	4.62	3.9													
	54	C-2	1.00	0.56	8.2	0.56	4.42	2.5	8.2	1.41	4.42	6.2	1	6.2				130	1.6	1.4	
	41	C-1c	1.19	0.52	5.5	0.62	5.02	3.1	9.6	2.03	4.19	8.5		0.3	8.2	1.3	30	180	2.2	1.3	On-grade inlet
									15.1	4.22	3.51	14.8			14.8						Total pipe flow at DP 41
	42	C-1f	0.14	0.74	5.0	0.10	5.17	0.5	10.9	0.17	4.00	0.7	1	0.7				185	2.0	1.5	Gutter flow to DP15
		C-3	0.18	0.76	6.4	0.14	4.80	0.7					1	0.7				660	2.0	5.5	Gutter flow through C-4 to DP44
	44	C-4	2.67	0.41	12.3	1.09	3.82	4.2	12.3	1.23	3.82	4.7	1	0.0	4.7	1.3	24	70	2.2	0.5	Flow into on-grade inlet at DP44
	43 15	C-1d	1.97	0.54	11.2	1.06	3.96	4.2	12.5	1.23	3.80	4.7									Flow into inlet at DP15

STANDARD FORM SF-3: PROPOSED
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass Filing No. 3
Project No.: CLH000020
Calculated By: CMV
Checked By: SMB
Date: 12/6/21

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	15								15.1	6.68	3.51	23.5									Total pipe flow at DP15
	12	C-1e	0.49	0.90	5.0	0.44	5.17	2.3													Flow into inlet at DP12
	19	C-1g	1.02	0.45	8.5	0.46	4.37	2.0	15.1	7.12	3.51	25.0			25.0						Total pipe flow at DP12 Flow into Pond North
	13	C-5	0.60	0.09	5.0	0.05	5.17	0.3	15.1	7.63	3.51	26.8									North Pond Total flow to Pond North. Outfalls to Basin B-1
	AA	B-1	6.59	0.09	21.6	0.59	2.97	1.8	46.6	165.69	1.82	301.6									Total flow under BGMD into Basin B-2
		D-2b	0.74	0.49	10.9	0.36	4.00	1.4													
		D-2a	0.50	0.75	5.2	0.38	5.10	1.9													
	14a	D-2c	0.31	0.68	5.0	0.21	5.17	1.1	10.9	0.95	4.00	3.8	1.3	3.8				230	2.3	1.7	Gutter flow through D-2d to DP14b
	14b	D-2d	0.24	0.65	5.0	0.16	5.17	0.8	12.6	1.11	3.78	4.2	1.3	4.2				625	2.3	4.6	Gutter flow through D-2d to DP14b
	14	D-2g	1.81	0.46	15.4	0.83	3.48	2.9	17.2	1.94	3.32	6.4	2.5	0.9	5.5			625	3.2	3.3	Flow into existing inlet at DP14
	9	OS-2	20.07	0.14	18.3	2.81	3.22	9.0													Overland flow into Basin D-3. Flow obtained from Bent Grass Filing No. 2 FDR
	10	OS-3	10.61	0.14	18.9	1.49	3.18	4.7													Offsite flow into Basin D-3. Flow obtained from Bent Grass Filing No. 2 FDR
	11	D-3	2.26	0.39	21.0	0.88	3.01	2.6	21.0	5.18	3.01	15.6			15.6	1.0	42	100	2.0	0.8	Flows conveyed via existing ditch into proposed area inlet.
	14e	D-2f	2.43	0.57	8.7	1.39	4.33	6.0													Flows to existing inlet at DP14e
	14d	D-2e	1.41	0.58	10.9	0.82	4.01	3.3	10.9	2.21	4.01	8.9			8.9	1.0	42	100	2.0	0.8	Flows to existing inlet at DP14d Flows conveyed storm sewer to DP16
		D-1a	1.83	0.45	10.9	0.82	4.01	3.3													
	16a	D-1b	1.19	0.49	10.0	0.58	4.13	2.4	10.9	1.40	4.01	5.6	1.3	5.6				1300	2.3	9.5	Gutter flow through Basin D-1c to DP16
	16	D-1c	3.95	0.45	21.1	1.78	3.01	5.4	21.1	3.18	3.01	9.6	2.5	2.7	6.9			625	3.2	3.3	Flows to existing inlet at DP16
	16								21.9	11.34	2.96	33.6			33.6	2.0	48	835	2.8	4.9	Combination of flows to existing inlets at DP14 and DP16. Flows to DP 17
		D-5	1.08	0.51	5.1	0.55	5.14	2.8					1	2.8				600	2.0	5.0	Gutter flow through Basin D-6b to DP18
		D-6b	2.69	0.55	12.6	1.48	3.78	5.6													
	18	D-6a	1.33	0.60	6.5	0.80	4.79	3.8	12.6	2.83	3.78	10.7			10.7	2.0	24	38	2.8	0.2	Flow to existing inlet. Flow out of inlet to DP17c
	17a	D-4a	0.98	0.55	11.1	0.54	3.97	2.1					1	2.1				700	2.0	5.8	Gutter flow through Basin D-4b to DP17b
	17b	D-4b	0.95	0.65	10.2	0.62	4.09	2.5	17.0	1.16	3.34	3.9									Gutter flow to DP17c
	17c	D-4c	1.22	0.54	14.2	0.66	3.60	2.4	17.0	1.82	3.34	6.1			6.1	2.0	24	8	2.8	0.0	Flows from Basin B-3 of Bent Grass Filing No. 2 FDR. Flows to existing inlet at DP17c
									17.0	4.65	3.34	15.5									Total pipe flow at DP17c to DP17
	17								26.8	15.99	2.65	42.4									Storm system entering existing pond at Basin D-7
		D-9	0.72	0.22	5.5	0.16	5.02	0.8					1.5	0.8				625	2.4	4.3	Gutter flow through Basin E-4 to DP24
		D-2h	0.23	0.45	15.5	0.10	3.47	0.3					1.5	0.3				550	2.4	3.7	Gutter flow through Basin E-4 to DP24
	24	E-4	0.91	0.74	8.0	0.67	4.46	3.0	24.4	2.10	2.79	5.9									Flow to existing inlet at DP24

STANDARD FORM SF-3: PROPOSED

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass Filing No. 3
Project No.: CLH000020
Calculated By: CMV
Checked By: SMB
Date: 12/6/21

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	25	E-5	0.89	0.81	7.3	0.72	4.60	3.3													Flow to existing inlet at DP25
	26								24.4	2.82	2.79	7.9									Flow into existing pond via Swale F at DP26
	32	D-8	1.69	0.43	14.0	0.73	3.62	2.6													Flow in Swale C (Basin D-8) into existing pond
		D-7	7.65	0.16	14.8	1.22	3.54	4.3													Exisitng Water quality pond
	30								26.8	20.76	2.65	55.0									Outlet to existing channel Basin B-2
		B-2	4.16	0.09	16.0	0.37	3.42	1.3													
	CC								46.6	186.82	1.82	340.0									

STANDARD FORM SF-3: PROPOSED
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass Filing No. 3
Project No.: CLH000020
Calculated By: CMV
Checked By: SMB
Date: 12/6/21

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
		RWT202	1574.40						46.6	327.87	3.05	1000.0									From Falcon DBPS by Matrix
		RWT204	38.40						11.4	6.52	6.60	43.0									From Falcon DBPS by Matrix
		WT200	192.00						37.8	53.07	3.58	190.0									From Falcon DBPS by Matrix
	21	OS-1	32.28	0.41	22.2	13.23	4.92	65.1	46.6	400.69	3.05	1222.1									Flows obtained from Bent Grass Filing No. 2 FDR. Q=65.1 CFS Cumulation of northern off-site flows entering Basin B-1
	1	OS-4	4.46	0.54	15.6	2.41	5.81	14.0					1.2	14.0				910	2.2	6.9	Flows from Basin B-1 of Bent Grass Filing No. 2 FDR into Basin EX-2
	2	OS-5	0.46	0.59	5.2	0.27	8.56	2.3					1	2.3				190	2.0	1.6	Flows from Basin B-2 of Bent Grass Filing No. 2 FDR into Basin EX-2
	3	OS-6	1.17	0.59	12.9	0.69	6.30	4.3					0.9	4.3				430	1.9	3.8	Flows from Basin B-3 of Bent Grass Filing No. 2 FDR into Basin EX-2
		EX-1	1.19	0.36	15.5	0.43	5.83	2.5													Flows to Basin EX-2
	5	EX-2	1.60	0.36	11.7	0.58	6.54	3.8	22.5	4.38	4.89	21.4									Flows to Basin EX-3
	7	E-3	0.78	0.89	7.4	0.69	7.70	5.3													
		C-6	0.94	0.43	5.4	0.40	8.49	3.4					1	3.4				216	2.0	1.8	
	45	C-7	0.52	0.70	6.7	0.36	7.95	2.9	16.7	1.28	5.64	7.2	1	2.9				216	2.0	1.8	
		E-2	0.68	0.85	6.9	0.58	7.89	4.6	18.5	2.26	5.38	12.2									Combination of C-6, C-7, E-2
	8	E-1	1.71	0.69	11.8	1.18	6.51	7.7	18.5	4.13	5.38	22.2									Ex Basin from Filing No. 2(East side of BGMD) Combination of C-6, C-7, E-1, E-2, E-3. Flows to Basin EX-3
	6 15a	EX-3	0.66	0.36	10.7	0.24	6.76	1.6	22.5	8.75	4.89	42.8									Flows to Basin B-1
		D-1g	0.78	0.51	12.8	0.40	6.32	2.5					1	2.5				57	2.0	0.5	
		D-1h	1.57	0.57	11.7	0.89	6.53	5.8													
	51	D-1j	0.95	0.63	7.6	0.60	7.63	4.6	13.2	1.89	6.23	11.8	0.9	1.6	10.2			225	1.9	2.0	Flows to existing on-grade inlet at DP51
		D-1f	0.67	0.68	5.4	0.46	8.49	3.9													
	52	D-1k	0.80	0.60	9.9	0.48	6.95	3.3	9.9	1.19	6.95	8.3									
	53	C-1a	0.27	0.80	5.0	0.22	8.68	1.9	9.9	1.41	6.95	9.8	1.1	0.8	9.0			430	2.1	3.4	Flows to proposed on-grade inlet at DP53
	53								13.2	2.93	6.23	18.3			18.3						Total pipe flow at DP 53
		C-1b	1.77	0.63	7.2	1.12	7.76	8.7													
	54	C-2	1.00	0.68	8.2	0.68	7.42	5.0	8.2	1.80	7.42	13.4	1	13.4				130	1.6	1.4	
	41	C-1c	1.19	0.65	5.5	0.77	8.43	6.5	13.3	2.69	6.21	16.7		4.1	12.6	1.3	30	180	2.2	1.3	Flow into existing on-grade inlet at DP41
									13.3	4.96	6.21	30.8			30.8						Total pipe flow at DP41
	42	C-1f	0.14	0.83	5.0	0.12	8.68	1.0	14.7	0.78	5.96	4.6	1	4.6				185	2.0	1.5	Gutter flow to DP15
		C-3	0.18	0.86	6.4	0.15	8.06	1.2					1	1.2				660	2.0	5.5	Gutter flow through C-4 to DP44
	44	C-4	2.67	0.57	12.3	1.52	6.41	9.7	12.3	1.67	6.41	10.7	1	1.1	9.6	1.3	24	70	2.2	0.5	Flow into existing on-grade inlet at DP44
	43 15	C-1d	1.97	0.67	11.2	1.32	6.64	8.8	16.2	2.27	5.71	13.0	2	2.1	10.9			85	2.8	0.5	Flow into inlet at DP15

STANDARD FORM SF-3: PROPOSED
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass Filing No. 3
Project No.: CLH000020
Calculated By: CMV
Checked By: SMB
Date: 12/6/21

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
	15								16.2	8.37	5.71	47.8									Total pipe flow at DP15
	12	C-1e	0.49	0.96	5.0	0.47	8.68	4.1					2	0.1	4.0			85	2.8	0.5	Flow into inlet at DP12
									16.2	8.83	5.71	50.4			50.4						Total pipe flow at DP12
	19	C-1g	1.02	0.59	8.5	0.60	7.33	4.4													Flow into Pond North
	13	C-5	0.60	0.36	5.0	0.22	8.68	1.9	16.2	9.65	5.71	55.1									North Pond Total flow to Pond North. Outfalls to Basin B-1
	AA	B-1	6.59	0.36	21.6	2.37	4.99	11.8	46.6	421.46	3.05	1285.4									Total flow under BGMD into Basin B-2
		D-2b	0.74	0.64	10.9	0.47	6.71	3.2													
		D-2a	0.50	0.84	5.2	0.42	8.57	3.6													
	14a	D-2c	0.31	0.78	5.0	0.24	8.68	2.1	10.9	1.13	6.71	7.6	1.3	7.6				230	2.3	1.7	Gutter flow through D-2d to DP14b
	14b	D-2d	0.24	0.76	5.0	0.18	8.68	1.6	12.6	1.31	6.35	8.3	1.3	8.3				625	2.3	4.6	Gutter flow through D-2d to DP14b
	14	D-2g	1.81	0.62	15.4	1.12	5.84	6.5	17.2	2.43	5.57	13.5	2.5	5.3	8.2			625	3.2	3.3	Flow into existing inlet at DP14
	9	OS-2	20.07	0.40	18.3	8.03	5.41	43.4													Overland flow into Basin D-3. Flow obtained from Bent Grass Filing No. 2 FDR
	10	OS-3	10.61	0.40	18.9	4.24	5.33	22.6													Offsite flow into Basin D-3. Flow obtained from Bent Grass Filing No. 2 FDR
	11	D-3	2.26	0.55	21.0	1.24	5.06	6.3	21.0	13.51	5.06	68.4			68.4	1.0	42	100	2.0	0.8	Flows conveyed via existing ditch into proposed area inlet.
	14e	D-2f	2.43	0.69	8.7	1.68	7.27	12.2													Flows to existing inlet at DP14e
	14d	D-2e	1.41	0.70	10.9	0.99	6.73	6.7	10.9	2.67	6.73	18.0			18.0	1.0	42	100	2.0	0.8	Flows to existing inlet at DP14d Flows conveyed storm sewer to DP16
		D-1a	1.83	0.61	10.9	1.12	6.73	7.5													
	16a	D-1b	1.19	0.64	10.0	0.76	6.93	5.3	10.9	1.88	6.73	12.7	1.3	12.7				1300	2.3	9.5	Gutter flow through Basin D-1c to DP16
	16	D-1c	3.95	0.60	21.1	2.37	5.05	12.0	21.1	4.25	5.05	21.5	2.5	11.3	10.2			625	3.2	3.3	Flows to existing inlet at DP16
	16								21.9	19.67	4.96	97.6			97.6	2.0	48	835	2.8	4.9	Combination of flows to existing inlets at DP14 and DP16. Flows to DP 17
		D-5	1.08	0.64	5.1	0.69	8.63	6.0					1	6.0				600	2.0	5.0	Gutter flow through Basin D-6b to DP18
		D-6b	2.69	0.67	12.6	1.80	6.35	11.4													
	18	D-6a	1.33	0.71	6.5	0.94	8.03	7.5	12.6	3.43	6.35	21.8			21.8	2.0	24	38	2.8	0.2	Flow to existing inlet. Flow out of inlet to DP17c
	17a	D-4a	0.98	0.67	11.1	0.66	6.66	4.4					1	4.4				700	2.0	5.8	Gutter flow through Basin D-4b to DP17b
	17b	D-4b	0.95	0.76	10.2	0.72	6.87	4.9	17.0	1.38	5.60	7.7									Gutter flow to DP17c
	17c	D-4c	1.22	0.68	14.2	0.83	6.04	5.0	17.0	2.21	5.60	12.4			12.4	2.0	24	8	2.8	0.0	Flows from Basin B-3 of Bent Grass Filing No. 2 FDR. Flows to existing inlet at DP17c
	17c								17.0	5.64	5.60	31.6									Total pipe flow at DP17c to DP17
	17								26.8	25.31	4.45	112.6									Storm system entering existing pond at Basin D-7
		D-9	0.72	0.44	5.5	0.32	8.44	2.7					1.5	2.7				625	2.4	4.3	Gutter flow through Basin E-4 to DP24
		D-2h	0.23	0.59	15.5	0.14	5.83	0.8					1.5	0.8				550	2.4	3.7	Gutter flow through Basin E-4 to DP24
	24	E-4	0.91	0.84	8.0	0.76	7.50	5.7	24.4	4.41	4.68	20.6									Flow to existing inlet at DP24

STANDARD FORM SF-3: PROPOSED

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass Filing No. 3
Project No.: CLH000020
Calculated By: CMV
Checked By: SMB
Date: 12/6/21

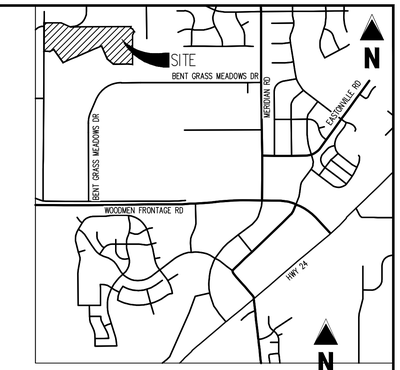
		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
	25	E-5	0.89	0.89	7.3	0.79	7.73	6.1													Flow to existing inlet at DP25
	26								24.4	5.20	4.68	24.3									Flow into existing pond via Swale F at DP26
	32	D-8	1.69	0.58	14.0	0.98	6.08	6.0													Flow in Swale C (Basin D-8) into existing pond
		D-7	7.65	0.40	14.8	3.06	5.94	18.2													Exisitng Water quality pond
	30								26.8	34.55	4.45	153.7									Outlet to existing channel Basin B-2
		B-2	4.16	0.36	16.0	1.50	5.75	8.6													
	CC								46.6	457.51	3.05	1395.4									

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
RWT202	1574.40	14.0	770.0
RWT204	38.40	7.0	43.0
WT200	192.00	25.0	110.0
OS-25	14.13	4.9	27.5
OS-26	5.81	1.9	12.7
OS-1	13.06	6.9	28.8
OS-2	17.81	11.2	41.4
OS-4	30.69	12.4	55.4
A-1	5.42	2.2	12.4
A-2	18.00	5.3	35.4
A-3	19.59	6.0	40.7
A-4	23.81	8.1	47.0
B-1	32.53	9.6	64.2
B-2	4.51	1.5	10.0
B-3	16.18	7.8	37.2

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
1	8.3	38.9
30	1.0	160.0
31	4.0	123.3
32	10.5	148.0
8	28.7	132.6
9	14.0	770.0
2	5.0	34.9
3	42.0	865.5
4	18.2	93.7
5	9.1	63.4
6	41.1	838.2
7	44.1	843.6



VICINITY MAP
1"=2,000'

SCALE: 1"=200'

DRAINAGE LEGEND

- PROPERTY LINE
- EXISTING MAJOR CONTOUR (6485)
- EXISTING MINOR CONTOUR (6483)
- BASIN BOUNDARY LINE
- FEMA EFFECTIVE 100-YR FLOODPLAIN (100YR)
- CENTERLINE OF STREAM
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DIRECTION OF RUNOFF

Galloway
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

CHALLENGER HOMES

FINAL DRAINAGE REPORT FALCON MEADOWS AT BENT GRASS FILING NO. 3 FOR CHALLENGER COMMUNITIES, LLC

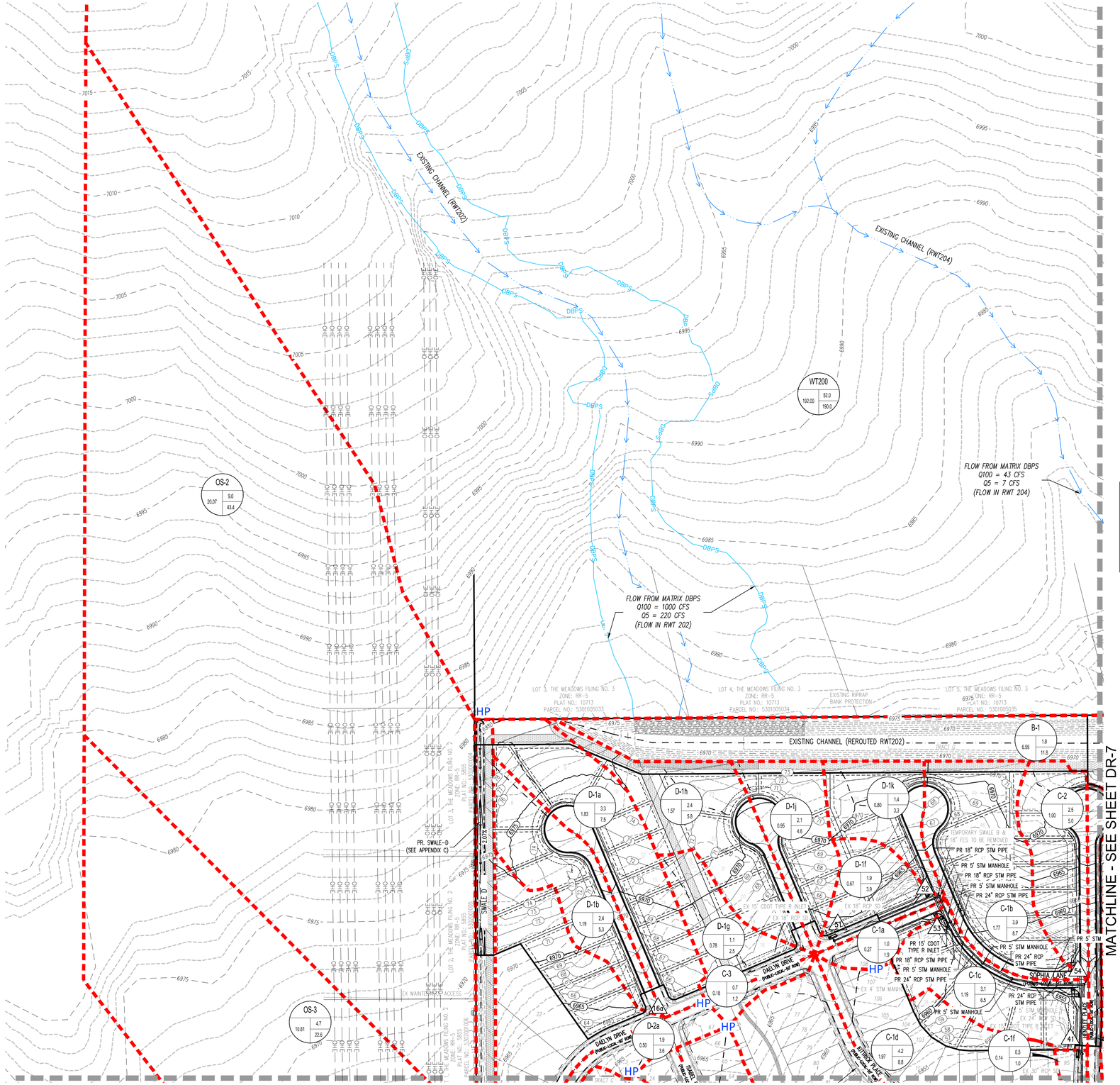
BENT GRASS MEADOWS DRIVE
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No:	CLH000014.20
Drawn By:	CMWJ
Checked By:	SMB
Date:	OCTOBER 2019

HISTORIC CONDITIONS DRAINAGE MAP

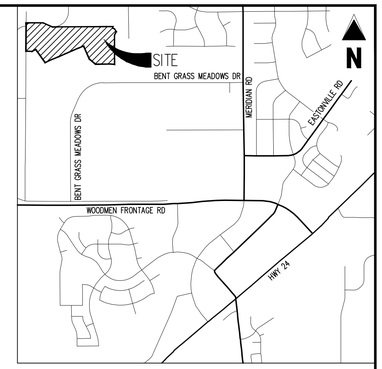
ED-1
Sheet 1 of 1



N

0 25 50 100

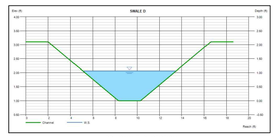
SCALE: 1"=100'



VICINITY MAP
1"=2,000'

DRAINAGE LEGEND

- PROPERTY LINE
- 6480 EXISTING MAJOR CONTOUR
- 6482 EXISTING MINOR CONTOUR
- 6480 PROPOSED MAJOR CONTOUR
- 6482 PROPOSED MINOR CONTOUR
- BASIN BOUNDARY LINE
- DRAINAGE TRAVEL PATH
- 100YR FEMA EFFECTIVE 100–YR FLOODPLAIN
- DBPS DBPS 100–YR FLOODPLAIN PER MATRIX DBPS
- CENTERLINE OF STREAM
- EXISTING RIPRAP
- EXISTING ACCESS
- PROPOSED RIPRAP
- PROPOSED ACCESS
- 1 / 1.8 / 0.71 / 4.6 BASIN DESIGNATION; 5–YEAR RUNOFF IN CUBIC FEET PER SECOND; 100–YEAR RUNOFF IN CUBIC FEET PER SECOND; BASIN AREA IN ACRES
- 1 DESIGN POINT
- DIRECTION OF RUNOFF



PR. SWALE D SECTION
(BTM WIDTH: 2.0'; DEPTH: 2.10'; SIDE SLOPES: 3:1; SLOPE: 2.10%; Q: 43.4 cfs)

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
RWT202	1574.40	220.0	1000.0
RWT204	38.40	7.0	43.0
WT200	192.00	52.0	190.0
EX-1	1.19	0.4	2.5
EX-2	1.60	0.5	3.8
EX-3	0.66	0.2	1.6
B-1	6.59	1.8	11.8
B-2	4.16	1.3	8.6
C-1a	0.27	1.0	1.9
C-1b	1.77	3.9	8.7
C-1c	1.19	3.1	6.5
C-1d	1.97	4.2	8.8
C-1e	0.49	2.3	4.1
C-1f	0.14	0.5	1.0
C-1g	1.02	2.0	4.4
C-2	1.00	2.5	5.0
C-3	0.18	0.7	1.2
C-4	2.67	4.2	9.7
C-5	0.60	0.3	1.9
C-6	0.94	1.0	3.4
C-7	0.52	1.4	2.9
D-1a	1.83	3.3	7.5
D-1b	1.19	2.4	5.3
D-1c	3.95	5.4	12.0
D-1f	0.67	1.9	3.9
D-1g	0.78	1.1	2.5
D-1h	1.57	2.4	5.8
D-1j	0.95	2.1	4.6
D-1k	0.80	1.4	3.3
D-2a	0.50	1.9	3.6
D-2b	0.74	1.4	3.2
D-2c	0.31	1.1	2.1
D-2d	0.24	0.8	1.6
D-2e	1.41	3.3	6.7
D-2f	2.43	6.0	12.2
D-2g	1.81	2.9	6.5
D-2h	0.23	0.3	0.8
D-3	2.26	2.6	6.3
D-4a	0.98	2.1	4.4
D-4b	0.95	2.5	4.9
D-4c	1.22	2.4	5.0
D-5	1.08	2.8	6.0
D-6a	1.33	3.8	7.5
D-6b	2.69	5.6	11.4
D-7	7.65	4.3	18.2
D-8	1.69	2.6	6.0
D-9	0.72	0.8	2.7
OS-1	32.26	15.1	65.1
OS-2	20.07	9.0	43.4
OS-3	10.61	4.7	22.6
OS-4	4.46	5.6	14.0
OS-5	0.46	1.1	2.3
OS-6	1.17	2.0	4.3
E-1	1.71	3.6	7.7
E-2	0.68	2.4	4.5
E-3	0.78	2.5	5.3
E-4	0.91	3.0	5.7
E-5	0.89	3.3	6.1

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
21	277.1	1222.1
1	5.6	14.0
2	1.1	2.3
3	2.0	4.3
5	7.6	21.4
6	0.2	1.6
15A	15.2	42.8
51	5.0	11.8
52	3.0	8.3
53	7.5	18.3
54	6.2	13.4
41	14.8	30.8
42	0.7	4.6
43	4.2	8.8
44	4.7	10.7
19	2.0	4.4
15	23.5	47.8
12	25.0	50.4
45	1.4	7.2
13	26.8	55.1
7	2.9	5.3
8	10.0	22.2
AA	301.6	1285.4
9	9.0	43.4
10	4.7	22.6
11	15.6	68.4
14a	3.8	7.6
14d	8.5	18.0
14e	6.0	12.2
14b	4.2	8.3
14	6.4	13.5
16a	5.6	12.7
16	33.6	97.6
18	10.7	21.8
17a	2.1	4.4
17b	3.5	7.7
17c	15.5	31.6
17	42.4	112.6
24	5.9	20.6
25	3.3	6.1
26	7.5	24.3
30	59.0	153.7
32	2.6	6.3
CC	340.0	1395.4

Galloway
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

CHALLENGER HOMES

FINAL DRAINAGE REPORT FALCON MEADOWS AT BENT GRASS FILING NO. 3 FOR CHALLENGER COMMUNITIES, LLC

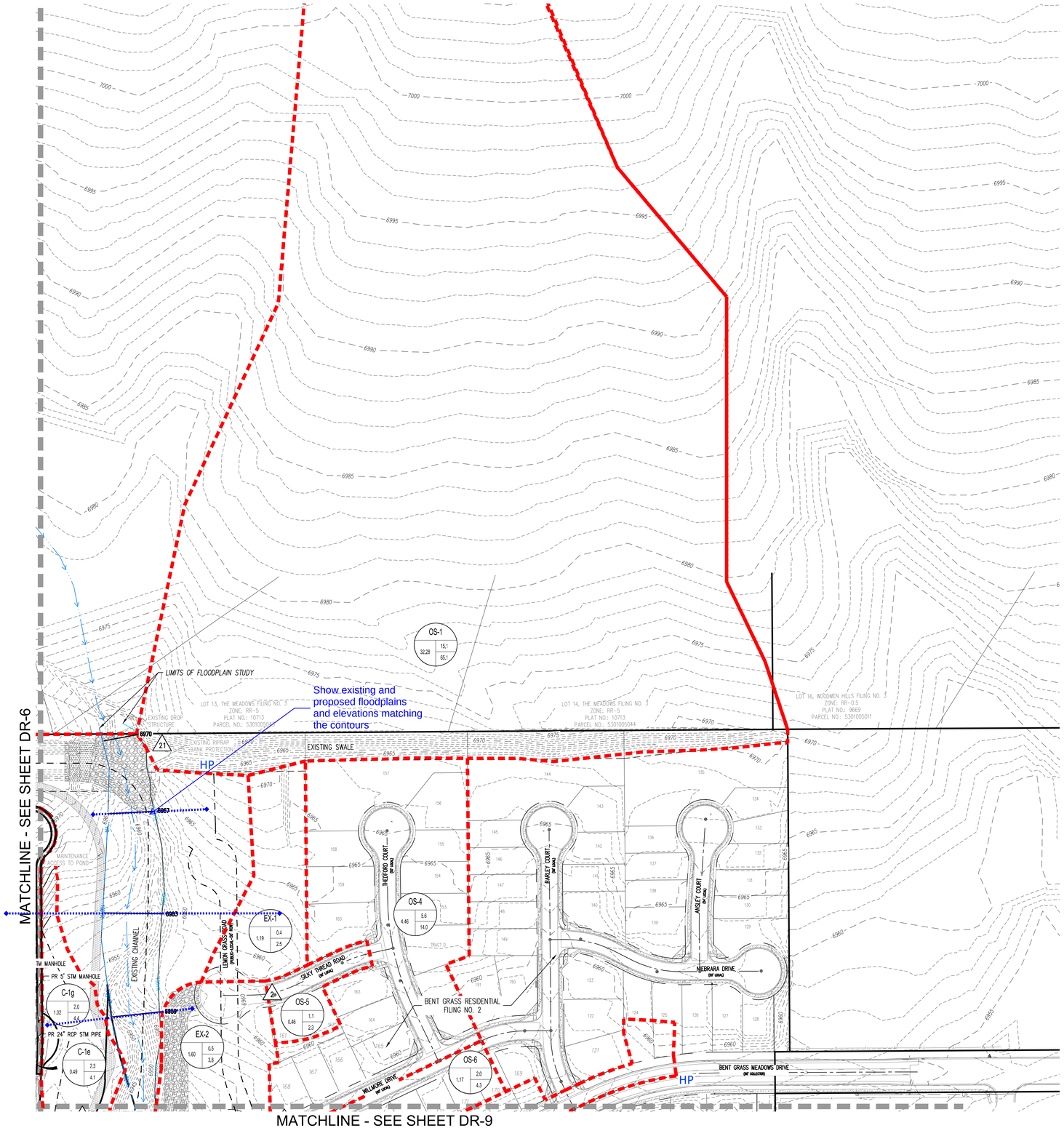
BENT GRASS MEADOWS DRIVE
FALCON, CO 80831 - EL PASO COUNTY

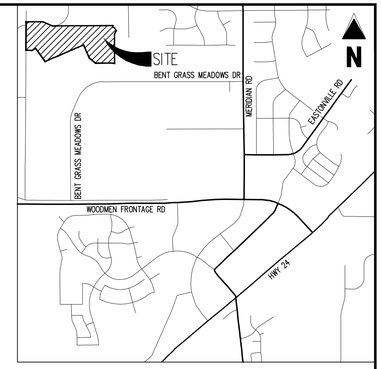
#	Date	Issue / Description	Init.

Project No:	CLH000020
Drawn By:	CMWJ
Checked By:	RGD
Date:	08/05/2020

PROPOSED DRAINAGE MAP

DR-6





VICINITY MAP
1"=2,000'

DRAINAGE LEGEND

- PROPERTY LINE
- 6480 EXISTING MAJOR CONTOUR
- 6482 EXISTING MINOR CONTOUR
- 6480 PROPOSED MAJOR CONTOUR
- 6482 PROPOSED MINOR CONTOUR
- BASIN BOUNDARY LINE
- DRAINAGE TRAVEL PATH
- 100YR FEMA EFFECTIVE 100-YR FLOODPLAIN
- DBPS DBPS 100-YR FLOODPLAIN PER MATRIX DBPS
- CENTERLINE OF STREAM
- EXISTING RIPRAP
- EXISTING ACCESS
- PROPOSED RIPRAP
- PROPOSED ACCESS
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DESIGN POINT
- DIRECTION OF RUNOFF

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
RWT202	1674.40	220.0	1000.0
RWT204	39.40	7.0	43.0
WT200	192.00	52.0	190.0
EX-1	1.19	0.4	2.5
EX-2	1.60	0.5	3.8
EX-3	0.66	0.2	1.6
B-1	6.99	1.8	11.8
B-2	4.16	1.3	8.6
C-1a	0.27	1.0	1.9
C-1b	1.77	3.9	8.7
C-1c	1.19	3.1	6.5
C-1d	1.97	4.2	8.8
C-1e	0.49	2.3	4.1
C-1f	0.14	0.5	1.0
C-1g	1.02	2.0	4.4
C-2	1.00	2.5	5.0
C-3	0.18	0.7	1.2
C-4	2.67	4.2	9.7
C-5	0.60	0.3	1.9
C-6	0.54	1.0	3.4
C-7	0.52	1.4	2.9
D-1a	1.83	3.3	7.9
D-1b	1.19	2.4	5.3
D-1c	3.95	5.4	12.0
D-1f	0.67	1.9	3.9
D-1g	0.78	1.1	2.5
D-1h	1.57	2.4	5.8
D-1i	0.95	2.1	4.6
D-1k	0.80	1.4	3.3
D-2a	0.50	1.9	3.6
D-2b	0.74	1.4	3.2
D-2c	0.31	1.1	2.1
D-2d	0.24	0.8	1.6
D-2e	1.41	3.3	6.7
D-2f	2.43	6.0	12.2
D-2g	1.81	2.9	6.5
D-2h	0.23	0.3	0.8
D-3	2.26	2.6	6.3
D-4a	0.98	2.1	4.4
D-4b	0.95	2.5	4.9
D-4c	1.22	2.4	5.0
D-5	1.08	2.8	6.0
D-6a	1.33	3.8	7.5
D-6b	2.69	5.6	11.4
D-7	7.68	4.3	18.2
D-8	1.69	2.6	6.0
D-9	0.72	0.8	2.7
OS-1	32.28	15.1	85.1
OS-2	20.07	9.0	43.4
OS-3	10.61	4.7	22.6
OS-4	4.46	5.6	14.0
OS-5	0.46	1.1	2.3
OS-6	1.17	2.0	4.3
E-1	1.71	3.6	7.7
E-2	0.68	2.4	4.6
E-3	0.78	2.9	5.3
E-4	0.91	3.0	5.7
E-5	0.89	3.3	6.1

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
21	277.1	1222.1
1	5.6	14.0
2	1.1	2.3
3	2.0	4.3
5	7.6	21.4
6	0.2	1.6
15A	15.2	42.8
51	5.0	11.8
52	3.0	8.3
53	7.9	18.3
54	6.2	13.4
41	14.8	30.8
42	0.7	4.6
43	4.2	8.8
44	4.7	10.7
19	2.0	4.4
15	23.5	47.8
12	29.0	50.4
45	1.4	7.2
13	26.8	55.1
7	2.9	5.3
8	10.0	22.2
AA	301.6	1285.4
9	9.0	43.4
10	4.7	22.6
11	15.6	68.4
14a	3.8	7.6
14d	8.9	18.0
14e	6.0	12.2
14b	4.2	8.3
14	6.4	13.5
16a	5.9	12.7
16	33.6	97.6
18	10.7	21.8
17a	2.1	4.4
17b	3.9	7.7
17c	15.5	31.6
17	42.4	112.5
24	5.9	20.6
25	3.3	6.1
26	7.9	24.3
30	55.0	153.7
32	2.6	6.0
CC	340.0	1395.4

Galloway
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

CHALLENGER HOMES

FINAL DRAINAGE REPORT FALCON MEADOWS AT BENT GRASS FILING NO. 3 FOR CHALLENGER COMMUNITIES, LLC

BENT GRASS MEADOWS DRIVE
FALCON, CO 80831 - EL PASO COUNTY

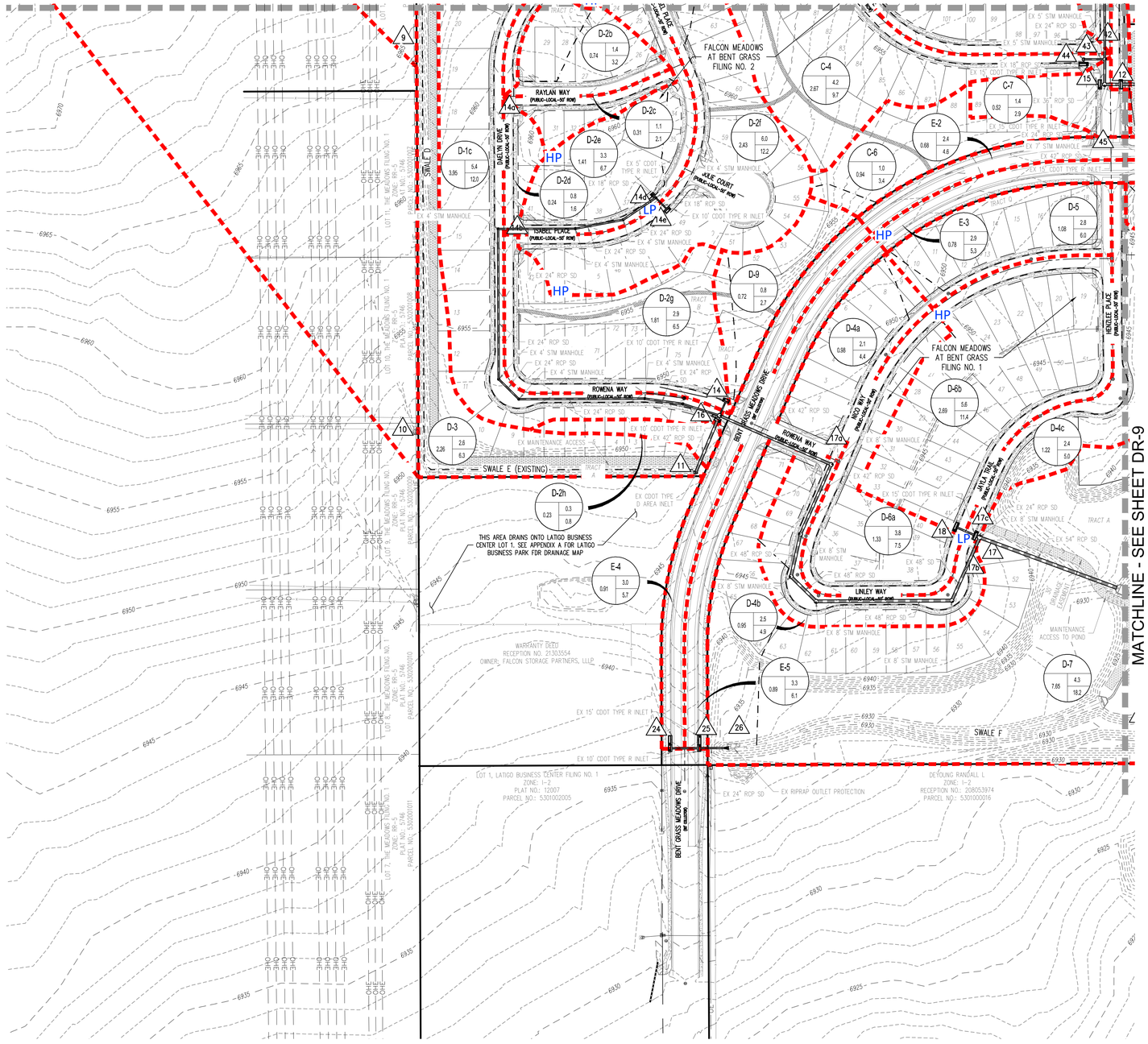
#	Date	Issue / Description	Init.

Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	08/05/2020

PROPOSED DRAINAGE MAP

DR-7

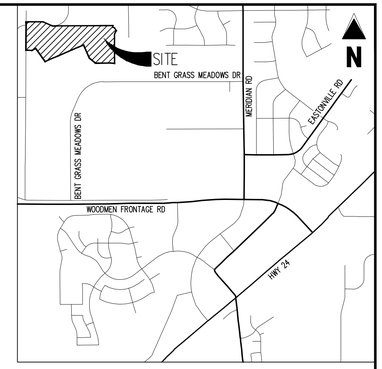
MATCHLINE - SEE SHEET DR-6



MATCHLINE - SEE SHEET DR-9

N

0 25 50 100
SCALE: 1"=100'



VICINITY MAP
1"=2,000'

DRAINAGE LEGEND

- PROPERTY LINE
- 6480 EXISTING MAJOR CONTOUR
- 6482 EXISTING MINOR CONTOUR
- 6480 PROPOSED MAJOR CONTOUR
- 6482 PROPOSED MINOR CONTOUR
- BASIN BOUNDARY LINE
- DRAINAGE TRAVEL PATH
- 100YR FEMA EFFECTIVE 100-YR FLOODPLAIN
- DBPS DBPS 100-YR FLOODPLAIN PER MATRIX DBPS
- CENTERLINE OF STREAM
- EXISTING RIPRAP
- EXISTING ACCESS
- PROPOSED RIPRAP
- PROPOSED ACCESS
- 1 / 0.71 / 1.8 / 4.6 BASIN DESIGNATION, 5-YEAR RUNOFF IN CUBIC FEET PER SECOND, 100-YEAR RUNOFF IN CUBIC FEET PER SECOND, BASIN AREA IN ACRES
- 1 DESIGN POINT
- DIRECTION OF RUNOFF

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
RWT202	1574.40	220.0	1000.0
RWT204	38.40	7.0	43.0
WT200	192.00	52.0	190.0
EX-1	1.19	0.4	2.5
EX-2	1.60	0.5	3.8
EX-3	0.66	0.2	1.6
B-1	6.59	1.8	11.8
B-2	4.16	1.3	8.6
C-1a	0.27	1.0	1.9
C-1b	1.77	3.9	8.7
C-1c	1.19	3.1	6.5
C-1d	1.97	4.2	8.8
C-1e	0.49	2.3	4.1
C-1f	0.14	0.5	1.0
C-1g	1.02	2.0	4.4
C-2	1.00	2.5	5.0
C-3	0.18	0.7	1.2
C-4	2.67	4.2	9.7
C-5	0.60	0.3	1.9
C-6	0.94	1.0	3.4
C-7	0.52	1.4	2.9
D-1a	1.83	3.3	7.5
D-1b	1.19	2.4	5.3
D-1c	3.95	5.4	12.0
D-1f	0.67	1.9	3.9
D-1g	0.78	1.1	2.5
D-1h	1.57	2.4	5.8
D-1i	0.95	2.1	4.6
D-1k	0.80	1.4	3.3
D-2a	0.50	1.9	3.6
D-2b	0.74	1.4	3.2
D-2c	0.31	1.1	2.1
D-2d	0.24	0.8	1.6
D-2e	1.41	3.3	6.7
D-2f	2.43	6.0	12.2
D-2g	1.81	2.9	6.5
D-2h	0.23	0.3	0.8
D-3	2.26	2.6	6.3
D-4a	0.98	2.1	4.4
D-4b	0.95	2.5	4.9
D-4c	1.22	2.4	5.0
D-5	1.08	2.8	6.0
D-6a	1.33	3.8	7.5
D-6b	2.89	5.6	11.4
D-7	7.65	4.3	18.2
D-8	1.69	2.6	6.0
D-9	0.72	0.8	2.7
OB-1	32.28	15.1	65.1
OB-2	20.07	9.0	43.4
OB-3	10.61	4.7	22.6
OB-4	4.46	5.6	14.0
OB-5	0.46	1.1	2.3
OB-6	1.17	2.0	4.3
E-1	1.71	3.6	7.7
E-2	0.68	2.4	4.6
E-3	0.78	2.9	5.3
E-4	0.91	3.0	5.7
E-5	0.89	3.3	6.1

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
21	277.1	1222.1
1	5.6	14.0
2	1.1	2.3
3	2.0	4.3
5	7.6	21.4
6	0.2	1.6
15A	15.2	42.6
51	5.0	11.9
52	3.0	8.3
53	7.9	18.3
54	6.2	13.4
41	14.8	30.8
42	0.7	4.6
43	4.2	8.8
44	4.7	10.7
19	2.0	4.4
15	23.5	47.8
12	25.0	50.4
45	1.4	7.2
13	26.8	55.1
7	2.9	5.3
8	10.0	22.2
AA	301.6	1285.4
9	9.0	43.4
10	4.7	22.6
11	15.6	68.4
14a	3.8	7.6
14d	8.9	18.0
14e	6.0	12.2
14b	4.2	8.3
14	6.4	13.5
16a	5.6	12.7
16	33.6	97.6
18	10.7	21.8
17a	2.1	4.4
17b	3.9	7.7
17c	15.5	31.6
17	42.4	112.5
24	5.3	20.8
25	3.3	6.1
26	7.9	24.1
30	55.0	153.7
32	2.6	6.0
CC	340.0	1395.4

Galloway
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

CHALLENGER HOMES

FINAL DRAINAGE REPORT
FALCON MEADOWS AT BENT GRASS FILING NO. 3
FOR
CHALLENGER COMMUNITIES, LLC

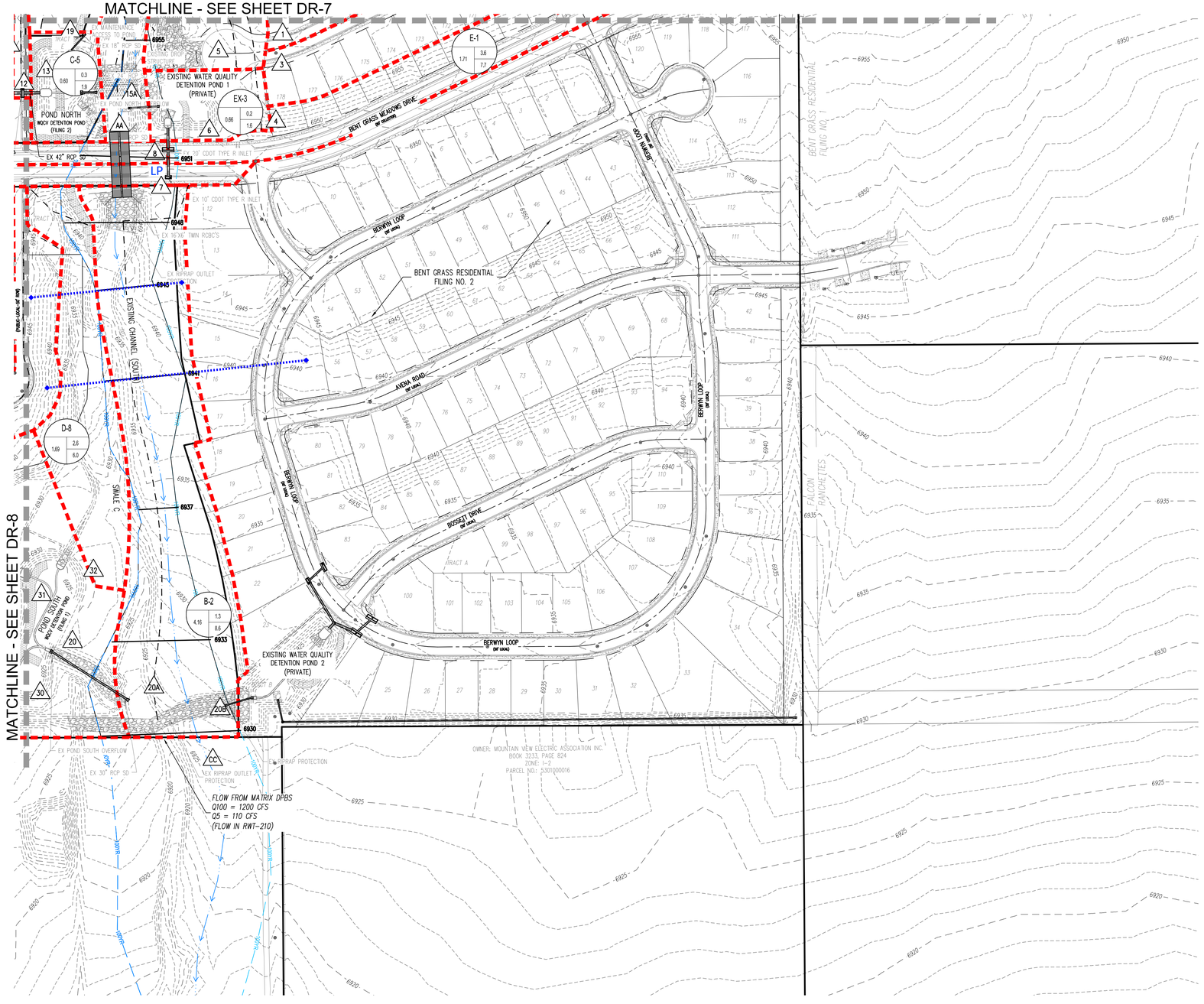
BENT GRASS MEADOWS DRIVE
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	08/05/2020

PROPOSED DRAINAGE MAP

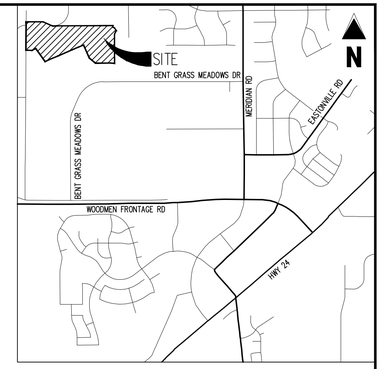
DR-8



N

0 25 50 100

SCALE: 1"=100'



VICINITY MAP
1"=2,000'

DRAINAGE LEGEND

- PROPERTY LINE
- 6480 EXISTING MAJOR CONTOUR
- 6482 EXISTING MINOR CONTOUR
- 6480 PROPOSED MAJOR CONTOUR
- 6482 PROPOSED MINOR CONTOUR
- BASIN BOUNDARY LINE
- DRAINAGE TRAVEL PATH
- 100YR FEMA EFFECTIVE 100-YR FLOODPLAIN
- DBPS DBPS 100-YR FLOODPLAIN PER MATRIX DBPS
- CENTERLINE OF STREAM
- EXISTING RIPRAP
- EXISTING ACCESS
- PROPOSED RIPRAP
- PROPOSED ACCESS
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DESIGN POINT
- DIRECTION OF RUNOFF

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
RWT-202	1574.40	220.0	1000.0
RWT-204	38.40	7.0	43.0
WT-200	192.00	52.0	190.0
EX-1	1.19	0.4	2.5
EX-2	1.60	0.5	3.8
EX-3	0.66	0.2	1.6
B-1	6.59	1.8	11.8
B-2	4.16	1.3	8.6
C-1a	0.27	1.0	1.9
C-1b	1.77	3.9	8.7
C-1c	1.19	3.1	6.5
C-1d	1.97	4.2	8.8
C-1e	0.49	2.3	4.1
C-1f	0.14	0.5	1.0
C-1g	1.02	2.0	4.4
C-2	1.00	2.5	5.0
C-3	0.18	0.7	1.2
C-4	2.67	4.2	9.7
C-5	0.60	0.3	1.9
C-6	0.94	1.0	3.4
C-7	0.52	1.4	2.9
D-1a	1.83	3.3	7.5
D-1b	1.19	2.4	5.3
D-1c	3.95	5.4	12.0
D-1f	0.67	1.9	3.9
D-1g	0.78	1.1	2.5
D-1h	1.57	2.4	5.8
D-1i	0.95	2.1	4.6
D-1k	0.80	1.4	3.3
D-2a	0.50	1.9	3.6
D-2b	0.74	1.4	3.2
D-2c	0.31	1.1	2.1
D-2d	0.24	0.8	1.6
D-2e	1.41	3.3	6.7
D-2f	2.43	5.0	12.2
D-2g	1.81	2.9	6.5
D-2h	0.23	0.3	0.8
D-3	2.26	2.6	6.3
D-4a	0.98	2.1	4.4
D-4b	0.95	2.5	4.9
D-4c	1.22	2.4	5.0
D-5	1.08	2.8	6.0
D-5a	1.33	3.8	7.5
D-5b	2.69	5.6	11.4
D-7	7.65	4.3	18.2
D-8	1.69	2.6	6.0
D-9	0.72	0.8	2.7
OB-1	32.28	15.1	68.1
OB-2	20.07	9.0	43.4
OB-3	10.61	4.7	22.6
OB-4	4.46	5.6	14.0
OB-5	0.46	1.1	2.3
OB-6	1.17	2.0	4.3
E-1	1.71	3.6	7.7
E-2	0.68	2.4	4.6
E-3	0.78	2.9	5.3
E-4	0.51	3.0	5.7
E-5	0.89	3.3	6.1

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
21	277.1	1222.1
1	5.6	14.0
2	1.1	2.3
3	2.0	4.3
5	7.6	21.4
6	0.2	1.6
15A	15.2	42.8
51	5.0	11.8
52	3.0	8.3
53	7.9	18.3
54	6.2	13.4
41	14.8	30.8
42	0.7	4.6
43	4.2	8.8
44	4.7	10.7
19	2.0	4.4
15	23.5	47.8
12	25.0	50.4
45	1.4	7.2
13	26.8	55.1
7	2.9	5.3
8	10.0	22.2
AA	301.6	1285.4
9	9.0	43.4
10	4.7	22.6
11	15.6	68.4
14a	3.8	7.6
14d	8.9	18.0
14e	6.0	12.2
14b	4.2	8.3
14	6.4	13.5
16a	5.6	12.7
16	33.6	57.6
18	10.7	21.8
17a	2.1	4.4
17b	3.9	7.7
17c	15.5	31.6
17	42.4	112.6
24	5.7	20.6
25	3.3	6.1
26	7.9	24.3
30	55.0	153.7
32	2.6	6.0
CC	340.0	1395.4

Galloway
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

CHALLENGER HOMES

FINAL DRAINAGE REPORT
FALCON MEADOWS AT BENT GRASS FILING NO. 3
FOR
CHALLENGER COMMUNITIES, LLC

BENT GRASS MEADOWS DRIVE
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	08/05/2020

PROPOSED DRAINAGE MAP

DR-9